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FOCUS GROUP DISCUSSION: IDENTIFICATION OF TUBERCULOSIS PROBLEMS IN BANGETAYU WETAN VILLAGE, SEMARANG CITY THROUGH A DIAGRAM APPROACH FISHBONE

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Abstract

Tuberculosis (TB) is an infectious disease caused byMycobacterium tuberculosis and transmitted through airborne droplets. This study aims to identify TB control issues in Bangetayu Wetan Village, Semarang City, through Focus Group Discussions (FGDs) and Fishbone diagram mapping.Research methods This is a qualitative study using Focus Group Discussion (FGD) techniques, conducted from June to September 2024, with purposive selection of informants from the Community Health Center program, sub-district government, community leaders, health cadres, and residents. The FGD findings were grouped into six Fishbone categories: people (man), materials/media (material), methods (method), budget (money), environment (environment), and stigma (market). Research result shows that the identified problems include the reluctance of some residents or families to undergo examinations, limited educational media, non-routine outreach and screening activities, limited resources, home/environmental conditions that do not support prevention, and social stigma against TB sufferers.The conclusionThe problem of TB case management in Bangetayu Wetan Village is multifactorial and not solely related to health services. The main issues are low public awareness and compliance with screening, the use of conventional educational media, suboptimal implementation of regular screening, limited funding, inadequate environmental sanitation, and the persistence of social stigma against TB sufferers.The findingsThis study shows that perceived barriers to TB control are related to individual, service, environmental, and social factors. TB control requires an integrated approach through strengthening education, increasing early detection and screening, improving the environment, providing resources, and actively engaging the community and cross-sectors. These findings can serve as an initial basis for developing recommendations for TB case control programs.

Keywords: Tuberculosis; Fishbone Diagram; Focus Group Discussion; TB Control

1. INTRODUCTION

Tuberculosis (TB) is an infectious disease that is mainly caused byMycobacterium tuberculosis and transmitted through the air. This disease primarily attacks the lungs, but can affect other organs. These transmission characteristics require continuous TB control, ranging from prevention, case detection, diagnostic testing, treatment, compliance monitoring, to social and environmental support. The global TB burden remains high. The World Health Organization (WHO) estimates that 10.7 million people will develop TB by 2024 and approximately 1.23 million will die from the disease. Indonesia is one of the countries with a large contribution to global TB cases [1].

The TB problem is not solely determined by the ability of health facilities to identify and treat patients. The success of programs is also influenced by the community's ability to understand the risks, willingness to seek care, family support, the patient's relationship with healthcare providers, and the social conditions in which the patient lives. Interventions that improve treatment adherence have demonstrated the importance of patient-centered support and their social environment [2]. In terms of case detection,active case finding Community-based interventions have the potential to expand the

reach of patient identification, although outcomes are highly influenced by the characteristics of the intervention and target population [3].

The home environment is also a concern in preventing transmission. Inadequate ventilation can contribute to conditions that allow exposure to contaminated air, so ventilation aspects need to be considered in TB control strategies at the household level [4]. Barriers to active case detection also do not stand alone, but are related to individual factors, community factors, access to services, implementation capacity, and system support [5].

Stigma is a social factor that can complicate TB control. Measuring stigma in the Indonesian context indicates that TB stigma is an identifiable construct and requires program attention [6]. Several studies in Indonesia have also found the burden of stigma and psychosocial problems in TB patients, as well as the need for community-based psychosocial support [7]. At the program implementation level, the involvement of community health workers can help expand active case finding and improve the efficiency of program implementation [8].

In Indonesia, the context of TB control is also related to strengthening the health system and case recording. The Indonesian Health Profile illustrates that TB remains a health problem that requires ongoing attention [9]. The government continues to encourage the acceleration of TB elimination by strengthening case detection, treatment, prevention, and cross-sector coordination [10]. At the patient level, non-adherence to treatment has also been linked to individual perceptions and social factors as well as health services [11]. Furthermore, stigma can also occur in the workplace, indicating that stigma issues can arise in the broader social environment, not only in the relationship between patients and health facilities [12].

Studies on the implementation of health screening show that screening approaches can be beneficial if designed with appropriate coverage and methods, but their effectiveness depends on the context of implementation [13]. Therefore, screening needs to be positioned as a series of services linked to diagnostic examinations, case determination, treatment, and follow-up. WHO guidelines also emphasize the importance of patient-centered TB services and support during treatment [14].

An effective TB response requires the involvement of communities and community organizations/community leaders or health workers, including in information dissemination, stigma reduction, patient support, and advocacy [15]. Prevention also includes efforts to identify individuals at risk and provide preventive interventions as indicated [16]. On the diagnostic side, the use of rapid diagnostic methods and service networks capable of following up on test results are essential components [17]. The practice of community engagement in various contexts shows that communities can be positioned as partners in the TB response, not simply program recipients [18].

Recent global reports indicate that TB remains a major problem and Indonesia is among the countries with a high number of incident cases [19]. Management also needs to consider comorbid conditions and continuity of care [20]. The 2023–2024 Indonesian TB inventory study demonstrated the importance of strengthening surveillance and the completeness of case detection and reporting [21].

This context is relevant to Bangetayu Wetan Village, Genuk District, Semarang City, because active TB cases are still found in the village. Previous research has identified various barriers to tuberculosis (TB) control, both related to individual and community factors and to the health care system. Fenta et al. (2023), through a systematic review of qualitative research in low- and middle-income countries, identified several barriers to active TB case detection, including limited community knowledge, stigma, health worker capacity, availability of diagnostic tools, workload, and program financing [5]. Meanwhile, Burke et al. (2021) examined community-based TB case detection interventions and demonstrated the importance of the scope and intensity of intervention implementation in supporting TB control [3]. Both studies provide a scientific basis for demonstrating that TB control is multidimensional and requires an approach that considers community factors and the health care system.

However, the findings from this research review do not directly describe how various TB control issues are mapped within the social context and health services at the sub-district level, particularly in Bangetayu Wetan Sub-district, Semarang City. A contextual approach is needed that can gather the perspectives of various stakeholders and organize the problems into a systematic framework. This study systematically identifies the causal factors of TB cases from the perspective of program implementers and the community using FGDs and Fishbone diagrams. This research gap indicates the

need for contextual mapping at the sub-district level by integrating various dimensions of the problem into a single Fishbone diagram analytical framework. In this context, FGDs can be used to explore and discuss issues deemed relevant by participants, while Fishbone diagrams can help group the mapping results into human resource aspects (Man), facilities and infrastructure (Material), implementation method (Method), financing (Money), environment (Environment), and social acceptance (Market).

This study aims to identify and categorize TB control issues in Bangetayu Wetan Village, Semarang City, based on stakeholder perspectives through FGDs and analyzing the root causes using Fishbone diagrams. The contribution of this study is expected to provide a contextual overview of the obstacles to TB control at the village level and become a consideration for community health centers, village governments, health cadres, community leaders, and related stakeholders in designing educational interventions, screening, community empowerment, strengthening patient support, environmental improvement, and cross-sector collaboration.

2. METHOD

2.1 FGD Design and Implementation

This study used a qualitative descriptive approach with Focus Group Discussions (FGDs) to identify tuberculosis control issues in Bangetayu Wetan Village, Semarang City. Informants were selected based on their relevant roles and experiences with tuberculosis control activities. The study was conducted from June to September 2024 in Bangetayu Wetan Village, Semarang City. FGDs were used to obtain information on the perceptions, experiences, obstacles, and understanding of various stakeholders related to TB control issues. The composition of informants included elements of health services/health centers (Head of Health Centers), elements of village government (Lurah), community leaders (Head of LPMK), health cadres (Head of FKK), PKK Groups, TP-PKK, Head of Karang Taruna, Members of Posyandu and the community as summarized in Table 1. The number of participants was 18 people and the FGD was conducted in one session with a duration of 90 minutes divided into 2 groups. Each group consisted of 9 people. This study has received informed consent from informants for participation through informed consent. This research has also received ethical approval from the Poltekkes Kemenkes Semarang with No. 0607/EA/KEPK/2023.

Table 1. Informant Groups and Roles in FGD

No.	Informant Category	Information	Role in FGD
1	Health Officer/Head of Community Health Center	Health stakeholder informants	Describe the achievements and constraints of the infectious disease control program in general and provide technical-operational data on the TB program in the work area and explain the media and educational strategies that have been implemented so far.
2	Village Head/Sub-district Government	Regional stakeholder informants	Providing policy perspectives and resource support at the cross-sector coordination regional level, and the role of government in TB control.

3	Public figure	Community informants	Describes patterns of acceptance, social norms, and potential stigma towards TB patients.
4	Health Cadres	Informant for implementing community activities	Delivering field conditions related to the implementation of socialization, discovery of suspected cases and patient assistance.
5	Youth organization	Youth element informant	Providing a youth perspective on the potential for youth involvement in disseminating health information, TB education and support for prevention activities in the village environment.
6	PKK Group	Informant on family empowerment elements	Explaining the role of family and community empowerment in implementing clean and healthy living behavior, and support for family members undergoing treatment.
7	Members of Integrated Health Post	Informant of community health service elements	Providing information on community-based health education activities, as well as opportunities for integrating TB prevention messages into community health service activities.
8	Public	Citizen informant	Provides direct perspective on insights, attitudes, and obstacles in TB prevention.

The discussion was facilitated to explore participants' perspectives on barriers to tuberculosis control. The information obtained was grouped into six categories in a fishbone diagram: man (human resources), material (facilities and supporting materials), method (implementation methods), money (financing), environment (environment), and market (social acceptance, stigma, and community norms, as defined in this study). These groups served as a framework for organizing and presenting the issues raised by participants.

During the FGD, discussions were recorded by a note-taker, and the notes entered into a computer (laptop) were displayed on an LCD/projector, but not recorded using audio devices. Therefore, data processing was based on written notes generated during the activity.

2.2 Provisions for Implementing FGD

The provisions for implementing FGD are:

1. Selection of participants: using*purposive sampling*, namely selecting informants who have experience, knowledge, or roles relevant to the research topic.
2. Group composition: participants have relevant characteristics or experiences.
3. Moderator: leads the discussion neutrally, does not direct answers, and gives equal opportunities to participants.

4. Note-taker: notes down the main points of opinion, differences of opinion, interactions and responses of participants.
5. Duration: approximately 60–90 minutes per session, depending on the complexity of the topic.

2.3 Stages of the FGD procedure

The stages of the FGD procedure are:

Stage 1. Preparation

Establish objectives, participant criteria, number of groups, schedule, location, moderator, note-taker, question guide, and ethical procedures.

Stage 2. Participant recruitment

Identify and invite informants who meet the criteria. Prepare sufficient backup participants to anticipate no-shows.

Stage 3. Opening

The moderator introduces the team, explains the purpose, duration, confidentiality, discussion rules, and asks for participants' consent.

Stage 4. Core discussion

Ask open-ended questions, moving from general to specific. The goal is to explore experiences, causes of problems, impacts, obstacles, and proposed solutions, and avoid leading questions.

Stage 5. Clarification and closing

The moderator summarizes the findings, confirms whether the summary aligns with the participants' views, provides an opportunity to add information, and then closes the session.

Stage 6. Data processing and analysis

Transcription, discussion, identification of themes, comparison of participant views, compilation of results, and documentation of direct quotations that actually come from recordings or notes.

These stages are in line with the FGD implementation guidelines which emphasize the preparation of objectives and questions, neutral facilitation, data recording, and preparation of reports after the session.

2.4. Data Analysis

The analysis was conducted by grouping information from the FGD notes directly and summarizing them into six predetermined Fishbone categories. Each note was reviewed to identify issues raised by participants, then grouped into relevant categories and summarized as findings. Grouping was done directly based on the Fishbone categories and no coding or qualitative software was used. The note-taker's notes contained only summaries and no verbatim quotations.

2.5. Data Validity (Trustworthiness)

The data validity effort carried out included checking the summary of the results with participants (member checking) to support credibility. The results entered on the laptop were displayed via LCD/projector so that participants could check the data they had written, assess the accuracy of the summary, and correct or add information. Corrections were made directly and witnessed by each participant and also received approval from each participant. The criteria for data sufficiency or termination of data collection were determined after the six fishbone findings were met and the contents had been approved by each participant.

The dependability aspect is carried out through storing and documenting activity records, FGD guides, and summaries.

For the confirmability aspect, through discussions between researchers about grouping findings in a Fishbone diagram after the procedure has been verified.

For the transferability aspect, this research has been conducted transparently and explains the characteristics and roles of each informant and the stages of FGD implementation.

3. RESULTS

Identification of Tuberculosis Control Problems Based on Fishbone Diagrams

Problem mapping using a Fishbone diagram groups tuberculosis control issues into six categories, namely:Man, Material, Method, Environment, Money, And Market. CategoryMancovers issues of cadre involvement and public awareness. CategoryMaterialrelated to the availability of educational media. CategoryMethodincludes the implementation of screening and education. CategoryMoneyrelated to budget support and activity coordination. CategoryEnvironmentincludes the condition of the residential environment, while the categoryMarketincludes social acceptance and stigma towards people with tuberculosis.

These six categories provide a framework for describing the various dimensions of tuberculosis control issues in the study area. These results represent a mapping of issues based on available discussion documents and are not intended to indicate the prevalence of each problem or determine the most dominant causal factors.

The results of the research based on the Fishbone diagram compiled with informants show that the TB problem in Bangetayu Wetan Village, Genuk District, Semarang City originates from six main elements, namely Man (human), Material, Method, Money (budget), environmental conditions, and Market (community acceptance/stigma), as presented in Figure 1 and Table 2.

Problem Identification in Bangetayu Wetan Village

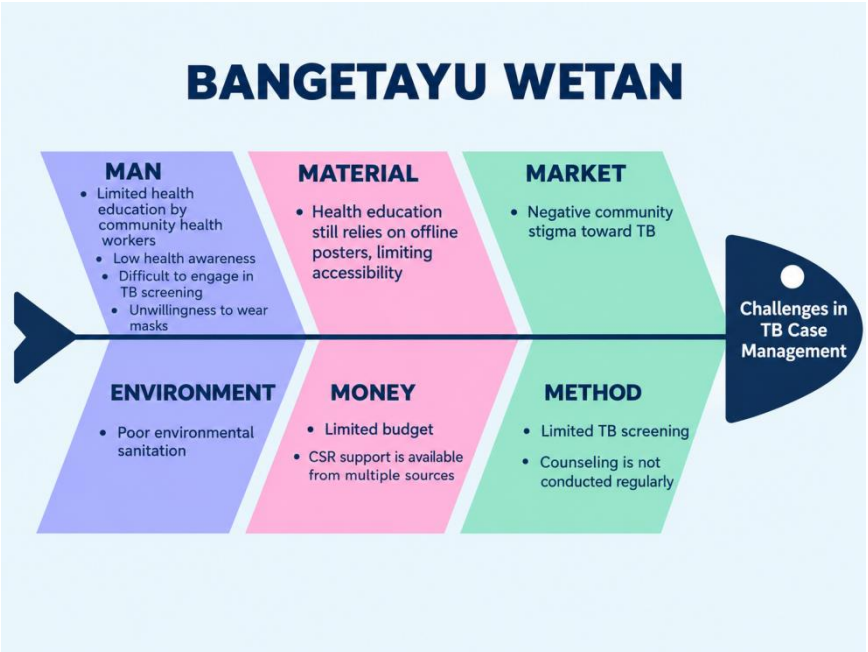


Figure 1. Mapping of TB control problems in Bangetayu Wetan Village using a Fishbone diagram (six categories).

Aspect	Problem	Alternative Problem Solving
1. Man (Human)	a. Cadres have not optimally carried out socialization b. Public concern for health is still low c. The family of a TB patient is reluctant to be examined due to limited knowledge. d. TB patients refuse to undergo examination e. Education is difficult to implement; patients refuse to wear masks because they are uncomfortable.	a. Intensive training for health workers including cadres b. Creative educational campaigns (cleanliness competitions, game-based outreach) c. Emotional approach by showing the positive impact of treatment d. Emphasis on the importance of early diagnosis and treatment e. Provision of comfortable and reusable cloth masks
2. Material	a. Educational resources are still in the form of printed posters so their reach is limited.	a. Digitization of educational materials via social media, health applications, or community WhatsApp groups
3. Method	a. TB screening schedules at Community Health Centers are still rare b. Counseling is not yet carried out routinely, only at certain moments	a. Addition of routine screening schedules, especially on busy visiting days b. Scheduling monthly counseling with varying themes
4. Money	a. The available budget is still limited b. Quite a lot of CSR (Corporate Social Responsibility) activities	a. Budget optimization for activities that have a direct impact (screening, education) b. Synchronizing CSR programs with local government agendas
5. Environmental Conditions	a. Inadequate residential sanitation (damp, minimal ventilation and light)	a. Educate residents about the importance of ventilation, lighting, and environmental cleanliness.
6. Market	a. The stigma among residents towards TB sufferers is still quite strong	a. Anti-stigma campaign via social media/radio with positive messages b. Delivering success stories of patients who have recovered

Table 2. *Identification of Problems and Alternative Solutions to TB Problems in Bangetayu Wetan Village*

Table 2 presents a problem mapping based on the summarized discussion results, not an in-depth analysis of the FGD transcripts. The FGD results demonstrate that the TB problem in Bangetayu Wetan Village is multifactorial. This finding is important because an approach focused solely on patient treatment will not fully address the barriers encountered at the community level. The WHO places the TB response within a community- and patient-centered care framework, including social support, health education, community engagement, and service system strengthening [16, 20, 21].

a. Human Aspect (Human Resources)

Results of FGD mapping on aspectsManidentified several problems related to human resources in TB control, namely the suboptimal involvement of health cadres in outreach, public awareness of health issues that still needs to be improved, difficulties in encouraging people to undergo examinations, and preventive behaviors that have not been consistently implemented, including the use of masks. These problems indicate that TB control efforts require not only health services, but also active community involvement in recognizing symptoms, accessing examinations, and supporting transmission prevention. These conditions can be understood as challenges in developing health-seeking behavior and community participation. Research by Fenta et al. (2023) identified that low public awareness, stigma, limited knowledge and skills of health workers, and resource constraints can affect the implementation of active TB case finding [5]. In line with this, Burke et al. (2021) showed that the effectiveness of community-based TB case finding is influenced by the scope and intensity of activity implementation [3].

Based on the results of this mapping, strengthening the capacity of cadres, providing accessible education, engaging families, and de-stigmatizing communication could be considered as program strategies. However, because this study lacks verbatim transcripts, these findings should be understood as issues identified in the FGD mapping, not as a quantitative depiction of the level of knowledge or behavior of the entire Bangetayu Wetan sub-district community.

b. Material Aspects (Facilities and Infrastructure)

On the aspectMaterialThe FGD results summarized in the problem mapping show that TB education media are still limited and screening and diagnostic facilities are considered inadequate. These limitations have the potential to hinder information delivery and case detection, especially if the community has limited access to health information or screening services. In the context of TB control, communication media need to be tailored to the characteristics of the target and regional conditions. Information delivered solely through print media can reach the community only if distribution, readability, or supporting educational activities are not optimal. Furthermore, the availability of screening and diagnostic facilities needs to be considered along with access to services, staff readiness, and referral mechanisms.

Burke et al. (2021) emphasized the importance of the scope and intensity of community-based case-finding interventions [3]. These findings support the need to assess not only the availability of facilities but also their utilization in TB control activities. However, this study did not quantitatively measure the effectiveness of educational media or the adequacy of diagnostic tools. Therefore, the limitations of the materials in this study were positioned as issues identified in the discussion and require further assessment through data on facility inventory, media availability, and service records.

c. Method Aspect (Method and Implementation)

AspectMethodThis study indicates problems related to the irregular implementation of TB education and outreach, suboptimal screening and case finding activities, and the need for strengthened cross-program coordination. The results of this mapping indicate that the existence of a program alone is insufficient if its implementation is not integrated and sustainable. Active case finding requires planning, targeting, examination, and follow-up of individuals suspected of having TB. Burke et al. (2021), through a systematic review of community-based TB case finding, showed that intervention outcomes can vary and are influenced by the intensity and scope of implementation [3]. Meanwhile, Fenta et al. (2023) identified limited resources, workload, staff capabilities, and communication barriers as factors that can hinder active case finding activities [5].

Compared to the aforementioned research, the Bangetayu Wetan mapping study highlighted the importance of educational continuity, screening, and cross-program coordination. Practical implications include a planned educational schedule, clear task allocation, an easily understood referral mechanism, and regular evaluation of activity implementation. However, this study was unable to determine the most effective method because it did not conduct intervention testing or measure program outcomes comparatively.

d. Money Aspect (Financing)

On the aspectMoneyThe FGD mapping results identified limited TB program budgets, suboptimal cross-sectoral financial support, and the need for improved budget management. These issues illustrate the importance of financial support in maintaining the continuity of education, case detection, coordination, and community support activities. TB control activities involving health care facilities, village governments, cadres, and community elements require financial planning aligned with activity needs. If financial support is not coordinated, activities requiring cross-sectoral participation have the potential to be difficult to implement sustainably. However, this relationship in this study is a programmatic interpretation, not a tested cause-and-effect relationship.

Thus, recommendations include mapping budget requirements based on activity priorities, aligning work plans between stakeholders, and monitoring budget utilization. Further research should utilize budget documents and activity reports to more objectively assess funding adequacy. Because this study does not present a financial analysis, its results cannot be used to determine the extent of the budget shortfall or determine the most effective funding sources.

e. Environmental Aspects

On the aspectEnvironment, the results of problem mapping indicate that poor environmental sanitation and home ventilation are seen as relevant issues for preventing TB transmission. Housing conditions are one of the environmental aspects that need to be considered in controlling airborne infectious diseases. However, identifying problems through FGDs is not the same as directly measuring the physical condition of the house or the level of transmission risk. Chamie et al. (2013), in a study on household ventilation and TB transmission in Kampala, Uganda, discussed the relevance of ventilation conditions to the residential environment and TB transmission [4]. Although this study provides a scientific context for attention to ventilation, the results cannot be directly considered representative of housing conditions in Bangetayu Wetan due to differences in location, population characteristics, and research context.

Based on this mapping, education on ventilation and air circulation, transmission prevention behaviors, and identification of households requiring attention can be considered in community programs. Further assessments should be conducted through observation of home conditions, measurement of relevant environmental indicators, and recording of risk factors. Therefore, the findings of this study indicate environmental aspects that require attention, but do not prove that all homes in the study area have poor ventilation or sanitation.

f. Market Aspect (Social Acceptance)

On the aspectMarket, this term is used operationally in a Fishbone diagram to describe social acceptance, stigma, and community norms toward TB, not commercial marketing. The results of the FGD mapping identified stigma toward TB patients, suboptimal social acceptance, and varying family and community support. These issues indicate that social factors need to be considered alongside service delivery, resources, and program implementation.

Stigma can be related to concerns about negative judgment from others and can potentially influence a person's openness about their illness and willingness to seek support. Fuady et al. (2024), in a multi-site study in Indonesia, discussed stigma in people with TB and its relationship to psychosocial conditions and support needs.[6] These findings provide relevant national context for the importance of a TB control approach that takes into account patients' social experiences.

In the context of Bangetayu Wetan, the mapping results indicate that social acceptance and family support need to be considered in developing educational activities. Strategies that could be considered include providing information that does not blame the patient, involving community leaders, protecting patient confidentiality, and strengthening family support. However, this study did not standardize stigma levels and cannot determine the extent of stigma within the community. Therefore, these results should be understood as identifying social issues that emerged during the FGD mapping.

3.1 Knowledge, awareness, and behavior factors

Low public awareness of health screening was one of the key findings of the FGD. This finding indicates a gap between the availability of services and the public's decision to utilize them. In the context of infectious disease control, knowledge is one component that can influence the formation of attitudes and behavior, but increased knowledge does not always automatically result in behavioral change. The results of Kahar and Wikandari's study show that knowledge and health prevention behavior need to be seen as two interrelated, but not always identical, aspects [33]. Therefore, TB education in Bangetayu Wetan should not stop at providing information, but should be directed at concrete actions such as recognizing symptoms, understanding when to get checked, practicing cough etiquette, and supporting family members who need testing.

Strengthening communication is also important because barriers encountered originate from families and patients. A persuasive, non-judgmental approach that takes into account community experiences is more appropriate than one-way messaging. Health education combined with community empowerment and cadre involvement has been reported to improve understanding of TB and preventative behaviors [35].

3.2 Strengthening Cadres and Community Empowerment

Cadres and the Family Welfare Movement (PKK) hold a strategic position because they interact directly with the community. However, FGDs revealed that outreach efforts by cadres have not been optimal. Cadre development needs to be directed not only at improving knowledge but also at improving communication skills, identifying symptoms, delivering prevention messages, recognizing signs requiring referral, and providing social support.

These findings are reinforced by community empowerment activities conducted in Bangetayu Wetan through the Health Promotion Model (HPM) and sneezing etiquette training. These activities involved local residents and demonstrated increased insight and ability to implement preventative behaviors and coughing/sneezing etiquette [35]. Therefore, the FGD results in this study have practical relevance to the empowerment approach implemented in the same location. Cadres can be positioned as liaisons between communities, families, and service facilities without taking over the functions of health workers.

3.3 Educational media and digitalization of communication

Research results show that educational media is still dominated by posters or conventional media. These media remain useful, but their reach can be limited. The development of digital communication provides opportunities to expand health messages through social media and community communication groups. Social media can be a complement to disseminating TB information, as demonstrated by a study of the use of social media for TB health promotion [1]. The use of digital media can be directed towards short, visual, easy-to-understand content that is relevant to local issues.

However, digitalization should not replace face-to-face communication. Communities with limited digital access still need cadres and officers as sources of information. A combined approach of posters, face-to-face outreach, short videos, WhatsApp groups, and social media can broaden information exposure. This principle also aligns with findings that behavioral change requires a process that does not rely solely on knowledge [33].

3.4 Regular screening and case finding of TB

The finding of inadequate screening is one issue directly related to early detection. Lack of screening is a significant issue because delays in case detection can prolong the period of time a person goes without diagnosis and treatment. Evidence regardingactive case findingshows that a community-based approach can increase the reach of case detection, but its implementation needs to be tailored to the characteristics of the target and the service system [3]. Qualitative studies also show that the success of active case detection is influenced by individual, community, and health system factors [5].

In Bangetayu Wetan, expanding the screening schedule needs to be accompanied by referral and follow-up mechanisms. Screening is insufficient if positive or suspected cases do not receive prompt diagnostic testing and management. WHO guidelines on diagnosis emphasize the importance of access to rapid and accurate diagnostic methods [17,28]. Local findings regarding AFB testing in Semarang health facilities also indicate that laboratory testing continues to play a role in case identification. In a study of 656 patients with a clinical diagnosis of pulmonary tuberculosis, 220 patients, or 33.5%, were AFB positive [34]. These data cannot be generalized to Bangetayu Wetan, but they

provide context for the importance of laboratory testing as a crucial component of the diagnostic process.

3.5. The Importance of Laboratory Testing and Continuity of Service

Strengthening screening must be accompanied by adequate diagnostic capacity. From a laboratory perspective, testing serves not only as a technical procedure but also as part of clinical and programmatic decisions. Therefore, the relationship between cadres, community health centers, laboratory personnel, and patients needs to be clearly defined to ensure that screened individuals do not stop at the symptom identification stage.

Continuity of care also includes monitoring patient condition during treatment. Local research on urine glucose and ketone examinations in pulmonary TB patients receiving anti-TB drugs (OTC) showed attention to monitoring laboratory parameters during therapy [37]. These findings were not the results of this focus group discussion (FGD) study, but they can broaden the perspective that TB control needs to integrate case finding with patient monitoring throughout the treatment course.

3.6 Treatment compliance and social support

Although the research focused on identifying problems, findings regarding low awareness and patient reluctance to undergo testing have implications for treatment continuity. TB treatment requires regularity over a period of time, making support from patients, families, healthcare workers, and the community crucial.

Patient reluctance to seek medical attention, as identified in FGDs, is potentially related to challenges in treatment continuity. TB adherence is influenced by various factors, including patient perceptions, family support, social conditions, and service characteristics [11]. Systematic evidence suggests that family support is a factor that needs to be considered in treatment adherence [26]. A review of the role of family support also confirms its relevance to medication adherence and patient quality of life [24].

Support doesn't always have to be rigid supervision. Patients need respectful communication, appropriate reminders, practical assistance, and support when dealing with side effects or social barriers. Evidence regarding patient support suggests that an individualized approach, education, reminders, and psychosocial support can aid the treatment process [27]. Nutritional support also has the potential to aid adherence, although evidence is mixed and requires higher-quality research [25].

3.7 Preventive behavior, cough etiquette and PHBS

FGD findings indicated that some patients refused to wear masks due to discomfort. This issue demonstrates that prevention messages need to be delivered with consideration for comfort, habits, and social context. Previous cough and sneeze etiquette training conducted in the Bangetayu Wetan community demonstrated that the Health Promotion Model approach can be used to improve knowledge and skills in preventive behavior [35].

Prevention efforts also need to be placed within the framework of clean and healthy living behaviors. Experience with PHBS socialization and screening programs shows that community education activities can be used as a gateway to increase health awareness [36]. In the context of TB, these messages can be linked to cough etiquette, mask use as needed, home hygiene, ventilation, and recommendations for testing when relevant symptoms appear.

3.8 Stigma as a social barrier

Stigma is one of the most important issues identified in FGD findings because it can influence how patients and families interact with healthcare services. Studies in Indonesia have shown that TB stigma is significant and associated with psychosocial consequences and quality of life [7]. Recent qualitative research has also demonstrated the psychological burden of stigma and the various coping strategies used by people living with TB [22].

Therefore, anti-stigma campaigns should be part of the program strategy, not just an additional activity. Public education needs to correct myths, explain that TB is diagnosable and treatable, and encourage community support for patients. A systematic review of health education shows that structured approaches, community empowerment, and support from cadres can be used to increase knowledge and reduce stigma [23]. If patient stories are used as a campaign medium, identity and

confidentiality must be protected, and the use of personal experiences must be based on informed consent.

3.9 Home environment and ventilation and sanitation

Damp house conditions, limited ventilation, inadequate lighting, and the habit of not opening windows are findings in the elements.Environment. Environmental factors need to be understood as part of the conditions that can influence the risk of exposure, not as the sole cause of TB. Research on home ventilation shows that air circulation characteristics are relevant in the study of TB transmission [4].

Environmental interventions can begin with relatively simple steps, such as increasing air circulation, utilizing natural lighting whenever possible, maintaining cleanliness, and reducing density. However, recommendations must take into account the physical condition of the home and the community's economic capacity. Household-based approaches also need to be integrated with family education and contact screening according to guidelines.

3.10 Cross-sector financing and collaboration

Budget constraints were identified in the Money element. This situation requires stakeholders to prioritize activities that have a direct impact on case detection, education, mentoring, and prevention. A financing approach involves not only increasing the budget but also reducing duplication of activities and integrating TB messages into existing community activities.

WHO emphasizes the importance of community and societal involvement in the TB response [15]. At the sub-district level, coordination between community health centers, sub-district government, cadres, community leaders, and local organizations can make limited resources more efficient. The development of Indonesia's surveillance system also demonstrates the importance of integrating recording, reporting, and coordination between services [30].

3.11 Integration of Services, Surveillance and Policy

TB control increasingly requires integration between primary care, laboratories, surveillance systems, and the community. Epidemiological and surveillance studies in Indonesia indicate that there are still challenges in identifying and reporting all cases, making strengthening data recording and integration crucial [29,30]. Guidelines for the management of drug-resistant TB also emphasize the importance of adequate system capacity and services to address the complexities of TB [31, 38]. In children and adolescents, diagnostic challenges also require a specialized approach [32].

The implication for Bangetayu Wetan Village is the need to establish a simple but consistent pathway: community education → symptom/risk identification → screening → diagnostic testing → treatment → monitoring → family and community support → recording and evaluation. This approach helps connect the six Fishbone issues so they are not addressed as separate activities.

3.12 Synthesis of findings and program implications

Overall, the Fishbone diagram helps organize TB control issues in Bangetayu Wetan Village into six interrelated categories. When all findings are combined, a chain of problems emerges. Low knowledge can lead to low risk perception; low risk perception can lead to delayed testing; delayed testing can perpetuate sources of infection; stigma can exacerbate reluctance to seek care; limited screening can lead to missed symptomatic cases; and environmental conditions can increase the likelihood of exposure.

This grouping provides a starting framework for understanding that program challenges are not always isolated. Therefore, recommended interventions should be comprehensive, not single-point activities. The package could include: strengthening cadres, routine education, media digitalization, periodic screening, referral and follow-up systems, anti-stigma campaigns, home ventilation education, and cross-sectoral coordination of financing and activities.

This research contributes to the initial mapping of TB program issues at the village level using focus group discussions (FGDs) and Fishbone diagrams as a tool to organize the discussion results. This mapping can help stakeholders prioritize follow-up actions. The novelty of this research lies in mapping TB issues at the village level by combining the perspectives of program managers, village government officials, community leaders, cadres, and the community within a single Fishbone

framework. This approach produces a problem map that connects human factors, materials, methods, budget, environment, and social acceptance. Thus, recommendations are not solely patient-oriented but directed toward strengthening the community system in an integrated manner.

3.13 Research limitations

This study faced limitations in qualitative data documentation. Group discussions were not audio-recorded, and detailed notes allowing for retrieval of each informant's statement were not available. Therefore, the analysis relies primarily on problem mapping documented in tables and fishbone diagrams. This situation limits the verification of individual statements, detailed exploration of the theme formation process, and assessment of variations in views among informants. Therefore, these results represent only a preliminary identification of the problem within the research area and cannot be statistically generalized or used to establish causal relationships. Future research is recommended to utilize documented discussion guides, systematic note-taking, and, where possible, audio recording with participants' consent, to better trace the relationship between the initial data, the coding process, and the analysis results.

4. CONCLUSION

Based on the results of research conducted during the implementation of the Fishbone diagram FGD activity, it can be concluded that the problem of handling TB in Bangetayu Wetan Village, Genuk District, Semarang City stems from six main elements, namely: (1) Man: lack of awareness, insight, and compliance of residents in checking themselves and undergoing TB treatment; (2) Material: educational facilities that are still conventional and have limited reach; (3) Method: infrequent routine screening and counseling schedules; (4) Money: limited budget accompanied by overlapping programs; (5) Environment: sanitation conditions in settlements that do not support the prevention of transmission; and (6) Market: social stigma of residents towards TB sufferers.

The FGD approach provides insight into the issues directly experienced by the community and program implementers, while the Fishbone approach helps systematically organize these causes. The research findings support the need to shift from a solely patient-centered approach to community-based and cross-sectoral TB control.

Alternative solutions that can be developed include increasing the capacity of cadres, creative and digital education, regular screening, strengthening follow-up systems, optimizing budgets, improving home ventilation and sanitation, and anti-stigma campaigns. With this approach, communities can be positioned not merely as program targets but as active partners in TB control.

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OXYTOCIN MASSAGE AND THE MARMET TECHNIQUE FOR MANAGING INEFFECTIVE BREASTFEEDING IN POSTPARTUM MOTHERS: A CASE STUDY IN PRIMARY CARE

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Abstract

Ineffective breastfeeding is a common problem experienced by postpartum mothers due to suboptimal breast milk production and milk ejection, which may hinder the success of exclusive breastfeeding. Non-pharmacological interventions that can be implemented include Oxytocin Massage and the Marmet Technique. This study aimed to describe nursing care for postpartum mothers experiencing ineffective breastfeeding through the application of Oxytocin Massage and the Marmet Technique in Cipayung District.

This study employed a descriptive case study design using the nursing process approach, which included assessment, nursing diagnosis, intervention, implementation, and evaluation. The subjects consisted of two postpartum mothers diagnosed with ineffective breastfeeding. The interventions were implemented over five days, and the outcomes were evaluated using the LATCH Assessment Tool. The results showed an improvement in breastfeeding ability in both subjects following the combined application of Oxytocin Massage and the Marmet Technique. This improvement was indicated by an increase in LATCH scores, from 3 to 9 in Subject 1 and from 1 to 8 in Subject 2. In addition, improvements were observed in the smoothness of breast milk ejection, infant latch, and mothers' breastfeeding ability.

In conclusion, the application of Oxytocin Massage and the Marmet Technique as part of nursing care was effective in improving breastfeeding effectiveness among postpartum mothers.

Keywords: Exclusive Breastfeeding, Postpartum Mothers, Ineffective Breastfeeding, Oxytocin Massage, Marmet Technique

1. INTRODUCTION

Exclusive breastfeeding is defined as feeding infants breast milk from birth until six months of age without adding or replacing it with other foods or liquids, except for medicines, vitamins, and minerals. Reduced breast milk production during the postpartum period may be caused by inadequate stimulation of the hormones prolactin and oxytocin, which play important roles in supporting breast milk production and milk ejection. Although the benefits of breastfeeding for newborns are widely recognized, many mothers are unable to breastfeed their infants immediately after delivery [1].

Ineffective breastfeeding refers to a situation in which the mother and infant experience dissatisfaction or difficulties during the breastfeeding process. This condition may affect breastfeeding success and maternal satisfaction, as well as the health and development of the infant. Several factors contribute to effective breastfeeding, including adequate breast milk production, proper latch technique, sufficient emotional and social support, maternal and infant health, maternal stress and anxiety levels, knowledge and education regarding breastfeeding, and the availability of adequate time and a comfortable environment for breastfeeding. The interaction of these factors directly influences the

mother's ability to provide adequate and appropriate breast milk and contributes to a positive breastfeeding experience for both mother and infant [2].

Other factors that may contribute to breastfeeding failure include breast-related problems, low milk production, and challenges associated with breastfeeding newborns, such as prematurity or cleft lip and palate. Breast conditions such as flat or inverted nipples, weak sucking reflexes, ineffective oxytocin reflexes, and breast milk stasis may also interfere with breastfeeding. Additional challenges include breastfeeding more than one infant simultaneously, inadequate maternal attention when breastfeeding twins, limited knowledge regarding the benefits and proper techniques of breastfeeding, insufficient family attention and support, and cultural influences [3].

Ineffective breastfeeding may lead to health problems for both mothers and infants. When breast milk is not adequately expressed, milk accumulation may occur, causing the alveoli to become excessively distended and the breasts to become engorged. Breast engorgement may result in pain and difficulties in breastfeeding and, if not appropriately managed, may increase the risk of complications such as mastitis and breast abscesses [4].

The World Health Organization (WHO) has established a target of at least 50% coverage of exclusive breastfeeding. Meanwhile, the Government of Indonesia, through the Ministry of Health, has set a higher national target of 80%. However, substantial challenges remain in achieving these targets. According to the 2023 (Survei Kesehatan Indonesia, SKI), the proportion of infants aged 0–6 months who received exclusive breastfeeding in Indonesia was 55.5% (SKI, 2023). The relatively low national achievement is also reflected at the regional level. In 2025, DKI Jakarta had an exclusive breastfeeding rate among infants aged 0–5 months of 74.10%, representing a decrease of 2.8 percentage points compared with the previous year [5].

This condition is consistent with a report published by Databoks (2021), which indicated that the proportion of infants aged 0–5 months receiving exclusive breastfeeding in East Jakarta was 74.32% (Widyantika, 2024). Regional exclusive breastfeeding program data demonstrate changes that require continuous attention and monitoring. Based on data from 2018, the proportion of infants receiving exclusive breastfeeding in the service area of Cipayung District Community Health Center reached 71.6%. This figure represented 619 exclusively breastfed infants out of a total target population of 846 infants in the area [6].

Several factors contribute to the failure to achieve exclusive breastfeeding targets in Indonesia. One of these is inadequate breast milk production during the first few days after delivery. This condition may be associated with insufficient stimulation of oxytocin and prolactin, hormones that play important roles in supporting lactation. Therefore, alternative approaches, including oxytocin massage, are needed to support breastfeeding [7].

Oxytocin massage is a technique performed along the spine, from the cervical region to the twelfth thoracic vertebra, with the aim of stimulating the release of prolactin and oxytocin after childbirth. This massage may stimulate the milk ejection reflex and increase oxytocin release, thereby promoting maternal relaxation, supporting milk production, and facilitating milk flow [8].

The effectiveness of oxytocin massage in stimulating the lactation reflex has been demonstrated in several clinical studies. One study by Marantika (2023) reported differences in the ease of breast milk flow before and after the intervention. These findings suggest that stimulation through oxytocin massage may support successful lactation among postpartum mothers [7]. In addition to oxytocin massage, stimulation of prolactin and oxytocin release after childbirth can also be facilitated through the Marmet technique [9].

The Marmet technique is a method of expressing breast milk manually using the fingers. The technique involves compressing and massaging the breast, particularly around the areola, to facilitate milk expression. Prolactin stimulates the alveoli to produce breast milk, while the milk ejection reflex, or let-down reflex, facilitates the movement of milk through the mammary ducts. Consequently, breast milk may be expressed more effectively. The Marmet technique combines massage and manual expression movements [14]. Consistent with this mechanism, a study by Wasis (2021) demonstrated an effect of the Marmet technique on the smoothness of breast milk flow among postpartum mothers. The technique was also associated with increased prolactin and oxytocin levels, which may promote relaxation during the postpartum period [10].

The combination of oxytocin massage and the Marmet technique may provide a complementary approach to supporting breastfeeding. Oxytocin massage may facilitate milk flow by stimulating oxytocin release, whereas the Marmet technique facilitates manual breast milk expression and breast emptying [9]. Further evidence was reported by Lubis and Rofiasari (2024), who found that mean breast milk production increased from 24.22 mL before the intervention to 95.47 mL after the intervention. Thus, an increase of 71.25 mL was observed following three sessions of combined oxytocin massage and the Marmet technique, indicating a significant difference in breast milk production before and after the intervention [11].

Several instruments have been developed to assess breastfeeding and identify breastfeeding difficulties. The LATCH score is one breastfeeding assessment instrument that evaluates five indicators: Latch (infant attachment to the breast), Audible swallowing (audible swallowing during breastfeeding), Type of nipple (maternal nipple type or shape), Comfort (maternal comfort during breastfeeding), and Hold/positioning (infant positioning during breastfeeding). Each indicator is scored on a scale of 0, 1, or 2 [12].

Based on the foregoing discussion, a gap remains between the importance of breastfeeding practices and mothers' ability to implement appropriate breastfeeding techniques in practice. Some postpartum mothers continue to experience breastfeeding difficulties due to inadequate understanding of appropriate lactation techniques and the suboptimal implementation of non-pharmacological interventions, such as Oxytocin Massage and the Marmet Technique, in nursing care. The importance of early management of ineffective breastfeeding provides the rationale for conducting a case study on the implementation of nursing care incorporating these interventions among postpartum mothers in Cipayung District.

2. METHODS

This study employed a descriptive case study design to describe the implementation of nursing care for two postpartum mothers experiencing ineffective breastfeeding. The study participants were postpartum mothers with ineffective breastfeeding problems residing in Cipayung District. Two participants with similar inclusion criteria were included in the study. The intervention was implemented over a five-day period. The use of two participants aimed to compare their responses and the effectiveness of the combined application of Oxytocin Massage and the Marmet Technique on breastfeeding status in each participant [13].

Participants were selected using a purposive sampling technique, in which participants were recruited based on predetermined inclusion criteria. The measurement instrument used in this study was the LATCH score, which assesses five breastfeeding indicators: Latch (infant attachment to the breast), Audible swallowing (audible swallowing during breastfeeding), Type of nipple (maternal nipple type or shape), Comfort (maternal comfort during breastfeeding), and Hold/positioning (infant positioning during breastfeeding). Each indicator is scored from 0 to 2.

In this case study, the researchers directly observed postpartum mothers experiencing ineffective breastfeeding during the provision of nursing care involving Oxytocin Massage and the Marmet Technique in Cipayung District. The primary outcomes assessed included the progression of lactation, the accuracy of infant attachment to the breast, and indicators of adequate infant nutrition, such as urinary elimination frequency and sleep quality, as measures of the effectiveness of the intervention. Ethical considerations were addressed by obtaining informed consent from all participants prior to participation in the study.

3. RESULTS AND DISCUSSION

3.1 Characteristics of the Participants

Both participants were postpartum mothers experiencing ineffective breastfeeding. During the initial assessment, breast milk had not been expressed adequately on postpartum days 2–5. The participants experienced breast engorgement and breast tenderness upon palpation, and one participant developed fever on postpartum day 4. Both participants also had flat nipples. These

conditions provided the basis for monitoring LATCH scores and implementing the combined *Oxytocin Massage* and *Marmet Technique* interventions.

3.2 Nursing Diagnosis and Intervention

The nursing diagnosis identified in both participants was **Ineffective Breastfeeding (D.0029)** related to inadequate breast milk supply, as evidenced by breast milk not flowing adequately[15]. The diagnosis was established on May 14, 2026, and May 17, 2026, respectively. The nursing intervention provided was **Breastfeeding Education (I.12393)**, with the target of resolving the ineffective breastfeeding problem[16]. The intervention included educating mothers about the benefits of breastfeeding for both mother and infant, teaching four breastfeeding positions and proper infant attachment (*latch-on*), and implementing the *Oxytocin Massage* and *Marmet Technique*.

3.3 Application of the *Oxytocin Massage* and *Marmet Technique*

The *Oxytocin Massage* was performed in the paravertebral area, from the neck down toward the scapular region, approximately at the level of the fifth or sixth ribs. The *Marmet Technique* is a manual breast milk expression method that combines massage, stroking, and shaking movements of the breast. Both interventions were performed according to the established procedure and Standard Operating Procedures (SOPs) [17]

3.4 Progress

The interventions were implemented based on the priority nursing diagnosis identified in both participants, namely ineffective breastfeeding related to inadequate breast milk supply. The intervention was provided over five sessions using an observational approach. The assessment included identifying the mothers' readiness and ability to receive lactation-related information, as well as their willingness to breastfeed. The results are presented in Table 1.

Table 1. LATCH Scores Before and After the Combined *Oxytocin Massage* and *Marmet Technique* Intervention

LATCH Indicator	Participant 1 Before	Participant 1 After	Participant 2 Before	Participant 2 After
Latch	0	2	0	1
Audible swallowing	0	2	0	2
Type of nipple	1	1	1	1
Comfort	2	2	0	2
Hold positioning	0	2	0	2
Total skor LATCH	3	9	1	8

Source: Primary Data (2026)

For Participants 1 and 2, observations conducted before the combined Oxytocin Massage and Marmet Technique intervention using the LATCH Assessment Tool on the first day showed that both mothers experienced limitations in breastfeeding ability, with scores indicating a low level of breastfeeding performance. These limitations were reflected in low scores across the five lactation indicators, including weak infant sucking, the absence of regular audible swallowing, flat maternal nipples, complaints of breast pain and tension, and the mothers' inability to independently position and hold the infant appropriately without substantial assistance.

Based on the results presented in Table 1, following the combined Oxytocin Massage and Marmet Technique intervention, an improvement in breastfeeding ability was observed. The final LATCH scores

increased to 9 for Participant 1 and 8 for Participant 2, indicating substantial improvement across the assessed breastfeeding indicators.

The improvement was characterized by effective infant attachment to the breast, with the infant's mouth firmly attached to the areola and the lower lip everted during breastfeeding. The mothers were able to stimulate the milk ejection reflex, as indicated by regular audible swallowing during breastfeeding. The maternal nipple became slightly more prominent following periodic manual stimulation. The mothers also reported that their breasts felt more relaxed and softer, with no nipple or breast skin abrasions. In addition, both mothers were able to independently position the infant with the infant's body close to the mother's chest, although slight assistance with a supporting pillow was still required to stabilize the mother's arm and maintain the infant's position.

3.5 Discussion

Based on the evaluation results, both participants demonstrated an increase in their *LATCH Assessment Tool* scores following the intervention provided during the nursing care period. The increase in LATCH scores indicated improvements in infant attachment, effective infant sucking ability, maternal nipple condition, maternal comfort, and the level of assistance required by the mothers during breastfeeding. In addition, observations showed that the infants were able to attach more effectively to the breast, sucking became more coordinated and effective, and the mothers appeared more confident during breastfeeding compared with the initial assessment. These changes indicate that the expected nursing outcome of improving breastfeeding effectiveness was achieved in both participants.

In addition to the improvement in LATCH scores, the evaluation also demonstrated changes in breast milk production and flow. During the initial assessment, both participants reported that breast milk was not being expressed optimally and that their breasts felt full. Following the combined application of *Oxytocin Massage* and the *Marmet Technique*, breast milk began to flow more readily, the breasts felt softer and less full after breastfeeding or milk expression, and breastfeeding frequency increased. These findings suggest that the combined intervention may have supported the physiological processes involved in lactation, including oxytocin-mediated milk ejection and prolactin-related milk production.

4. CONCLUSIONS

The findings of this case study involving two participants indicate that the combined application of *Oxytocin Massage* and the *Marmet Technique* was associated with improvements in breastfeeding performance, breast milk flow, and breastfeeding-related outcomes among postpartum mothers experiencing breastfeeding difficulties. The combination of these interventions may support the milk ejection reflex, facilitate breast milk expression, and reduce breast fullness or tension. Therefore, *Oxytocin Massage* and the *Marmet Technique* may be considered as complementary interventions within nursing care for postpartum mothers experiencing breastfeeding difficulties.

However, because this study used a descriptive case study design involving only two participants, the findings should be interpreted as case-based observations and should not be generalized to the broader postpartum population without further research.

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APPLICATION OF SPONGE BATH AND DRY CORD CARE FOR THE PREVENTION OF UMBILICAL CORD INFECTION IN NEONATES: A CASE STUDY IN PRIMARY CARE

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Abstract

Umbilical cord infection is one of the health problems that may occur in neonates and can potentially progress to systemic infection if appropriate cord care is not provided. Maintaining the umbilical cord clean and dry is an important approach to preventing infection. This case study aimed to describe the application of sponge bath and dry cord care as part of nursing care for neonates at risk of umbilical cord infection. A descriptive case study design was used involving two neonates diagnosed with risk for infection. Nursing care included assessment, nursing diagnosis, planning, implementation, and evaluation. The primary intervention was Infection Prevention (I.14539), including monitoring for signs and symptoms of infection, application of sponge bath and dry cord care, hand hygiene, and maternal education regarding umbilical cord care and signs of infection. The findings showed improvement in umbilical cord conditions in both subjects. Umbilical cord discharge gradually disappeared, erythema in one subject resolved, and no swelling, foul odor, or increased body temperature was observed. The umbilical cords separated physiologically on the fifth day in the first subject and the seventh day in the second subject. The application of sponge bath and dry cord care may be incorporated into neonatal nursing care to maintain umbilical cord cleanliness and dryness and to support the prevention of infection risk.

Keywords: Dry Cord Care, Neonates, Infection Risk, Sponge Bath, Umbilical Cord

1. INTRODUCTION

A newborn is defined as an infant younger than 28 days of age (1). Newborns undergo a process of adaptation, which refers to the physiological adjustment required to transition from intrauterine life to life outside the womb. This adaptation period generally occurs during the first month or longer after birth and involves several body systems, including the respiratory system, circulatory system, thermoregulatory system, and the ability to obtain and utilize glucose. Several factors may influence neonatal adaptation, including the mother's pregnancy history and the condition of the newborn (2). The neonatal immune system is still immature, making newborns particularly vulnerable to various infections and allergic reactions (3).

The World Health Organization (WHO) (2024) reported that 2.3 million children die within the first 20 days of life. Worldwide, approximately 130 million babies are born each year, with an estimated 4 million deaths occurring during the first four weeks of life, of which approximately 1.5 million deaths are caused by (4). Infection accounts for approximately 36% of neonatal deaths worldwide, and neonatal sepsis may originate from umbilical cord infections. The prevalence of umbilical cord infection among newborns ranges from 3% to 5% (3). In Southeast Asia, an estimated 220,017 infant deaths are associated with inadequate hygiene during umbilical cord care. Therefore, cleaning the umbilical cord with alcohol is not recommended because it may delay the healing and drying process (5).

The 2018 Basic Health Research (Riset Kesehatan Dasar/Riskesdas) conducted by the Ministry of Health of the Republic of Indonesia reported that umbilical cord care practices among newborns in

Indonesia remain varied. Nationally, the most common method of umbilical cord care was the application of povidone-iodine (Betadine) or alcohol (48.0%), followed by no specific treatment and allowing the cord to dry naturally (41.5%). Other practices included the use of powdered medication (1.3%), herbal or traditional medicines (3.0%), and unknown methods of care (6.2%) (6).

Data from the Ministry of Health (2022) indicate that the neonatal mortality rate in Indonesia remains relatively high. One of the causes of neonatal mortality is infection. Research has shown that 33% of neonatal tetanus cases are associated with omphalitis and sepsis. Omphalitis is a localized infection of the umbilical cord that primarily affects newborns. Therefore, appropriate umbilical cord care is essential to prevent the development of omphalitis (7).

Data from DKI Jakarta Province based on the 2018 Riskesdas showed that the majority of umbilical cord care practices in DKI Jakarta involved no specific treatment and allowing the cord to dry naturally (53.1%), followed by the use of povidone-iodine or alcohol (41.3%), powdered medication (0.3%), herbal or traditional medicines (0.7%), while 4.6% of cases used unknown methods of care (Ministry of Health, 2018). Meanwhile, 198 infant deaths were reported in East Jakarta in 2020, with an incidence rate of 6 per 1,000 live births. Fatal complications were primarily associated with neonatal tetanus (16.3%) and sepsis (5.9%) (8).

Secondary data from the Central Statistics Agency (Badan Pusat Statistik/BPS) of DKI Jakarta in 2022 showed that the population aged 0–4 years reached 238,040, consisting of 122,065 males and 115,975 females. These figures indicate a substantial number of infants and young children requiring special attention in health services, particularly during the neonatal period (0–28 days), when newborns are particularly vulnerable to infection. BPS data for 2022 also recorded 4,340 births in East Jakarta. More specifically, Cipayung District ranked second in terms of the number of births, with 3,017 births. This condition further emphasizes the urgency of improving the quality of neonatal health services, particularly through appropriate umbilical cord care to prevent infection (9).

In nursing practice, the condition of newborns who are vulnerable to invasion by pathogenic microorganisms can be identified as the nursing diagnosis Risk for Infection. According to the Indonesian National Nurses Association (Persatuan Perawat Nasional Indonesia/PPNI) in the Indonesian Nursing Diagnosis Standards (Standar Diagnosis Keperawatan Indonesia/SDKI), Risk for Infection is defined as a condition in which an individual is at risk of increased invasion and proliferation of pathogenic microorganisms that threaten health. Therefore, inappropriate umbilical cord care may increase the likelihood of infection in neonates and requires appropriate nursing interventions for prevention (14).

The World Health Organization (WHO) emphasizes the importance of clean and dry cord care as an effort to prevent infection in newborns. Postpartum mothers who have positive attitudes toward infant health are more likely to comply with these principles, including maintaining umbilical cord hygiene, avoiding the application of unrecommended traditional substances, and monitoring for signs of infection (10). Sitepu et al. (2021) explained that several measures can be undertaken to prevent neonatal mortality, with a focus on optimal prenatal care, including hygienic delivery practices and hygienic umbilical cord care. A mother's ability to care for her newborn's umbilical cord is one of the factors that may influence the infant's growth and development. However, many mothers do not know how to care for their newborn's umbilical cord properly or are unable to perform the care adequately (7).

One technique that can be used for dry umbilical cord care is the sponge bath technique, which involves bathing or cleaning the neonate by washing the entire body from the head to the feet without immersing the infant in a bathtub. A sponge bath is performed in neonates until the umbilical cord becomes dry. Through this method, neonates can receive adequate hygiene care. In addition, this method helps prevent the umbilical cord from becoming wet and supports the drying process of the umbilical cord (11). Appropriate umbilical cord care is particularly important for mothers, especially postpartum mothers, so that they can provide optimal care for their newborns, allowing the infants to grow and develop healthily without experiencing infection through the umbilical cord (10).

The assessment instrument for umbilical cord infection based on the Indonesian Nursing Outcome Standards (Standar Luaran Keperawatan Indonesia/SLKI) for the nursing diagnosis Risk for Infection indicates that the expected outcome is a reduction in infection risk factors, characterized by clean body surfaces, a dry umbilical cord, and the absence of signs of infection such as erythema, edema, or umbilical cord exudate. Assessment is conducted through observation of the umbilical cord condition

and the cleanliness of the infant's body before and after the application of the sponge bath technique (15).

Various studies on newborn care have been conducted, particularly those focusing on umbilical cord care and infant bathing practices. One strategy for preventing neonatal infection is to maintain the infant's body hygiene while keeping the umbilical cord clean and dry. Therefore, safe and appropriate bathing methods for newborns are essential. The sponge bath technique is one approach that may be used because it can maintain infant hygiene while keeping the umbilical cord dry. This technique can be applied to normal, premature, and low-birth-weight infants and may help reduce the risk of infection in newborns.

Based on the background described above and the prevalence of morbidity among newborns in East Jakarta, particularly in the Cipayung Community Health Center area, the authors conducted a case study to directly evaluate the application of nursing care in two neonatal subjects as an approach to preventing umbilical cord infection.

2. METHODOLOGY

This study employed a descriptive case study design to describe the implementation of nursing care in two neonates at risk of umbilical cord infection. The subjects consisted of two neonates, both of whom were one day old at the time of the initial assessment. Both neonates had umbilical cord conditions that required monitoring and care to prevent infection. The nursing care process included assessment, nursing diagnosis, planning, implementation, and evaluation. The nursing diagnosis established for both subjects was Risk for Infection (D.0142) related to increased exposure to pathogenic organisms from the environment.

The intervention was based on Infection Prevention (I.14539), with Infection Level (L.14137) as the expected outcome. The interventions included monitoring for local and systemic signs and symptoms of infection, implementing sponge bath and dry cord care, performing hand hygiene before and after contact with the neonate, and providing education to the mothers regarding proper handwashing, umbilical cord care, signs and symptoms of infection, and the sponge bath technique. The interventions were implemented directly and repeatedly throughout the observation period. For the first subject, nursing care was provided for five days until the umbilical cord separated on the fifth day. For the second subject, nursing care was continued until the seventh day, when the umbilical cord separated. Monitoring focused on the condition of the umbilical cord, body temperature, and the neonates' responses to the interventions.

The data were analyzed descriptively by comparing the condition of the umbilical cord before and during the implementation of the interventions. The observed indicators included redness, swelling, discharge, odor, cleanliness and dryness of the umbilical cord, body temperature, and the time to umbilical cord separation.

Ethical Considerations in this case study was conducted in accordance with ethical principles for research involving human participants. Informed consent was obtained from the neonate's parent or legal guardian prior to data collection and implementation of the sponge bath and dry cord care. The confidentiality and privacy of the neonate and family were maintained throughout the study, and all collected data were used solely for scientific purposes. The intervention was performed according to standard nursing procedures while prioritizing the neonate's safety and well-being.

3. RESULTS AND DISCUSSION

3.1 Subject Characteristics

Both subjects were neonates aged one day at the initial assessment. At the initial assessment, the umbilical cords were still attached and had not yet separated. Both infants were considered at risk of infection due to the umbilical cord stump, which may serve as a potential portal of entry for microorganisms. In one subject, the umbilical cord appeared moist and had some fluid discharge; however, no signs of severe infection, such as swelling or redness, were observed. This condition provided the basis for continuous monitoring and consistent implementation of umbilical cord care.

3.2 Nursing Diagnosis and Intervention

The nursing diagnosis for both subjects was Risk for Infection (D.0142) related to increased exposure to pathogenic organisms in the environment. The diagnosis was established on May 13, 2026, for both subjects. The nursing intervention provided was Infection Prevention (I.14539), with the expected outcome of a decreased Infection Level (L.14137). The interventions included monitoring for local and systemic signs and symptoms of infection, performing umbilical cord care using sponge bath and dry cord care, maintaining hand hygiene, and providing education to the mothers.

3.3 Application of Sponge Bath and Dry Cord Care

The sponge bath was performed by cleansing the infant's body using a clean washcloth without immersing the infant in water. The procedure was carried out carefully to maintain the infant's body temperature and minimize excessive moisture around the umbilical cord area. During the procedure, particular attention was given to preventing water or other substances from accumulating around the umbilical cord stump.

Dry cord care was performed by keeping the umbilical cord stump clean, dry, and exposed to air. The cord was not covered unnecessarily, and no additional substances, such as traditional preparations, powders, or antiseptic agents not recommended for routine cord care, were applied. The umbilical area was monitored regularly for changes in color, moisture, discharge, redness, swelling, or other signs suggestive of infection. Hand hygiene was performed before and after contact with the infant and during cord care procedures to minimize the risk of microorganism transmission (12).

The combination of sponge bathing and dry cord care was implemented consistently throughout the observation period. Sponge bathing was selected as an appropriate bathing method during the period when the umbilical cord was still attached because it allowed the infant's body to be cleansed while minimizing direct exposure of the cord stump to water. Meanwhile, dry cord care was intended to support natural drying and separation of the umbilical cord while reducing unnecessary exposure to potential contaminants.

In addition to direct care, the mothers were provided with education regarding the proper technique for performing sponge baths and dry cord care. The mothers were also instructed to maintain hand hygiene before touching the umbilical area, avoid applying unrecommended substances to the cord stump, and keep the cord clean and dry. Education was also provided regarding the recognition of warning signs, including redness or swelling around the umbilicus, foul-smelling discharge, persistent moisture or pus, bleeding, and fever. The mothers were encouraged to seek health-care services promptly if any signs of infection were observed.

The educational approach was intended to strengthen the mothers' ability and confidence to continue appropriate newborn care at home. Thus, the intervention not only focused on direct nursing care but also emphasized maternal involvement and continuity of care as part of infection prevention in neonates.

3.4 Development of Umbilical Cord Condition

The development of the umbilical cord condition in both neonates was evaluated based on the Infection Level (L.14137) outcome according to the Indonesian Nursing Outcome Standards (Standar Luaran Keperawatan Indonesia, SLKI). The assessment focused on clinical indicators associated with the potential occurrence of umbilical cord infection, including redness, swelling, fluid/discharge, unpleasant odor, increased body temperature, and the cleanliness and dryness of the umbilical cord. Each indicator was assessed using a 1–5 scale, with 1 = increased, 2 = moderately increased, 3 = moderate, 4 = moderately decreased, and 5 = decreased. A higher score indicated a greater reduction in signs or indicators of infection and an improvement in the neonate's condition. The development of the umbilical cord condition before and after the application of sponge bath and dry cord care is presented in Table 1.

Table 1. Development of Umbilical Cord Condition Based on the Infection Level Outcome (L.14137) Before and After the Application of Sponge Bath and Dry Cord Care

IAssessed Indicator	Subject 1 Before	Subject 1 After	Subjek 2 Before	Subjek 2 After
Redness around the umbilical cord area	3	5	2	5
Swelling around the umbilical cord area	5	5	5	5
Fluid/discharge from the umbilical cord	3	5	3	5
Unpleasant odor from the umbilical cord	5	5	5	5
Increased body temperature	5	5	5	5
Umbilical cord remains clean and dry	3	5	3	5
Umbilical cord separation	Not yet separated	Day 5	Not yet separated	Day 7

Source: Primary Data (2026)

Based on the evaluation of the Infection Level (L.14137) outcome, the development of the umbilical cord condition in both subjects showed an improvement following the application of sponge bath and dry cord care. In Subject 1, the initial assessment showed moderate redness, moderate fluid/discharge, and a moist umbilical cord. During the observation period and implementation of the intervention, the redness and swelling were no longer observed, while the fluid/discharge gradually diminished until the umbilical cord became clean and dry. The umbilical cord separated on the fifth day. In Subject 2, the initial assessment showed markedly increased redness and fluid/discharge from the umbilical cord. During the observation period, both indicators gradually resolved. No swelling or unpleasant odor was observed, and the body temperature remained within the normal range. The umbilical cord separated on the seventh day.

Overall, the outcome scores demonstrated a shift toward the decreased category (score 5) for the observed indicators of infection. Following umbilical cord separation, the umbilical area appeared clean and dry, with no signs of infection observed in either neonate.

3.5 Discussion

The observation results for Subject I before the intervention showed the presence of fluid around the umbilical cord area, redness, and irritability, with a body temperature of 36.5°C. After the application of the sponge bath and dry cord care techniques for five days, the observations showed favorable improvement in the condition of the umbilical cord. The fluid around the umbilical cord began to decrease on the second day and was no longer observed on the third day. During the observation period, no redness, swelling, or unpleasant odor was observed around the umbilical cord. The umbilical cord gradually became drier and separated on the fifth day, while the body temperature remained within the normal range.

In Subject II, before the intervention, redness and fluid were observed around the umbilical cord area. The infant appeared irritable, with a body temperature of 36.9°C. After the application of the sponge bath and dry cord care techniques for seven days, the condition of the umbilical cord showed favorable improvement. The redness around the umbilical cord resolved following the care provided, while the fluid gradually decreased until it was no longer observed. During the observation period, no swelling or unpleasant odor was observed around the umbilical cord. The umbilical cord gradually became drier and separated on the seventh day. The umbilical area following cord separation appeared clean and dry, while the body temperature remained within the normal range.

Redness, swelling, discharge, unpleasant odor, and increased body temperature are signs that should be monitored when assessing the condition of the umbilical cord as part of early detection of infection (13). Therefore, all of these indicators should be monitored regularly throughout the umbilical cord healing process. These findings are consistent with the study by Nujulah et al. (2022), which stated that observation of the umbilical cord condition is an important component of neonatal care because it

enables the detection of changes in the umbilical area and provides a basis for determining infection-prevention measures (9). Similarly, Ningsih et al. (2025) reported that the application of dry cord care can maintain the umbilical cord in a clean and dry condition, thereby helping to prevent the development of signs of infection during the healing process (3).

Based on these observations, the nursing intervention involving the application of the sponge bath technique combined with dry cord care throughout the observation period is recommended as a preventive nursing measure (12). his intervention aims to maintain the infant's body cleanliness, keep the umbilical cord clean and dry, support physiological umbilical cord separation, and prevent umbilical cord infection. The study focused on the nursing problem of risk for infection in both subjects, referring to the Indonesian Nursing Intervention Standards (Standar Intervensi Keperawatan Indonesia) (16). using an Infection Prevention and Umbilical Cord Care approach. The interventions included applying the sponge bath technique, performing dry cord care, keeping the umbilical cord clean and dry, avoiding unnecessary covering of the umbilical cord with gauze or an abdominal binder, and providing education to the mothers regarding proper umbilical cord care at home.

The observations of both subjects indicated that the application of the sponge bath technique combined with dry cord care resulted in favorable improvement in the condition of the umbilical cord. These findings are supported by Sihombing et al. (2024), who reported that dry cord care was effective in maintaining the umbilical cord in a clean and dry condition, accelerating the drying and separation process, and reducing the occurrence of signs of infection such as redness, swelling, discharge, and unpleasant odor in the umbilical area (8). Santi et al. (2022) also reported that open umbilical cord care (dry cord care) creates a dry environment that inhibits microorganism growth and supports the physiological healing process of the umbilical cord (13). In addition, the application of the sponge bath technique helps maintain the infant's overall cleanliness without excessively wetting the umbilical cord, thereby helping to control moisture around the umbilical area and minimize the risk of microorganism contamination.

4. CONCLUSIONS

The findings of this case study involving two subjects indicate that the application of the sponge bath technique combined with dry cord care resulted in favorable improvement in umbilical cord condition as part of infection prevention. Parents were able to maintain the cleanliness and dryness of the umbilical cord, thereby supporting the healing process of the umbilical wound and preventing umbilical cord infection. The combination of sponge bath and dry cord care may be applied as one of the preventive measures for infection in neonates at risk of infection following umbilical cord cutting.

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HEALTHCARE WORKERS' LIVED EXPERIENCES IN RESPONDING TO FLOOD-AFFECTED COMMUNITIES: A DESCRIPTIVE PHENOMENOLOGICAL STUDY

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Abstract

Flooding is among the most frequent hydrometeorological disasters in Indonesia. Healthcare workers serve on the front lines of emergency response, yet limited attention has been given to how they live through and make sense of this work. This study aimed to describe the lived experiences of Public Safety Center healthcare workers responding to flood-affected communities in Bantaeng Regency, Indonesia. A qualitative design grounded in descriptive phenomenology was used. Ten Public Safety Center healthcare workers with flood-response experience and at least three years of work experience were recruited through purposive sampling. Data were collected through in-depth, semi-structured interviews and analyzed using thematic analysis grounded in descriptive phenomenology. Four themes captured the shared structure of participants' experiences: (1) entering an unpredictable disaster environment, with preparedness shaped by experience; (2) striving to provide care amid restricted access and limited resources; (3) sustaining professional commitment through spirituality and team solidarity; and (4) transforming difficult field experiences into expectations for a more responsive system. Participants experienced flood response as an ongoing effort to fulfill professional and humanitarian responsibilities despite rapidly changing conditions and operational constraints. Clinical preparation, experience, interagency coordination, spirituality, and solidarity enabled them to sustain care. These experiences also shaped expectations for stronger logistics, coordination, workforce capacity, and community preparedness. Disaster-response systems should support not only technical preparedness but also psychological well-being, team relationships, and safe, responsive care in resource-constrained settings.

Keywords: Disaster Response; Flood; Healthcare Workers; Lived Experience; Psychospiritual Adaptation

1. INTRODUCTION

Disasters pose significant threats to public health by causing fatalities, injuries, displacement, environmental damage, and disruptions to essential services. Floods are among the most frequent natural hazards worldwide and can have both immediate and long-term consequences for affected communities and healthcare systems. In 2023, 164 flood events were recorded globally, resulting in more than 7,700 deaths and affecting approximately 32 million people [1]. These figures demonstrate the substantial public health burden associated with flooding and the need for effective emergency preparedness and response systems..Indonesia, a tropical archipelagic country, is highly vulnerable to natural hazards, particularly hydrometeorological events. In 2021, floods were the most frequently recorded disaster type in the country [2].

Indonesia is particularly vulnerable to natural hazards because of its geographical and climatic characteristics. According to the National Disaster Management Agency [3], Indonesia recorded 5,402 disaster events in 2021, including 1,794 floods, making flooding the most frequently recorded disaster

type that year. These events resulted in substantial human and infrastructure losses, with millions of people affected or displaced [2]. Flood-related health consequences extend beyond injuries and immediate emergency conditions. Contaminated water, inadequate sanitation, overcrowding in temporary shelters, and disruptions to routine healthcare may increase the risk of infectious diseases and interrupt the management of chronic conditions. Flooding can also damage healthcare infrastructure, disrupt electricity and water supplies, obstruct transportation routes, and restrict access to medical services [1].

Floods may also disrupt access to healthcare, damage infrastructure, and complicate the delivery of timely and appropriate care. Therefore, flood response requires not only emergency clinical interventions but also the capacity to maintain continuity of care under rapidly changing and resource-constrained conditions.Bantaeng Regency in South Sulawesi is vulnerable to flooding. Regional disaster records indicate that floods have repeatedly affected the regency, prompting emergency responses [4]. In this context, Public Safety Center 119 operates within Indonesia's integrated emergency-management system, coordinating emergency reports, medical response, evacuation, and referrals to appropriate health facilities [5].

Nurses and other healthcare workers play essential roles across preparedness, response, and recovery. Their responsibilities require clinical competence, psychological readiness, communication, adaptability, and disaster-specific knowledge and skills [6;7]. In practice, inadequate preparedness, limited disaster education, role uncertainty, and resource constraints may hinder safe and effective response [6].

Providing healthcare during a flood is both an operational responsibility and a lived human experience. Healthcare workers may make rapid decisions, work beyond their usual roles, face personal safety risks, and continue providing care despite limited control over their environment. Their experiences may include uncertainty, physical and emotional strain, professional responsibility, team solidarity, and reliance on personal or spiritual values.

Previous studies have largely focused on preparedness, knowledge, competencies, training, and organizational readiness. Community health nurse coordinators in South Sulawesi were reported to have moderate preparedness and ongoing learning needs [8]. Disaster preparedness has also been linked to work experience, workplace preparedness, training, and prior disaster-response experience [9]. These findings are important, but competency-focused evidence may not fully illuminate how frontline personnel experience and interpret flood response.

Descriptive phenomenology focuses on describing a phenomenon as it is lived and experienced while remaining open to the meanings expressed in participants' accounts. Rather than examining flood response solely as clinical activities or procedures, this approach can illuminate shared meanings and the structure of healthcare workers' experiences [10].

Bantaeng Regency in South Sulawesi, Indonesia, has experienced recurrent flooding, although the annual number of recorded events has varied. Data reported in the South Sulawesi Provincial Government's disaster records indicate that five flood events occurred in Bantaeng Regency in 2021, affecting approximately 5,000 people and 2,423 facilities or infrastructure units. The number of recorded flood events subsequently decreased to one in 2022, with no flood events recorded in 2023, before increasing to three events in 2024 [11]. These fluctuations highlight the importance of maintaining emergency-response capacity even when flood occurrence decreases in a particular year. For healthcare workers, flood emergencies may require rapid mobilization, coordination across agencies, adaptation to changing environmental conditions, and the delivery of care to affected communities. Understanding how healthcare workers experience and respond to these demands is therefore important for strengthening local emergency preparedness and response.

Limited attention has been paid to the lived experiences of Public Safety Center personnel who provide frontline flood-emergency services in Indonesia. Understanding how personnel navigate responsibility, uncertainty, resource constraints, relationships, and personal meaning can inform systems that address both operational preparedness and the psychological, relational, and professional needs of responders. Therefore, this study aimed to describe the lived experiences of Public Safety Center healthcare workers responding to flood-affected communities in Bantaeng Regency, Indonesia.

2. METHODOLOGY

This study employed a qualitative design grounded in descriptive phenomenology. The phenomenon of interest was the lived experience of Public Safety Center healthcare workers delivering emergency services to flood-affected communities. Descriptive phenomenology was chosen to illuminate the meanings embedded in participants' accounts while maintaining openness to the phenomenon [10]. A local qualitative research guide served as a supplementary source [12]. Reflective notes were used throughout the analysis to examine how prior assumptions could influence interpretation.

The study was conducted from March to May 2025 at the Public Safety Center in Bantaeng Regency, South Sulawesi, Indonesia. The center was selected because it is a frontline emergency unit with experience responding to floods. Participants were recruited through purposive sampling. Eligible participants were Public Safety Center healthcare workers who were willing to complete the interview process, held Basic Trauma and Cardiac Life Support certification, had at least three years of work experience, and had participated in flood response. Ten healthcare workers participated, enabling detailed accounts of the shared phenomenon and attention to variation across participants.

The primary researcher conducted in-depth, face-to-face, semi-structured interviews at the Public Safety Center. Semi-structured interviews provided consistent coverage of the phenomenon while allowing participants to describe their experiences in their own terms [13]. Interviews lasted approximately 45–60 minutes, were digitally audio-recorded with consent, and were supplemented by field notes. Questions addressed preparation, field care, operational and emotional challenges, personal and spiritual resources, relationships with other responders, and expectations for improvement.

Data were analyzed using thematic analysis grounded in descriptive phenomenology, following the methodological principles described by [10]. Sundler et al.'s framework provided the phenomenological orientation for identifying patterns of meaning across participants' lived experiences, while [13], six-phase process guided the systematic procedures of data familiarization, initial coding, theme development, theme review, theme definition and naming, and production of the final report. Audio recordings were transcribed verbatim and read repeatedly to obtain a holistic understanding. Relevant segments were coded, compared across participants, and organized into patterns of meaning. Emerging themes were reviewed against coded segments, complete transcripts, and the dataset as a whole. Analysis was conducted manually and supported by field notes and reflective notes.

Trustworthiness was addressed through credibility, transferability, dependability, and confirmability [14]. Credibility was supported by sustained engagement with the interview data, cross-participant comparison, member checking, and analytical discussion with the research supervisor. Transferability was enhanced by detailed contextual description. Dependability was supported by an audit trail of recruitment, data collection, coding, theme development, and analytical decisions. Confirmability was strengthened by reflective notes and discussions examining the relationship between the data and interpretations.

Ethical approval was obtained from the Research Ethics Committee of STIKes Panrita Husada Bulukumba under approval number 001326/KEP STIKes Panrita Husada Bulukumba/2025. All participants provided written informed consent. Confidentiality was protected using participant codes P1–P10, and participants could withdraw at any time without penalty.

3. RESULTS

3.1. Participant Characteristics

Ten healthcare workers participated. Six were men, and seven held a professional nursing qualification. Most participants were aged 35–40 years. Participant characteristics are summarized in Table 1.

Table 1. Participant Characteristics (n = 10)

Characteristic	Total (n)	Percentage (%)
Age		
- 28–34 years	2	20
- 35–40 years	8	80
Sex		
- Men	6	60
- Women	4	40
Education		
- Bachelor of nursing	3	30
- Professional nurse	7	70
Total	10	100

3.2 Thematic Structure of the Lived Experience

Participants experienced flood response as a tension between the responsibility to provide timely humanitarian care and uncertainty in a rapidly changing, resource-constrained environment. Preparedness was shaped by training, experience, and team planning, but access difficulties, insufficient personnel, and limited equipment repeatedly constrained action. Spiritual beliefs and team solidarity sustained commitment. Difficult encounters were later transformed into expectations for a stronger, more responsive system.

Table 2. Themes and Patterns of Meaning

No.	Theme	Patterns of meaning
1	Entering an unpredictable disaster environment with preparedness shaped by experience	Physical, mental, and logistical preparation; training and field experience; coordination before deployment; readiness translated into emergency care.
2	Striving to provide care amid restricted access and limited resources	Personnel, medicine, and equipment shortages; narrow and muddy routes; adaptation of evacuation and care.
3	Sustaining professional commitment through spirituality and team solidarity	Psychosocial support; personal coping; prayer and surrender; humanitarian meaning; shared team burdens.
4	Transforming difficult field experiences into expectations for a more responsive system	Stronger logistics and workforce capacity; community preparedness; environmental responsibility; system learning.

Theme 1. Entering an Unpredictable Disaster Environment With Preparedness Shaped by Experience

Preparedness was experienced as a practical, embodied process for entering an uncertain environment. Mental and physical preparation, medicines, consumable supplies, rotating teams, and command-post coordination contributed to readiness. Basic Trauma and Cardiac Life Support and water-rescue training increased confidence, while prior field experience helped participants anticipate changing conditions.

Readiness was not perceived as an individual attribute alone. Coordinated action among the Public Safety Center, the disaster-management agency, search-and-rescue personnel, the fire service, primary healthcare centers, and other agencies enabled evacuation, door-to-door assessment, wound care, stabilization, and referral.

> *"We usually collaborate with other search-and-rescue teams, including the fire service, the regional disaster management agency, and the local water utility." (P1)*

> *"Working here requires us to complete Basic Trauma and Cardiac Life Support training." (P3)*

> *"We have to be mentally and physically prepared. We also prepare the medicines, equipment, and consumable supplies that we will use in the field." (P7)*

> *"We identify affected locations and go directly to streets or homes to determine what residents need and what should be done next." (P8)*

Theme 2. Striving to Provide Care Amid Restricted Access and Limited Resources

Participants sought to uphold professional responsibility despite limited control over care conditions. Shortages of personnel, medicine, and equipment complicated the response as needs increased, while rapidly changing conditions intensified uncertainty about priorities, deployment, and evacuation.

Restricted access was the most immediate expression of this struggle. Narrow alleys kept ambulances from reaching homes, while mud blocked routes to hospitals and primary healthcare centers. Responders therefore continued on foot and carried patients.

> *"Access to the location is usually the problem. If the house is in a narrow alley, the vehicle cannot enter." (P3)*

> *"The evacuation route can be very difficult because there is often a lot of mud." (P6)*

> *"We have to continue on foot and carry the patient when a car or ambulance cannot enter." (P10)*

Theme 3. Sustaining Professional Commitment Through Spirituality and Team Solidarity

Flood response extended beyond clinical intervention. Participants encountered residents who were shocked, anxious, or distressed by the damage and loss. Responders provided reassurance, education, and positive communication, while managing their own physical and emotional strain and working to reduce panic.

Spirituality provided strength when situations were beyond participants' control. Prayer, surrender to God, and understanding work as a humanitarian and spiritual responsibility fostered calmness and perseverance. Rest, vitamin intake, mutual support, and team solidarity complemented these spiritual resources.

"We pray that, as healthcare workers, we will be given strength and health to care for people affected by the flood." (P1)

"We surrender ourselves to God. We can only make our best effort and pray." (P2)

"She was in shock and stressed about her belongings, so we tried to reassure her and encourage her to remain patient and pray." (P7)

"For psychosocial support, we provide education, comfort, and positive encouragement so that people do not panic." (P8)

Theme 4. Transforming Difficult Field Experiences Into Expectations for a More Responsive System

Field experiences shaped expectations for future disaster response. Shortages of medicine and equipment led participants to emphasize more comprehensive and accessible logistics, stronger workforce capacity, and better collaboration.

Participants also understood prevention and community preparedness as part of their responsibility. They encouraged environmental cleanliness and avoidance of indiscriminate waste disposal, reflecting a shift from response alone toward community awareness and risk reduction.

"From the health-service perspective, medicines and other facilities must be fully provided." (P1)

"People should not dispose of waste indiscriminately and should continue to protect the environment." (P5)

"Clean the surrounding environment and do not throw rubbish anywhere so that a disaster like this will not happen again." (P9)

4. DISCUSSION

The essence of participants' experience was sustaining professional and humanitarian responsibility in an unpredictable, resource-constrained environment. Preparedness enabled organized entry into affected areas but was repeatedly tested by access barriers, insufficient personnel, and limited equipment. Spirituality and team solidarity sustained engagement, and difficult encounters became expectations for stronger organizational and community preparedness. The themes are therefore interconnected dimensions of a shared experience.

Preparedness as an Individual, Relational, and Systemic Experience

Participants experienced readiness as more than clinical knowledge. Mental and physical preparation, supplies, technical training, team organization, and interagency coordination collectively shaped their ability to enter the disaster environment.

Zhang et al [15], found that disaster-response experience, disaster nursing education, simulation exercises, and specialized disaster training were positively associated with emergency nurses' preparedness. Lamberti-Castronuovo et al [16], similarly demonstrated that prior disaster experience, workplace preparedness, and competency-based training were important preparedness factors. Individual certification should therefore be complemented by scenario-based exercises, interprofessional training, role clarification, and decision-making practice in resource-constrained conditions.

Lamberti-Castronuovo et al [16], emphasized integrating primary healthcare into overall disaster-management strategies to maintain continuity of care and to respond to the needs of vulnerable populations. Such integration requires clear roles, effective communication, and coordination among

emergency services, primary healthcare facilities, disaster-management agencies, and local responders.

Providing Care Within Environmental and Resource Constraints

Operational constraints directly challenged professional responsibility. Limited personnel, medicines, and equipment restricted the response, while narrow alleys and mud prevented ambulances from reaching affected residents. The experience was marked by a gap between the care participants believed should be provided and what the environment allowed them to deliver.

The World Health Organization has emphasized that effective emergency response requires a ready and capable workforce supported by continuing education and competency development [17]. Previous reviews have also identified inadequate preparedness, limited disaster education, role-related uncertainty, and organizational constraints among nurses throughout disaster management [6].

Evidence from informal riverbank settlements in Yogyakarta indicates that flood-evacuation routes are shaped by individual physical capacity, path safety, spatial legibility, and path-network configuration [19]. At the health-system level, Pradhan et al [19], found that floods disrupted transportation and outreach, caused shortages of medicines and personnel, and exposed weaknesses in financing, training, supply chains, and reporting. Therefore, locally adapted evacuation plans and logistics should reflect the accessibility and physical characteristics of affected areas.

Psychospiritual Meaning, Humanitarian Responsibility, and Team Solidarity.

Participants' accounts revealed clinical, psychological, relational, spiritual, and existential dimensions. Said et al [20], demonstrated that psychological first aid training improved nurses' psychological preparedness, optimism, self-esteem, and self-efficacy for emergencies and disasters. This supports structured training in psychological first aid, crisis communication, identification of vulnerable groups, referral pathways, and professional boundaries.

Li et al [21], found that lower social support and negative coping strategies were linked to higher psychological stress among frontline medical personnel during an earthquake. Support for responders should therefore be treated as an essential component of workforce safety and service continuity.

Spirituality helped participants stay engaged when circumstances were beyond their control. In Aceh, religiosity, beliefs, values, communication, family engagement, and spiritual care were identified as elements of nurses' disaster-response competencies [23] .Spirituality should serve as a personal source of resilience, while support for affected people should remain person-centered and respectful of differing beliefs and preferences.

Team solidarity enabled participants to share physical tasks, emotional burdens, and responsibilities. Peer support, pre-deployment briefings, team check-ins, and post-operation debriefings could help personnel reflect on field experiences, identify support needs, and prepare for subsequent events.

From Lived Experience to System and Community Preparedness.

Difficult field experiences were transformed into practical expectations for adequate medicines, equipment, workforce capacity, and coordination. Frontline expectations reflect experiential knowledge gained through direct engagement with system limitations.

Participants also linked emergency response to prevention and community preparedness. Sofyana et al [23], reported that the ILATGANA-PHN model strengthened community knowledge and attitudes, preparedness planning, warning systems, and resource mobilization. Noor et al [24], found that a Health Belief Model-based intervention improved community knowledge, skills, flood preparedness, perceived benefits, perceived barriers, and cues to action. Community education should therefore extend beyond information provision to practical preparedness capabilities.

At the system level, after-action reviews should assess resources, access barriers, coordination, role distribution, staff well-being, and training gaps. Incorporating frontline accounts into organizational learning may translate lived experience into measurable improvements in preparedness.

Phenomenological Interpretation and Implications.

Phenomenologically, the experience involved continual negotiation of responsibility, uncertainty, and limitations. Familiar roads and alleys became inaccessible workplaces; action depended on colleagues, other agencies, and community cooperation; and coping, solidarity, prayer, and humanitarian meaning sustained continued care. Disaster-preparedness programs should combine technical training with interagency simulation, adaptable logistics, psychological first aid, workforce support, spiritual and cultural sensitivity, and community engagement.

5. CONCLUSIONS

The main findings of the study indicate that the experiences of Public Safety Center (PSC) healthcare personnel in responding to flood victims are multidimensional. These experiences are reflected in four main themes: (1) healthcare personnel preparedness and capacity, (2) challenges and barriers in service delivery, (3) psychospritual adaptation through the meaning of humanitarian service, and (4) system improvement and personnel expectations.

The preparedness and capacity of healthcare personnel serve as the foundation for delivering services; however, in practice, personnel must cope with various challenges, including limited human resources, logistical constraints, and difficulties accessing flooded areas. These conditions require healthcare personnel to adapt psychologically while simultaneously providing psychosocial support to affected victims.

In facing the pressures encountered during disasters, spirituality, a sense of meaning derived from humanitarian service, and solidarity among healthcare personnel serve as important sources of strength. These experiences subsequently shape personnel's expectations for improvements in the service system, increased availability of logistical resources, strengthened cross-sectoral coordination, and enhanced community capacity for flood prevention and preparedness.

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BETWEEN LOVE AND LIMITED KNOWLEDGE: A QUALITATIVE STUDY OF MOTHERS' EXPERIENCES CARING FOR TODDLERS WITH STUNTING IN RURAL COMMUNITIES

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Abstract

Purpose: This study aims to explore the lived experiences, perceptions, and challenges mothers face in caring for toddlers with stunting in a rural community setting in the service area of Puskesmas Sukarame, Palembang, South Sumatra, Indonesia.
Methodology: A qualitative descriptive design was used, involving fifteen mothers of stunted toddlers selected through purposive sampling. Data were collected through in-depth, semi-structured interviews lasting 45 to 60 minutes and analyzed using the six-step thematic analysis approach. Ethical approval was obtained from Universitas Padjadjaran (Approval No. 1265/UN6.KEP/EC/2024), and all participants provided informed consent before data collection.
Findings: Five major themes emerged: (1) mothers' incomplete and often inaccurate understanding of the causes of stunting, (2) economic and access barriers to nutritious food, (3) socio-cultural beliefs shaping child feeding practices, (4) emotional burden and social stigma experienced by mothers of stunted children, and (5) mothers' reliance on and trust in posyandu cadres and midwives for guidance.
Practical/Social Implications: The findings highlight the need for nutrition education that is culturally sensitive, economically feasible, and delivered by health workers already trusted by the community, rather than through generic, top-down messaging.
Originality/Value: This study offers an emic, mother-centred perspective that is largely absent from quantitative stunting surveillance data, revealing the psychosocial dimensions of caregiving that accompany the biomedical definition of stunting.

Keywords: Maternal Experience, Nutritional Care, Rural Health, Stunting

1. INTRODUCTION

Stunting continues to be framed predominantly through anthropometric indicators and epidemiological trends, yet behind every height-for-age measurement below the World Health Organization standard is a mother navigating daily decisions about how to feed, care for, and protect her child.(1) National surveys such as the Indonesian Nutritional Status Survey provide valuable prevalence data, but they offer limited insight into how mothers themselves understand, experience, and respond to their child's condition.(2) This gap is particularly important because maternal knowledge, beliefs, and emotional wellbeing are known to strongly influence child feeding practices and health-seeking behavior.

In rural communities, where access to nutritious food, clean water, and specialized health services is often constrained, mothers frequently bear the primary responsibility for child nutrition while facing economic, cultural, and informational barriers that are rarely captured by structured survey instruments. Understanding stunting from the mother's point of view is therefore essential to designing nutrition interventions that are not only clinically sound but also acceptable, feasible, and sustainable within the realities of everyday family life.(3)

Although previous qualitative studies have explored mothers' perceptions of stunting and the experiences of families caring for children with stunting, less is known about how mothers in rural communities navigate the interconnected challenges of limited knowledge, economic constraints, socio-cultural beliefs, emotional burden, and access to trusted sources of health information in their everyday caregiving practices.(4) Existing studies have provided important insights into mothers' perceptions and family resilience; however, the ways in which these factors interact within the daily caregiving experiences of mothers living in rural settings remain insufficiently understood.(5) This gap is particularly important because rural mothers may face contextual barriers related to food affordability, access to health services, family influences, and culturally embedded beliefs that may shape how stunting prevention recommendations are understood and implemented.(6)

Therefore, this study aimed to explore the lived experiences, perceptions, barriers, and emotional challenges of mothers caring for toddlers with stunting in a rural community. By focusing on mothers' own perspectives, this study contributes an emic understanding of how knowledge, socioeconomic and socio-cultural constraints, emotional experiences, and trust in community health workers shape caregiving practices and may inform more contextually grounded and family-centred strategies for stunting prevention.

2. METHODOLOGY

Participants and Recruitment

This study employed a qualitative descriptive design. Fifteen mothers of toddlers aged 24–59 months who had been confirmed as stunted based on length-for-age or height-for-age measurements recorded at the local Integrated Health Service Post (Posyandu) were recruited using purposive sampling. Participants were selected to obtain information-rich accounts relevant to the study objectives. The inclusion criteria were: (1) mothers or primary caregivers of toddlers aged 24–59 months; (2) having a child confirmed as stunted based on the recorded length-for-age or height-for-age measurement at the local Posyandu; (3) having experience caring for the child during the period of stunting; (4) being able to communicate in Indonesian; and (5) being willing to participate and provide informed consent. Mothers who were unable to participate in the interview because of a severe health condition, cognitive or communication difficulties, or who withdrew their consent during the study were excluded.

Potential participants were identified with the assistance of [Posyandu/community health workers] based on the eligibility criteria. Eligible mothers were approached and provided with an explanation of the study objectives, procedures, potential risks and benefits, voluntary nature of participation, confidentiality, and their right to withdraw at any time without consequences. Participation was not based solely on availability; eligibility was first determined according to the predefined inclusion and exclusion criteria, after which participants were invited to participate. Written informed consent was obtained from each participant before data collection. To minimize potential selection bias, recruitment was conducted across Posyandu Sukabangun II and continued until sufficient information relevant to the research questions had been obtained.

Ethical approval was obtained from Universitas Padjadjaran (Approval No. 1265/UN6.KEP/EC/2024). The study was conducted in accordance with applicable ethical principles for research involving human participants. All participants provided written informed consent before the interviews. Participants' identities were protected by assigning unique codes, and identifiable information was removed from the transcripts and reporting.

Sample Size and Data Saturation

The sample size was determined using an information-rich purposive sampling approach rather than a predetermined statistical sample-size calculation. Recruitment and data collection proceeded iteratively, with the adequacy of the sample assessed based on information saturation and the relevance and depth of the information obtained from participants. After the [13th/14th] interview, no substantially new concepts or themes emerged from the data. The subsequent [14th and 15th] interviews were conducted to confirm the consistency and completeness of the emerging findings. Data

collection was therefore concluded after 15 participants when the research team judged that additional interviews were unlikely to generate substantively new information relevant to the study objectives.

Researcher Reflexivity

Researcher reflexivity was maintained throughout data collection, analysis, and interpretation. The research team consisted of researchers with backgrounds in [midwifery/public health/nutrition/other relevant backgrounds]. The researchers' professional backgrounds and prior knowledge of maternal and child health may have influenced the formulation of interview questions, interactions with participants, and interpretation of the data. Where applicable, the researchers' relationship with the participants was limited to the context of the research, and the researchers did not have a direct clinical or supervisory relationship with the participants. During the research process, the researchers maintained reflexive notes to identify their assumptions, expectations, and potential influence on participants' responses and interpretation of the findings. These reflections were discussed within the research team during the analysis process to reduce the influence of individual preconceptions.

Data Analysis and Qualitative Rigor

Qualitative data were analyzed using a systematic thematic analysis process. Interviews were transcribed verbatim and reviewed against the original audio recordings to ensure accuracy. The researchers repeatedly read the transcripts to become familiar with the data and identify meaningful statements relevant to the research questions. Initial codes were generated inductively from the participants' accounts. Similar codes were compared, grouped, and organized into categories. The research team then examined relationships among categories and developed preliminary themes. Themes were reviewed against the coded extracts and the complete dataset to assess their internal coherence, distinctiveness, and relevance to the study objectives. The final themes were developed through iterative discussion and consensus among the researchers.

To establish qualitative rigor, several strategies were applied. First, investigator triangulation was used by involving [two or more] researchers in reviewing transcripts, coding, and interpretation. Differences in coding or interpretation were discussed until consensus was reached. Second, member checking was conducted by [returning a summary of the findings/key interpretations to selected participants and asking them to confirm whether the interpretation reflected their experiences]. Third, an audit trail was maintained throughout the research process, including records of recruitment, interview procedures, coding decisions, development of categories, and revisions of themes. Fourth, reflexive notes were maintained to document researchers' assumptions and potential influences on the analytical process. Finally, the research team reviewed the final themes against the original transcripts to ensure that the findings remained grounded in participants' accounts..

Table 1. *Characteristics of informants (n = 15)*

Characteristic	Category	n (of 15)
Mother's age	20-29 years	8
	30-38 years	7
Mother's education	Elementary school	3
	Junior high school	6
	Senior high school	5
	Diploma/Bachelor	1
Occupation	Housewife	11
	Farm laborer/small trader	4
Child's age (stunted)	24-59 months	15
Number of children	1-2 children	9
	3-4 children	6

Note: Informants are identified in the Results section using anonymized codes M1 to M15.

Data were collected through in-depth, semi-structured interviews, each lasting approximately 45 to 60 minutes, conducted in the informants' homes to allow for a relaxed and naturalistic conversation. Interview guides covered informants' understanding of stunting, daily feeding practices, perceived barriers, sources of support, and emotional responses to their child's condition. All interviews were audio-recorded with consent, transcribed verbatim, and analyzed using the six-step thematic analysis approach, comprising familiarization with the data, initial coding, searching for themes, reviewing themes, defining and naming themes, and producing the final analysis. Trustworthiness was established through member checking, investigator triangulation, and an audit trail of the coding process.

3. RESULTS

Thematic analysis of the 15 interviews identified 5 major themes reflecting mothers' perceptions, experiences, and challenges in caring for children with stunting. The analysis progressed from initial codes to focused codes, subthemes, and overarching themes by identifying recurring patterns across the interview transcripts. The five themes were supported by representative quotations illustrating the informants' experiences and perspectives.

Theme 1: Incomplete and Misconceived Understanding of Stunting

The first theme concerned mothers' incomplete understanding and misconceptions about stunting. This theme comprised three subthemes: stunting perceived primarily as short stature, stunting perceived as hereditary, and limited awareness of its long-term consequences. Most informants associated stunting mainly with a child being shorter than other children of the same age and had limited understanding of its broader implications for growth and development. Some mothers considered short stature to be a familial characteristic and therefore perceived it as normal rather than as a condition requiring further attention. Awareness of the potential long-term effects of stunting, including impaired cognitive development and other aspects of child development, was also limited. One mother explained, "I thought my child was just short because I am also short. I did not know it was called stunting until the cadre measured him at the Posyandu" (M4).

Theme 2: Economic and Access Barriers to Nutritious Food

The second theme highlighted economic and access-related barriers to providing nutritious food. Three subthemes emerged: limited household income, limited access to protein-rich foods, and prioritization of staple foods. Mothers frequently described household income as an important determinant of food choices, particularly the ability to provide animal-source foods such as eggs, fish, and meat on a regular basis. Although some mothers recognized the nutritional value of these foods, their relatively high cost made regular consumption difficult. Consequently, mothers often prioritized staple foods and less expensive vegetables to ensure sufficient food for the entire household. As one informant stated, "I know eggs and fish are good for him, but if I buy them every day, there will not be enough money left for the rest of the week" (M9).

Theme 3: Socio-Cultural Beliefs Shaping Feeding Practices

The third theme reflected the influence of socio-cultural beliefs on child-feeding practices. This theme consisted of traditional beliefs about food, the influence of older family members, and conflicts between traditional beliefs and health professionals' recommendations. Several mothers reported food-related beliefs and restrictions, including perceptions that certain foods were unsuitable or "too heavy" for young children. Advice from older family members, particularly mothers-in-law and other senior relatives, also influenced mothers' decisions regarding complementary feeding. In some cases, these beliefs conflicted with recommendations from midwives or other health professionals and contributed

to delayed introduction of nutrient-dense foods. One mother reported, “My mother-in-law told me not to give fish too early because it would make him have worms, so I waited longer than the midwife suggested” (M12).

Theme 4: Emotional Burden and Social Stigma

The fourth theme concerned the emotional burden and perceived social stigma associated with having a child identified as stunted. Three subthemes were identified: maternal guilt and self-blame, anxiety and sadness, and social comparison and stigma. Several mothers described feelings of guilt, sadness, worry, and self-blame after becoming aware of their child’s growth condition. These emotional responses were intensified when mothers perceived negative comments or comparisons from neighbors and relatives. Some mothers also reported feeling uncomfortable attending Posyandu when their child’s growth was compared with that of other children, which in some cases resulted in temporary avoidance of Posyandu visits. One mother expressed this experience by stating, *“When people say my child looks smaller than others his age, I feel like it is my fault as a mother, even though I try my best”* (M2).

Theme 5: Reliance on and Trust in Cadres and Midwives

The fifth theme described mothers’ reliance on and trust in village midwives and Posyandu cadres as sources of information and support. This theme included three subthemes: trust in health workers, preference for personalized communication, and health workers as the primary source of information. Despite the economic, socio-cultural, and emotional challenges they experienced, mothers consistently described midwives and Posyandu cadres as accessible and credible sources of information about child growth, nutrition, and stunting. Mothers particularly valued face-to-face communication and individualized advice because they perceived health workers as being familiar with their child’s condition. Personalized guidance was considered more meaningful and trustworthy than general information obtained from posters, printed materials, or broader health campaigns. As one informant explained, *“I listen more to what the midwife says directly to me than to the posters at the health center, because she knows my child personally”* (M7).

Overall, the five themes illustrate that mothers’ experiences of caring for children with stunting were shaped by interconnected informational, economic, socio-cultural, emotional, and health-service factors. While limited knowledge, financial constraints, traditional beliefs, and social stigma created challenges in implementing optimal feeding and care practices, trusted relationships with midwives and Posyandu cadres represented an important source of support and potentially provided an avenue for strengthening mothers’ understanding and engagement in stunting prevention and management.

(M7)

4. DISCUSSION

The findings of the present study indicate that mothers’ understanding of stunting was incomplete and, in some cases, shaped by misconceptions. In this study, mothers primarily associated stunting with short stature, while some interpreted their child’s short stature as a hereditary characteristic. Mothers also demonstrated limited awareness of the broader and long-term consequences of stunting for child development. These findings represent the perspectives emerging directly from the present participants and should be distinguished from interpretations derived from previous research. The findings are broadly consistent with previous qualitative research in Indonesia showing that mothers’ perceptions of stunting and its risk factors vary according to personal experiences, educational background, socioeconomic conditions, and exposure to health information. (7) Similarly, Rahmadiyah et al. (2024) reported that some families perceived stunting as hereditary or believed that children who were short would eventually achieve normal growth. Thus, the present findings are consistent with previous evidence rather than representing a substantially different pattern. (8)

However, the present study adds a contextual perspective by demonstrating how these misconceptions were expressed in mothers’ everyday interpretations of their own children’s growth. Rather than simply lacking factual knowledge, some mothers appeared to incorporate short stature into an existing family explanation, particularly when they themselves or other family members were also

short. This may help explain why technical explanations of stunting are not necessarily sufficient to change perceptions. Although previous studies have emphasized the influence of education and socioeconomic conditions on maternal understanding. (7) The present findings suggest that health education should also address how families interpret growth within their own social and family contexts. Therefore, education on stunting should move beyond technical definitions, prevalence data, and lists of risk factors and instead connect information with mothers' experiences of growth monitoring, breastfeeding, complementary feeding, childhood illness, sanitation, and hygiene.

The present study also identified economic and access barriers that affected mothers' ability to provide diverse and nutrient-dense foods. Mothers described difficulty purchasing protein-rich foods such as eggs, fish, and meat on a regular basis and reported prioritizing staple foods and less expensive alternatives when household resources were limited. This finding is consistent with previous research indicating that socioeconomic conditions may constrain dietary diversity even when mothers possess awareness of appropriate child nutrition. (7) Similarly, research in Banten identified maternal knowledge, exclusive breastfeeding, complementary feeding history, health-worker support, and socioeconomic status as factors associated with stunting. (9) At the broader structural level, Siswati et al. (2022) demonstrated that poverty reduction, education, food access, sanitation, hygiene, and improvements in knowledge and perceptions collectively contribute to stunting reduction.(10)

No finding in the present study clearly contradicted these previous studies or the broader theoretical expectation that stunting is influenced by multiple and interacting determinants. Rather, the findings reinforce the understanding that maternal knowledge is only one component of the problem. Importantly, the present findings illustrate how structural constraints may limit the translation of knowledge into action. Mothers may understand that eggs, fish, or other nutrient-dense foods are beneficial but remain unable to provide them consistently because of competing household needs. This distinction is important because it indicates that improving knowledge alone may not result in sustained changes in feeding practices when families face substantial economic constraints. The present findings further demonstrate that feeding practices were influenced by socio-cultural beliefs and family decision-making. Some mothers reported food-related beliefs and advice from older family members that conflicted with recommendations from health professionals. Previous research has similarly demonstrated that dietary practices, food accessibility, family support, and information constraints are interconnected within women's health experiences. (11)

More recent research has identified social and cultural norms as factors influencing the acceptance and effectiveness of stunting prevention interventions.(12) The present study is therefore broadly consistent with this literature; however, it provides a more specific illustration of how intergenerational advice may directly influence decisions about complementary feeding. This finding suggests that mothers should not be regarded as the sole decision-makers in child feeding. Health education may be more effective when it also engages husbands, grandparents, mothers-in-law, and other family members who influence childcare and feeding decisions.

The economic and socio-cultural findings have direct implications for health counseling. In the present study, mothers' difficulties were not limited to knowing what should be done; they also involved whether recommended practices were affordable, culturally acceptable, and supported by other family members. Consequently, counseling that provides recommendations without considering these contextual factors may create a gap between professional advice and families' capacity to implement it. A problem-solving approach may therefore be more appropriate, whereby health professionals assist families in identifying feasible dietary and caregiving strategies based on available resources. Previous research has emphasized the importance of communication with mothers as well as husbands and other family members in stunting prevention and has highlighted the need to strengthen cadres' knowledge and communication skills. (13) . The present findings support this direction by showing that family context needs to be considered when translating health recommendations into everyday practices.

Another finding of the present study was the emotional burden and perceived social stigma experienced by some mothers. Mothers described guilt, sadness, anxiety, and self-blame, particularly when their children were compared with other children or when comments from neighbors and relatives were perceived as judgmental. This psychosocial dimension was evident in the present interviews and should not be interpreted solely as an extension of previous nutritional research. Previous qualitative research has shown that mothers' experiences of caring for children with stunting are embedded within

broader family and social contexts. (5) However, the present findings specifically highlight how perceptions of social comparison and maternal responsibility may influence mothers' emotional experiences and, in some cases, their willingness to attend Posyandu.

This finding has an important implication for the way stunting is communicated. Although previous studies have emphasized the importance of maternal knowledge and caregiving practices, communication that focuses excessively on maternal responsibility may unintentionally reinforce guilt or stigma. This interpretation extends the previous literature by suggesting that the effectiveness of health education should be considered not only in terms of knowledge acquisition but also in terms of how messages are emotionally experienced by mothers. Health professionals should therefore use empathetic and non-judgmental communication and position mothers as partners in problem-solving rather than as individuals who need to be blamed or corrected. In practical terms, counseling should address not only "what should be done" but also "what can realistically be done within the family's circumstances."

A further finding was the strong trust that mothers placed in midwives and Posyandu cadres. In the present study, mothers described these health workers as accessible and credible sources of information and particularly valued face-to-face guidance because they believed that health workers understood their child's individual condition. This finding is consistent with research demonstrating the important role of cadres in communicating with mothers, husbands, and families in stunting prevention. (13) Research has also identified gaps in cadres' knowledge and anthropometric measurement skills, emphasizing the need for structured training and competency development (Widiasih et al., 2025). Training approaches incorporating demonstrations and role-play have further been shown to improve cadres' knowledge, attitudes, and self-efficacy in their health-education roles. (14)

Nevertheless, the present study adds an important perspective by showing that trust in health workers was not simply related to their role as information providers, but also to the perceived personal relationship between the health worker and the child. Mothers considered individualized, face-to-face advice more meaningful than general information provided through posters or broader health campaigns. This finding was not inconsistent with previous research; rather, it provides a contextual explanation of why interpersonal communication may be particularly important in community-based stunting prevention. Midwives and cadres may therefore function not only as disseminators of health information but also as trusted intermediaries who translate technical recommendations into practical and context-sensitive guidance.

Overall, the findings of the present study largely support previous research and theoretical expectations that stunting is a multidimensional problem influenced by nutritional, socioeconomic, cultural, familial, and health-service factors. No major finding clearly contradicted the existing literature. However, the present study contributes additional contextual insights into how these factors are experienced by mothers in everyday life, particularly the interaction between misconceptions about hereditary short stature, household economic constraints, intergenerational beliefs, emotional burden, and trust in community health workers. These findings suggest that effective stunting prevention should not rely solely on transferring knowledge. Instead, health education should be contextualized, family-centered, culturally sensitive, responsive to socioeconomic realities, and delivered through trusted health professionals and community cadres. Such an approach may help bridge the gap between what mothers know, what they believe, and what they are realistically able to implement in their daily lives.

5. CONCLUSIONS

This qualitative study reveals that mothers of stunted toddlers in a rural community navigate a complex interplay of limited knowledge, economic constraints, socio-cultural beliefs, and emotional burden in their daily caregiving. Stunting prevention efforts that rely solely on biomedical messaging are unlikely to be effective unless they also address the lived economic and social realities described by mothers, and unless they build upon the trust that mothers already place in local midwives and health cadres. Future stunting interventions are encouraged to adopt a mother-centred, family-inclusive approach that combines nutrition education with emotional support and culturally appropriate communication strategies

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EVALUATION OF THE IMPLEMENTATION OF THE MEDICAL RECORD INFORMATION SYSTEM USING THE HOT FIT METHOD AT BHAYANGKARA HOSPITAL, BANDA ACEH

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Abstract

The implementation of Electronic Medical Records (EMR) in hospitals is a strategic step to enhance the quality of healthcare services. This research aims to evaluate the application of the EMR system using the Human, Organization, Technology, and Net Benefit Fit (HOT-Fit) method at Bhayangkara Hospital in Banda Aceh. The study employs a qualitative approach with a case study design. Sample selection was carried out through purposive sampling, resulting in 10 informants, including the head of medical records, the head of IT, doctors, and nurses. Data collection was conducted through in-depth interviews, structured observations in service units, and document reviews. The validity of the data was tested using source, method, and theory triangulation. The results indicate a misalignment among the components of HOT-Fit. In the Human dimension, there is a gap in computer literacy among senior medical staff, leading to resistance to independent data input. In the Organization dimension, management demonstrates strong regulatory commitment through the obligation to use EMR; however, this is not supported by adequate training duration and the availability of written contingency Sops for system downtime. In the Technology dimension, data integration across units works well, but system performance slows during peak hours due to capacity limitations (bandwidth). These barriers hinder the achievement of net benefits in terms of optimal service time efficiency. Nonetheless, EMR has successfully reduced medical errors and enhanced patient data security. It is concluded that the success of EMR requires a balance between technological infrastructure capacity, ongoing user competence, and organizational governance readiness.

Keywords: Bhayangkara Hospital Banda Aceh. Electronic Medical Records, HOT-Fit, RME Evaluation

1. INTRODUCTION

Hospitals are healthcare facilities that play a vital role in improving the health status of individuals. Hospitals are expected to provide good, quality services and continuously enhance the quality of care in line with the expectations of the community. According to Minister of Health Regulation No. 24 of 2022, the quality of care is no longer assessed solely based on medical services, but also on supporting services. One of the supporting services that need attention is medical records, where digitization through Electronic Medical Records (EMR) has been shown to significantly enhance efficiency, clinical accuracy, and patient safety in hospitals (Rushdie ET AL., 2024; Clinical Journal, 2026).

In this era of digitization, many technologies are developing rapidly, making the implementation of digitization extremely important for people's lives. The existence of digitization today can enhance productivity, workforce efficiency, time efficiency, and the ability to produce goods and services. The development of digitization has spread across various fields, including education, healthcare, economic development, tourism, and others. One implementation of digitization in the medical service sector is electronic medical records.

Before the advent of digitization and computerization, healthcare services, particularly in the field of medical records, were still manual, relying on paper as the medium. However, the development of medical records has now transitioned to the use of electronic medical records. Electronic Medical Records (EMR) are a subsystem of the information system for healthcare facilities, which is connected to other information subsystems within the healthcare facility. Electronic medical records can replace paper medical records to reduce service time and the storage of medical record documents. The content of electronic medical records must include personal, demographic, social, and clinical data throughout the service process from various data sources (multimedia) and must actively function for service decision-making (Amri Handayani ET AL., 2023).

The development of information and communication technology has brought about significant transformations across various sectors, including the healthcare sector. According to the Minister of Health Regulation (Permenkes) Number 24 of 2022, all healthcare facilities in Indonesia are required to implement Electronic Medical Records (EMR). This policy has been enacted by the government to modernist health administration, minimize the risk of medical errors, and ensure rapid, accurate, and secure integration of health data through a national platform.

The Regulation of the Minister of Health of the Republic of Indonesia Number 24 of 2022 explains about medical records, which are defined as documents containing patient identity data, examinations, treatments, procedures, and other services that have been provided to the patient. Medical records are extremely important documents as they serve as a source of information related to clinical documentation, administration, finance, research, and legal matters, thus requiring management by a competent and authorized individual in accordance with existing legislation.

Health information systems are a set of arrangements that encompass data, information, indicators, procedures, devices, technology, and human resources that are interconnected and managed in an integrated manner to guide actions or decisions that are useful in supporting health development (Regulation of the Minister of Health of the Republic of Indonesia No. 18 of 2022). A good information system should be able to provide relevant sources of information to its users to support effective decision-making and hospital administration (Padilla, 2020). The implementation of health information systems and the development of Electronic Medical Records (EMR) have brought remarkable changes for patients, doctors, and other health services as well as healthcare facilities both in Indonesia and abroad (Rosalinda ET AL., 2021). EMR can be a solution to maintaining the quality of safe, high-quality, and efficient services (Amri Handayani ET AL., 2023).

The development of RME plays a crucial role in improving the quality of healthcare services in hospitals. To further enhance the quality of these services, it is necessary to conduct evaluations to ensure that the implementation is optimal and that its positive impacts on the delivery of healthcare can be felt. Evaluation is a system of information and a form of effort to ascertain whether the existing conditions align with the implementation. It is hoped that this evaluation will reveal the achievements of the administration of an information system, allowing for performance and implementation improvements (Mahfudhoh, 2022). Evaluations are also conducted to determine whether the current system is functioning well compared to the previous system (F. D. Lestari et al., 2020).

Bhayangkara Hospital Banda Aceh is one of the healthcare institutions under the auspices of the Aceh Regional Police (Polda Aceh). In addition to serving members of the Police Force, civil servants, and their families, this hospital also serves as a healthcare provider for the general public in Banda Aceh and its surroundings. To maintain service quality and comply with national regulations, Bhayangkara Hospital Banda Aceh has implemented a Hospital Management Information System (SIMRS) that is integrated with electronic medical records.

The digital transformation from conventional paper-based systems to computer-based medical record information systems brings fundamental changes to daily work patterns. The shift to a digital system demands a comprehensive adaptation of the daily workflows in hospitals. In practice, the adoption of new technology in clinical settings does not always proceed smoothly. The implementation of medical record information systems is not merely an issue of procuring hardware and software. The success and sustainability of these systems in the field greatly depend on the dynamics of the socio-technical interactions between the system itself and the environment in which it is applied. Common phenomena encountered in the field include variations in the digital literacy levels of medical staff, resistance to changes in work culture, and technical infrastructure challenges such as fluctuations in internet stability, which can potentially hinder the speed of services in critical units like emergency departments and outpatient services.

However, the application and implementation of the RME information system at Bhayangkara Hospital Banda Aceh continues despite various obstacles. The success of the system is not only determined by the sophistication of the software or hardware (Technology) but is also greatly influenced by the readiness of its users' behaviour (Human) and the alignment of management and governance within the institution (Organization). Challenges on the ground, such as fluctuations in network stability, varying adaptation times for clinical staff, and the synchronization of internal regulations, often pose real challenges in pursuing the net benefits (Net Benefit) of this system.

The initial observation results to evaluate the success of the implementation of this complex hospital information system and medical records require a comprehensive evaluation framework. One relevant and widely recognized information system evaluation model is the HOT-Fit method (Human, Organization, Technology, and Net Benefit) developed by Yusof ET AL. This method integrates four important components: 1. Human: assessing user readiness, competence, satisfaction, and behavior. 2. Organization: evaluating management support, availability of regulations/Sops, and organizational culture. 3. Technology: assessing system quality, information quality, and the quality of technological services provided. 4. Net Benefit: evaluating the actual impact of the system on time efficiency, work productivity, and patient service quality.

The objectives of this research include:

1. Conducting an in-depth analysis of the behavioral readiness, complaints, skill levels, and user satisfaction (Human) regarding the operation of the medical record information system.
2. Exploring the role of leadership, policy commitment, availability of written guidelines (SOP), and adaptation of organizational work culture (Organization) in supporting the sustainability of the system.
3. Assessing the technical reliability of the application, interface aspects, accuracy and security of data, and supporting network constraints (Technology) used in the service units.
4. Identifying the contributions and net benefit value (Net Benefit) generated by the medical record system towards accelerating workflow and improving the quality of hospital health services.

Research Contribution:

For the Management of Bhayangkara Hospital Banda Aceh: as strategic input, objective evaluation material, and concrete recommendations to determine the direction of policy improvements for the SIMRS/RME, both in terms of infrastructure enhancement, SOP revisions, and medical staff training mapping.

2. METHODOLOGY

The research conceptual framework is based on a modification of the HOT-Fit (Human, Organization, Technology, and Net Benefit) model developed by Yusof et al. (2008). This model is employed to evaluate the success of Electronic Medical Record (EMR) system implementation in hospitals, aiming to explore, understand, and describe in depth the alignment (fit) and dynamic interactions among human, organizational, and technological aspects. The evaluation focuses on identifying the enablers and barriers influencing the successful implementation of Electronic Medical Records (EMR) in hospitals.

This study employs a qualitative research design to evaluate the implementation of Electronic Medical Records (EMR) at Bhayangkara Hospital Banda Aceh, utilizing the HOT-Fit method within a descriptive qualitative case study framework.

The combination of a case study design and the HOT-Fit (Human, Organization, Technology, and Net Benefit) framework is ideal, as the HOT-Fit method requires the gathering of comprehensive and specific data across various dimensions of the hospital environment.

In this study, the types and sources of data utilized include both primary and secondary data, with the operational structure of the HOT-Fit method integrated into a qualitative case study design—specifically regarding:

1. Research design characteristics,
   a. The exploratory/descriptive case study focuses on answering the question of "How" the alignment between humans, organizations, and RME technology at Bhayangkara Hospital Banda Aceh occurs, as well as "Why" certain obstacles still persist.
   b. The unit of analysis at Bhayangkara Hospital Banda Aceh is evaluated as a single system (including interactions between units such as registration, outpatient clinic, pharmacy, and IT).
2. The HOT-Fit Operational Matrix within the qualitative design: HOT-Fit Components, Qualitative Variables Evaluated, and Key Informant Candidates (Purposive)
3. Data collection and triangulation techniques, Data triangulation to ensure that the evaluation results are objective and valid.
   a. In-depth Interviews: using semi-structured interviews based on the HOT-Fit components above
   b. Direct Observation: directly observing the RME application interface, page loading speed, and the real challenges faced by doctors when inputting patient data in the outpatient clinic.
   c. Documentation Study: examining the decision letter (SK) on the implementation of RME, written SOPs, IT system complaint reports, and the completeness rates of medical records.
4. Qualitative data analysis (thematic approach): The interview transcript data was analyzed using thematic analysis methods. The informants' response codes will be grouped into 4 main themes according to the HOT-Fit components (Human, Organization, Technology, Net Benefit) to draw conclusions about which aspects are not yet fit and require improvement.

3. RESULTS

The implementation of Electronic Medical Records (EMR) at Bhayangkara Hospital Banda Aceh was analyzed using the HOT-Fit framework to examine the extent to which the alignment between Human, Organization, and Technology aspects influences the benefits of the system. Based on data reduction and coding of transcripts from in-depth interviews with 10 informants, several main themes were identified as follows.

3.1 Human Dimension: Acceptability and User Enjoyment

Based on the interview results, the system's ease of use component (HUM-USE-EAS) was rated quite well by the group of young medical staff. The clear menu characteristics accelerated their adaptation process. However, real obstacles were found among the senior user group, who experienced technology capability limitations (HUM-KNOW-GAP). This triggered a specific resistance (HUM-ATT-RES) where some senior doctors were still reluctant to type independently during service. This was confirmed by Informant 3 (Outpatient Nurse):

"For the younger nurses, there is no problem; the menu is easy to understand. But for the older specialist doctors, they often hesitate to type because they feel it takes longer. In the end, we nurses are the ones asked to input the data into the EHR."

3.2 Organization Dimension: Policies and Training Support

From a regulatory aspect, Bhayangkara Hospital in Banda Aceh has a strong management commitment (ORG-CUL-MNG), evidenced by the issuance of a Decree (SK) from the hospital commander regarding the obligation to use the Electronic Medical Record (ORG-POL-SK). However,

the implementation in the field remains sub optimal due to the perceived brevity of training quality (ORG-RES-TRN). Additionally, there is currently no specific Standard Operating Procedure (SOP) for emergency handling when the system suddenly goes down (ORG-POL-SPO). Informant 1 (General Practitioner in the Emergency Installation) stated:

"According to the regulations from the head of the hospital, it is indeed mandatory, but at the time of the initial release, we were only trained for one day. As a result, on the first day of service, everything was chaotic because many forgot how to do it. Additionally, if suddenly the power goes out or the server is down, we did not have a written standard operating procedure on which format to switch to for paper."

3.3 **Technology Dimension: System and Infrastructure Performance**

The aspect of data integration between units (TEC-INT-ALL) at Bhayangkara Hospital is considered very helpful because laboratory and radiology results are directly connected to the doctors' screens. However, the system's quality experiences a drop in performance during peak hours. Complaints were found regarding the system being slow or lagging (TEC-SYS-LAG) due to limited internet bandwidth (TEC-INF-NET), especially in the corner area of the service building. Informant 2 (Head of the Medical Records Unit) explained:

"This RME application is actually good because patient data from registration is directly linked to the outpatient and pharmacy. The problem arises when it's 10 a.m., during peak hours for BPJS patient visits. The hospital's Wi-Fi network often overloads, causing the system to take a long time to load and hindering doctors from inputting diagnoses. As a precaution, we still keep patient data manually."

The evaluation of the implementation of RME at Bhayangkara Hospital in Banda Aceh shows a mismatch in the relationships among the HOT-Fit components, which affects the optimization of the net benefits of the system.

Human-Technology Fit, the mismatch between the capabilities of senior staff technology (HUM-KNOW-GAP) and the RME interface design that requires many clicks (HUM-USE-DIF) causes the medical service process to be hindered. When technology is perceived to take more time from doctors than traditional paper records, it triggers a decline in user satisfaction. The HOT-Fit theory emphasizes that successful technology adoption requires systems that have high usability and align with the clinical workload of users in the field.

Organization-Technology Fit, the findings indicate a gap between the mandatory RME policies from management (ORG-POL-SK) and the provision of supporting infrastructure (TEC-INF-NET). High organizational commitment will not have an optimal impact if it is not accompanied by an increase in internet bandwidth capacity and the provision of proportional computers at each polyclinic desk. The surge in traffic from 9:30 AM to 11:00 AM WIB at Bhayangkara Hospital triggered a system bottleneck, demonstrating that technological readiness has not been able to keep pace with the demands of organizational regulations.

Impact on Net Benefit, overall, the RME at Bhayangkara Hospital Banda Aceh has provided significant benefits in reducing prescription reading errors (BEN-ERR-DEC) and enhancing data security (BEN-SEC-SAFE). However, service time efficiency (BEN-EFF-TIM) has not been maximized during peak hours due to network issues and gaps in staff operational capabilities. To achieve the ideal maturity level of RME, the management of Bhayangkara Hospital is advised to increase bandwidth capacity, formulate emergency contingency standard procedure, and conduct periodic refreshment training grouped by staff computer literacy levels.

Cross-informant triangulation involves triangulating sources by cross-referencing the results of interviews between primary informants (doctors and nurses as front line users) and key informants

(head of the IT unit and head of the medical records unit as system and policy managers) at Bhayangkara Hospital in Banda Aceh.

Triangulation System Lag Issues During Busy Hours, the system latency issue (Technology) has been proven valid not due to damage to the RME application, but rather due to the lack of separation of the network transmitter paths between the clinical needs of the organization and the public visitor facilities.

Triangulation: Senior Doctors' Resistance and the Delegation of Electronic Medical Record (EMR) Entry. The researcher cross-referenced the phenomenon of senior doctors not independently completing EMR entries with insights from the perspective of medical record management.

The phenomenon of delegating the completion of Electronic Medical Records (EMR)—reflecting a "Human-Organization Fit" issue—is driven by a mismatch between complex system interface designs (Technology) and the limited computer literacy of senior users; a situation ultimately tolerated by the organization to ensure the smooth delivery of patient care.

Triangulation: Preparedness of Emergency Sops During System Downtime. The researcher cross-referenced clinical staff's understanding of emergency procedures with the availability of regulatory documents at the structural level.

Claims by field staff regarding a lack of knowledge about emergency procedures proved valid, as they were supported by organizational documentation showing that the Standard Operating Procedure (SOP) for Electronic Medical Record (RME) emergencies had not yet been finalized or officially disseminated to the service units at Bhayangkara Hospital Banda Aceh.

4. CONCLUSIONS

Based on the results of the research and discussion regarding the evaluation of the implementation of the Electronic Medical Record (EMR) system using the HOT-Fit method (Human, Organization, Technology, and Net Benefit) at Bhayangkara Hospital in Banda Aceh, it can be concluded that.

The implementation of RME at Bhayangkara Hospital in Banda Aceh has proven successful in reducing medical errors and enhancing patient data security, as well as integrating well between units. However, the benefits of time efficiency have not been maximally achieved due to gaps in computer literacy among senior staff, which burdens nurses, insufficient training duration and SOPs during system downtimes, and slow Wi-Fi network speeds during peak service hours.

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THE APPLICATION OF PROGRESSIVE MUSCLE RELAXATION THERAPY IN SCHIZOPHRENIC PATIENTS AT RISK OF VIOLENT BEHAVIOR: A CASE STUDY

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Abstract

Schizophrenia is a mental disorder that may be associated with a risk of violent behaviour a condition that has the potential to endanger oneself, others, or the environment. Currently, the risk of violent behavior remains a nursing challenge at psychiatric hospitals in East Jakarta. Data from the East Jakarta Psychiatric Hospital show an increase in cases from 224 in 2024 to 383 in 2025, with 91 cases recorded as of May 19, 2026. Progressive muscle relaxation therapy is one nonpharmacological intervention that can help reduce tension and stress responses. This study employed a descriptive method with a case study approach involving two respondents selected through purposive sampling. The objective of the study was to identify the effectiveness of nursing care for patients with schizophrenia at risk of violent behavior using progressive muscle relaxation therapy. Data were collected through interviews, observations, physical examinations, and documentation in accordance with the SDKI, SLKI, and SIKI standards. The measurement instruments used were the Overt Aggression Scale (OAS) and a therapy observation sheet. Progressive muscle relaxation therapy was administered for seven days, lasting 25-30 minutes per day; following the intervention, both participants showed a reduction in signs and symptoms of violent behavior, improved emotional control, and a more relaxed state. Both respondents' OAS scores decreased to 0, indicating a low-risk category. Progressive muscle relaxation therapy demonstrated benefits as a nonpharmacological nursing intervention in helping to control the risk of violent behavior in patients with schizophrenia.

Keywords: Nursing Care; Progressive Muscle Relaxation (PMR); Risk Of Violence; Schizophrenia.

1. INTRODUCTION

Schizophrenia is a mental disorder that may be associated with a risk of violent behaviour that is, behavior that has the potential to endanger oneself, others, or the environment (1), and is a syndrome or disease process that affects an individual's cognition, perception, emotions, behavior, and an individual's social functioning (Risk of Violent Behavior (RVB), manifested through excessive anger, threats, shouting, destruction of property, self harm, or attacks on others, thus requiring appropriate management and supervision by healthcare professionals; Suryanti & Ariani (2018)(2).

The World Health Organization (WHO) reports that globally, 1 in 300 (or 27 million) people live with schizophrenia. Stigma, discrimination, and human rights violations against people with schizophrenia are common. There are various effective treatment options for people with schizophrenia, and at least one in three people with schizophrenia will be able to make a full recovery (3). According to the 2023 Indonesian Health Survey (SKI), schizophrenia occurs in 4.0 per 1,000 households, and in DKI Jakarta, the prevalence ranges from 2.8% to 8.3% (Ministry of Health, 2023)(4). Case data from the East Jakarta Psychiatric Hospital show an increase in cases from 224 in 2024 to 383 in 2025, and as of May 19, 2026, 91 cases had been recorded (5).

People with schizophrenia may exhibit emotional reactions to frustration over unmet desires, threats to their physical and emotional needs, or challenges that manifest as anger which is a

fundamental factor in the emergence of aggression and violence. These emotions can be considered positive if expressed appropriately, but if anger is manifested through violence or aggression, it becomes a problem whether directed at the individual themselves or toward others such as self harm or harming others (Ministry of Health, 2023)(4). This nonpharmacological therapy is one of several interventions that involve physical activity, communication therapy, social therapy, spiritual therapy, and relaxation techniques. Progressive muscle relaxation is a non-pharmacological intervention that can help reduce tension and stress responses; this therapy is effective in helping patients at risk of violent behavior to alleviate physical and psychological symptoms. This technique works by suppressing the activity of the sympathetic nervous system and increasing the activity of the parasympathetic nervous system, thereby calming the body and triggering the release of endorphins, which play a role in reducing tension and enhancing a sense of well-being (Ma'sum et al., 2021)(6).

This progressive muscle relaxation therapy is designed to suppress the activity of the sympathetic nervous system and increase parasympathetic activity, thereby inducing a relaxation response characterized by a decrease in heart rate, blood pressure, and muscle tension. In addition, progressive muscle relaxation also affects the neuroendocrine system by lowering levels of stress hormones such as norepinephrine and increasing the body's sense of well-being (Aini et al., 2023)(7). Progressive muscle relaxation can help individuals identify which muscles are tense and then gradually release that tension until an optimal state of relaxation is achieved. This process leads to a reduction in excessive physiological activity, such as lower blood pressure and heart rate (Ismail et al., 2024)(8).

Progressive muscle relaxation techniques have been developed through research and have been shown to reduce violent behavior, as demonstrated in the study by Suryanti & Ariani (2018) titled "The Effect of Progressive Muscle Relaxation on Reducing Violent Behavior in Schizophrenia Patients at the Klaten Regional Psychiatric Hospital," which found that progressive muscle relaxation therapy was able to lower anger behavior scores in both subjects, though the reduction was not yet significant since both remained in the "escalation" category (4), and this study is also supported by the research by Destyany et al. (2023) titled "The Application of Progressive Muscle Relaxation on Signs and Symptoms of Patients at Risk for Violent Behavior at the Lampung Provincial Regional Psychiatric Hospital," which showed that progressive muscle relaxation therapy can help reduce signs and symptoms of violent behavior risk (9), This study is supported by the research by Cholifah & Agustin (2024), based on the results of implementing progressive muscle relaxation therapy on patients at risk of violent behavior in the Srikandi ward of the Dr. Arif Zainuddin Regional Psychiatric Hospital in Surakarta, which found that there was an effect on changes in signs and symptoms of violent behavior, evidenced by a decrease in these signs and symptoms on Day 1-11 cases in the moderate category, on day 2 - 10 cases in the moderate category and on day 3-6 cases in the mild category (10).

Progressive muscle relaxation therapy is an intervention that offers advantages in terms of cost, ease of use, and efficiency, as it does not require special equipment and can be applied in various healthcare settings. Progressive muscle relaxation therapy is also easy to understand and can be performed independently by patients at any time when signs of heightened emotions arise, thereby helping to improve self control (11). Thus, the study results illustrate the effectiveness of nursing care involving progressive muscle relaxation therapy in reducing signs and symptoms of violent behavior risk in patients with schizophrenia.

2. METHODOLOGY

The research method used was a descriptive method with a case study approach, focusing on the nursing process for patients with schizophrenia at risk of violent behavior, beginning with the assessment stage, through nursing diagnosis, planning, implementation, and evaluation. Data were collected through interviews, observations, physical examinations, and documentation. The sampling technique used was purposive sampling with a sample size of 2 subjects. The subjects were given progressive muscle relaxation exercises for 7 days, lasting 15–30 minutes each day, and the instrument used to measure changes in the risk of violent behavior was the OAS (Overt Aggression Scale) (12).

Nursing care for both subjects with the nursing diagnosis "Risk of Violent Behavior" (D.0146) (13) involved interventions focused on "Prevention of Violent Behavior" (I.14544) (14) through observation, therapeutic, and educational measures, and the standard outcome "Self-Control" (L.09076) (15), which include: a decrease in verbal threats toward others, a decrease in verbal

profanity, a decrease in aggressive behavior, a decrease in behavior that harms oneself or others, a decrease in behavior that damages the surrounding environment, a decrease in aggressive or violent outbursts, a decrease in loud voices, and a decrease in harsh speech.

3. RESULTS AND DISCUSSION

The case study was conducted over a period of 7 days in May 2026 with 2 subjects who met the established inclusion and exclusion criteria.

3.1. Subject Characteristics

Both subjects were adult males who had been diagnosed with schizophrenia and were receiving treatment at a hospital. During the assessment, data indicated that both subjects were at risk for violent behavior, as evidenced by verbal aggression, object-directed aggression, and self directed aggression; however, no evidence of aggression toward others was found. Each subject had a different aggression score based on the OAS scale: at the time of the assessment, the first subject had a score of 5 (moderate risk) and the second subject had a score of 9 (high risk). The first subject predominantly exhibited verbal aggression and aggression toward others, while the second subject predominantly exhibited aggression toward objects.

3.2 The Application of Progressive Muscle Relaxation Therapy

The results of the case study indicate that the provision of nursing interventions in the form of anger management and Progressive Muscle Relaxation (PMR) contributed to a reduction in signs and symptoms of violent behavior risk in both subjects. Based on measurements using the Overt Aggression Scale (OAS), there was a gradual change in aggression scores during the nursing care process; this not only affected observable aggressive behavior but also the subjects' ability to control emotional tension and anger responses.

Table 1: Overt Aggression Scale (OAS) Measurement Result

Aspek	Subject 1		Subject 2	
	Pre Day 1	**Post Day 7**	**Pre Day 1**	**Post Day 7**
Verbal Agression	2	0	3	0
Aggression toward objects	2	0	4	0
Self-directed aggression	1	0	2	0
Aggression toward others	0	0	0	0
Total score	**5**	**0**	**9**	**0**

Based on the table of measurement results using the Overt Aggression Scale (OAS), it was found that Subject 1, prior to receiving progressive muscle relaxation therapy, had a total score of 5, indicating aggressive behaviour particularly in the areas of verbal aggression, aggression toward objects, and self-directed aggression and was therefore categorized as having a moderate risk of violent behavior. After receiving progressive muscle relaxation therapy for 7 days, the score dropped to 0, indicating that none of the indicators of aggressive behavior were present, thus placing the subject in the low-risk category. These results demonstrate a reduction in the risk of violent behavior following progressive muscle relaxation therapy.

On the first day, before receiving progressive muscle relaxation therapy, the second subject had a total OAS score of 9, indicating that the subject still exhibited aggressive behavior, particularly in the areas of verbal aggression, aggression toward objects, and aggression toward others; thus, based on the OAS score, the subject was classified as high-risk. After 7 days of receiving the progressive muscle relaxation therapy nursing intervention, the total OAS score decreased to 0, indicating that aggressive behaviour including aggression toward objects, self-harm, and verbal aggression was no longer

observed. The table shows that progressive muscle relaxation therapy is effective in reducing the level of aggressiveness and the risk of violent behavior in Subject 2.

The results of this case study indicate that progressive muscle relaxation intervention, when performed gradually and continuously, can reduce physical and emotional tension, leading to a daily decrease in aggressive behavior.

4. CONCLUSIONS

This case study demonstrates that the administration of Progressive Muscle Relaxation therapy to patients with schizophrenia at risk of violent behaviour when administered continuously and combined with other nursing interventions can help reduce aggression levels while also controlling anger in the study subjects. However, since this study involved only two subjects, the effectiveness of the intervention still needs to be further evaluated using a larger sample size and statistical data to measure the effectiveness of Progressive Muscle Relaxation in reducing the risk of violent behavior in patients with schizophrenia.

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SOCIOECONOMIC AND DEMOGRAPHIC FACTORS ASSOCIATED WITH GROWTH MONITORING RECORD COMPLETENESS IN THE INDONESIAN MATERNAL AND CHILD HEALTH HANDBOOK: EVIDENCE FROM THE 2023 INDONESIAN HEALTH SURVEY

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Abstract

The Maternal and Child Health (MCH) Handbook is the only home-based health record in Indonesia that contains the child growth monitoring chart. Complete growth records allow health workers and families to follow a child's growth trajectory over time. This study aimed to examine the socioeconomic and demographic factors associated with the completeness of growth monitoring records in the MCH Handbook among children aged 0–59 months in Indonesia. This cross-sectional study used published aggregated tabulations from the 2023 Indonesian Health Survey (SKI) report. We reconstructed category-specific counts by multiplying the weighted number of children in each category by the reported proportion, yielding an estimated weighted total of 55,145 children. Socioeconomic variables included household head occupation, household economic status, household head education, and place of residence; child age was analysed as a demographic variable. Bivariate analyses were performed using the chi-square test and crude odds ratios (COR) with 95% confidence intervals (CI); these analyses could not account for the complex survey design. Overall, 61.2% of children had complete growth records. In bivariate analyses, record completeness was associated with household head occupation (p=0.034), economic status (p<0.001), place of residence (p<0.001), and child age (p=0.002), but not with household head education (p=0.685). Completeness was higher in rural than in urban areas (COR 1.13; 95% CI 1.10–1.18), and lower in the rich than in the poor group (COR 0.93; 95% CI 0.89–0.98) and among children aged 36–59 months than among infants (COR 0.92; 95% CI 0.88–0.97). However, the absolute differences between groups were small (at most 3.2 percentage points). Nearly four in ten children did not have complete growth records, indicating that incomplete recording is common across all socioeconomic and demographic groups. Because the associations were unadjusted and derived from aggregated data, they should be interpreted cautiously and confirmed using individual-level survey data with design-based multivariable analysis.

Keywords: Completeness; Growth Monitoring; Indonesian Health Survey; MCH Handbook; Socioeconomic Factors

1. INTRODUCTION

Early childhood is the period of most rapid growth and the period most vulnerable to growth faltering. Growth failure, such as stunting, wasting, and underweight, is associated with shorter adult height, lower educational attainment, reduced economic productivity, and a higher risk of non-communicable diseases later in life [1], [2]. In Indonesia, the prevalence of stunting among children under five was 21.5% in 2023 [3], underscoring the need for regular and well-documented growth monitoring.

In Indonesia, growth monitoring is documented through the Maternal and Child Health (MCH) Handbook (Buku Kesehatan Ibu dan Anak or Buku KIA). The MCH Handbook has been developed since the 1990s and, through a 2004 decree of the Minister of Health, was established as the only home-based health record for mothers, newborns, and children [4]. The handbook contains records of pregnancy, delivery, and immunisation, as well as child growth and development charts that are filled in by health workers and community health volunteers (cadres) each time the child is weighed and measured, usually at the posyandu (integrated health post) [5]. Evidence shows that home-based health records improve service utilisation, immunisation coverage, and the continuity of maternal and child care [6], [7]. In Indonesia, use of the MCH Handbook has been shown to promote continuous service utilisation and better child care practices at home [8].

These benefits depend on the growth chart being completed, not merely on the handbook being owned. Owning or using the MCH Handbook and having a complete growth record are distinct indicators: a child may possess a handbook whose growth chart is only partly filled in. Incomplete recording makes it difficult to assess growth trends, so growth faltering may be detected late. At the same time, complete recording does not by itself guarantee accurate measurement, correct interpretation of the chart, or appropriate counselling and follow-up [9].

Previous Indonesian studies have mainly examined MCH Handbook ownership or use and posyandu participation. Ownership and use of the handbook have been linked to increased maternal health service utilisation and early breastfeeding practice, higher immunisation coverage, and a more continuous pathway of care [4], [8], [10]. The completeness of maternal and child health record-keeping in Indonesia is influenced by various factors, including the knowledge, attitudes, and skills of health workers, as well as mothers' knowledge. Another important factor is the standard operating procedures for filling out the maternal and child health record book [11].

Studies of family characteristics have produced mixed findings: in North Aceh, household income was the only sociodemographic factor associated with mothers' participation in the posyandu, with low-income families attending more frequently, whereas education was not associated with participation [12]; in the Greater Jakarta metropolitan area, only about 62.5% of mothers used the MCH Handbook [13]; and sociodemographic factors, including education, were not associated with mothers' knowledge of the handbook's content [14]. These studies were local in scope and measured ownership, use, attendance, or knowledge rather than whether the growth chart itself had been completed. Consequently, little is known at the national level about how the completeness of growth recording varies across socioeconomic and demographic groups.

This study addresses this gap by analysing the completeness of growth monitoring records, rather than handbook ownership or use, using nationally representative data from the 2023 SKI. Household socioeconomic position was represented by household head occupation and education, household economic status, and place of residence, which are the household-level characteristics by which the published SKI tabulations are disaggregated. Household head characteristics were used as proxies for household socioeconomic position, although maternal or caregiver characteristics may be more closely related to posyandu attendance and handbook management. Child age was examined separately as a demographic, not a socioeconomic, factor because contact with health services varies with the immunisation and growth monitoring schedule. Therefore, this study aimed to examine the socioeconomic and demographic factors associated with the completeness of growth monitoring records in the MCH Handbook among children aged 0–59 months in Indonesia.

2. METHODOLOGY

This was an analytical cross-sectional study based on secondary data from the 2023 Indonesian Health Survey (Survei Kesehatan Indonesia, SKI), conducted by the Health Development Policy Agency (Badan Kebijakan Pembangunan Kesehatan, BKPK) of the Ministry of Health of the Republic of Indonesia [3]. The SKI integrates the Basic Health Research (Riset Kesehatan Dasar, Riskesdas) and the Indonesian Nutritional Status Study (Studi Status Gizi Indonesia, SSGI) and provides community-based health data that are representative at the national, provincial, and district/city levels. Data collection for the 2023 SKI took place in 38 provinces from August to early October 2023. This study did not use individual-level (micro) data. All figures were obtained from published aggregated tabulations in the 2023 SKI report [3], which present, for each category of a background characteristic, the weighted number of children and the weighted percentage distribution of growth record

completeness (Table 13.12, p. 645). This table reports child age in six groups (0–5, 6–11, 12–23, 24–35, 36–47, and 48–59 months), household head education in six levels, household head occupation in nine categories, place of residence, and household economic status in five quintiles, together with child sex; the categories were merged by the authors as described below.

The study population comprised children aged 0–59 months included in the 2023 SKI for whom the completeness of growth monitoring records in the MCH Handbook was reported. The completeness of the MCH book is assessed by examining the completeness of the entries in MCH book; this refers to a physical MCH book and does not include the digital MCH book. The denominator for the calculation includes all children aged 0–59 months who have a KIA book and can present it. The total of 55,145 children corresponds to the weighted N reported in Table 13.12; it is a weighted estimate rather than the unweighted number of children observed. No additional inclusion or exclusion criteria were applied by the authors, and missing data could not be examined because only aggregated tabulations were available. The dependent variable was the completeness of growth monitoring records in the MCH Handbook. The 2023 SKI classified this variable as fully completed, partially completed, and not completed, based on the growth chart pages of the child's MCH Handbook as observed by the enumerator. The assessment is based on the Health Progress Card (KMS) in the Maternal and Child Health (KIA) Book. “Completely filled out” (code 1): The child’s weight is recorded and the weight-for-age curve is plotted on the KMS according to the child’s age; “Incompletely filled out” (code 2): There is a weight record or plot, but it does not meet both of these requirements; Not filled out (code 3): There are no relevant records in the growth monitoring section. In this study, the variable was dichotomised into complete (fully completed) and incomplete (partially completed and not completed) because only a fully completed chart allows a child's growth trajectory to be followed continuously, whereas both partially completed and blank charts prevent a reliable assessment of growth trends. The dichotomy also allowed the calculation of odds ratios. The independent variables were household head occupation, household economic status, household head education, and place of residence (socioeconomic factors), and child age (demographic factor).

Household head occupation was grouped into not working and working. The not-working category included household heads who were not working or still in school, while the working category included civil servants/military/police/state-owned enterprise employees, private employees, self-employed persons, farmers/farm labourers/fishers, labourers/drivers/domestic workers, and others. Household head occupation and education were used because these were the characteristics by which the published SKI tabulations were disaggregated; maternal or caregiver characteristics were not available. These variables are therefore proxies of household socioeconomic position and may not reflect the characteristics of the person who usually brings the child to the posyandu. Economic status was determined using a household asset ownership index; the higher the household's economic status, the more durable goods it owns. The index was constructed from 12 variables: type and capacity of household lighting, washing machine, refrigerator, air conditioner, computer/laptop, flat-screen TV, gold/jewellery of at least 10 grams, private vehicle, cooking fuel, ceiling type, floor type, and wall type. The five index quintiles reported by the SKI were grouped by the authors into three categories: poor (lowest and lower-middle quintiles), middle (middle and upper-middle quintiles), and rich (highest quintile). This grouping was used to obtain groups of adequate size while keeping the highest quintile separate, because households in this quintile were expected to differ most in their use of private health services. Household head education was grouped into low (never attended school, did not complete primary school, completed primary school, and completed junior secondary school), middle (completed senior secondary school), and high (completed a diploma or university degree). Place of residence was divided into urban and rural. Child age was grouped into 0–11 months (infants), 12–35 months (toddlers), and 36–59 months.

Because only aggregated data were available, the number of children in each cell was reconstructed by multiplying the weighted N of each original SKI category by the reported proportion (n = weighted N × reported proportion); categories were then merged according to the operational definitions, and the summed products were rounded to the nearest whole number. In the source table, the weighted Ns for household head education and occupation sum to 55,144, one fewer than for the other characteristics (55,145). In addition, because the published percentages are rounded to one decimal place, the reconstructed numbers of complete records differ slightly between variables (33,761–33,778; at most 12 children, <0.04%, from the overall 33,773). Univariate analysis was performed to describe the frequency distribution of each variable. Bivariate analysis used Pearson's chi-square test (α=0.05) on the reconstructed 2×k contingency tables to assess the association between each independent variable and record completeness, together with crude odds ratios (COR) and 95%

confidence intervals to describe the magnitude and direction of the associations. The COR was calculated as (a/b)/(c/d), where a and b are the numbers of complete and incomplete records in the category of interest and c and d those in the reference category, and the 95% CI was calculated using the Woolf (logit) method: exp[ln(COR) ± 1.96√(1/a + 1/b + 1/c + 1/d)]. The reference categories were not working, poor, low education, urban, and age 0–11 months. Because the reconstructed counts are weighted estimates and the stratification and clustering of the SKI sample could not be incorporated, the p-values and confidence intervals do not account for the complex survey design and are likely too narrow; therefore, they should be regarded as approximate. All estimates are crude (unadjusted) associations that were not controlled for confounding. Analyses were performed using IBM SPSS Statistics version 26.

Ethical considerations: This study used secondary data in the form of aggregated tables published in the official 2023 Indonesian Health Survey (Survei Kesehatan Indonesia [SKI] 2023) report. The data were publicly available and did not contain individual-level information that could identify study participants. The study did not involve direct contact with human participants, data collection from individuals, or any intervention. The study did not require individual informed consent and therefore did not require ethical approval according to institutional regulations.

3. RESULTS

This analysis included an estimated weighted total of 55,145 children aged 0–59 months from 38 provinces in Indonesia. The univariate and bivariate results are presented in Tables 1 and 2.

Table 1. *Frequency Distribution of Sociodemographic Characteristics and MCH Handbook Record Completeness (weighted N = 55,145)*

Variable	Category	Weighted n*	%
Household head occupation	Not working	1,476	2.7
	Working	53,668	97.3
Economic status	Poor	15,400	27.9
	Middle	25,477	46.2
	Rich	14,268	25.9
Household head education	Low	23,414	42.5
	Middle	23,217	42.1
	High	8,513	15.4
Place of residence	Urban	32,288	58.6
	Rural	22,857	41.4
Child age	0–11 months	10,442	18.9
	12–35 months	22,790	41.3
	36–59 months	21,913	39.7
	Complete	33,773	61.2

Variable	Category	Weighted n*	%
MCH Handbook record completeness	Incomplete	21,372	38.8

*Weighted counts derived from the weighted N and the rounded percentages in Table 13.12 of the 2023 SKI report [3]; they are not unweighted counts of observed children. In the source table, the weighted Ns for household head occupation and education sum to 55,144 rather than 55,145, and percentages may not sum to exactly 100.0% because of rounding.

Table 1 shows that almost all children lived in households whose head was working (97.3%). Nearly half of the children came from households with middle economic status (46.2%). Most household heads had low (42.5%) or middle (42.1%) education, while only 15.4% had high education. A total of 58.6% of children lived in urban areas, and the largest age group was 12–35 months (41.3%). Overall, 61.2% of children had complete growth monitoring records in the MCH Handbook, while 38.8% had incomplete records.

Table 2. *Bivariate Association between Sociodemographic Characteristics and MCH Handbook Record Completeness (Crude Odds Ratios)*

Variable	Complete	Incomplete	Total	COR (95% CI)	p-value
	Weighted n (%)	Weighted n (%)			
Household head occupation					
Not working	865 (58.6)	611 (41.4)	1,476	1.00 (Ref)*	0.034
Working	32,913 (61.3)	20,755 (38.7)	53,668	1.12 (1.01–1.25)	
Economic status					
Poor	9,390 (61.0)	6,010 (39.0)	15,400	1.00 (Ref)*	<0.001
Middle	15,918 (62.5)	9,559 (37.5)	25,477	1.07 (1.02–1.11)	
Rich	8,461 (59.3)	5,807 (40.7)	14,268	0.93 (0.89–0.98)	
Household head education					
Low	14,353 (61.3)	9,061 (38.7)	23,414	1.00 (Ref)*	0.685
Middle	14,232 (61.3)	8,985 (38.7)	23,217	1.00 (0.96–1.04)	
High	5,176 (60.8)	3,337 (39.2)	8,513	0.98 (0.93–1.03)	
Place of residence					
Urban	19,373 (60.0)	12,915 (40.0)	32,288	1.00 (Ref)*	<0.001
Rural	14,400 (63.0)	8,457 (37.0)	22,857	1.13 (1.10–1.18)	

Variable	Complete	Incomplete	Total	COR (95% CI)	p-value
	Weighted n (%)	Weighted n (%)			
Child age					
0–11 months	6,528 (62.5)	3,914 (37.5)	10,442	1.00 (Ref)*	0.002
12–35 months	13,982 (61.3)	8,808 (38.7)	22,790	0.95 (0.91–1.00)†	
36–59 months	13,263 (60.5)	8,650 (39.5)	21,913	0.92 (0.88–0.97)	

*COR = crude (unadjusted) odds ratio; CI = confidence interval; Ref = reference category (COR = 1.00). n values are reconstructed weighted counts (see Table 1); owing to rounding, column totals differ slightly between variables (complete: 33,761–33,778). p-values were obtained from Pearson's chi-square test across all categories of each variable; COR and 95% CI were calculated using the Woolf (logit) method. Neither the p-values nor the CIs account for the complex survey design. †The unrounded 95% CI was 0.907–0.998.

In bivariate analyses, four of the five variables were significantly associated with the completeness of growth monitoring records. Children whose household head was working had higher crude odds of complete recording than those whose household head was not working (61.3% vs 58.6%; COR 1.12; 95% CI 1.01–1.25; p=0.034), although the not-working group comprised only 2.7% of the sample and the lower confidence limit was close to 1. Economic status showed a non-linear association (p<0.001): completeness was highest in the middle group (62.5%; COR 1.07; 95% CI 1.02–1.11), whereas the rich group had the lowest completeness (59.3%), with 7% lower odds than the poor group (COR 0.93; 95% CI 0.89–0.98).

Children living in rural areas had higher record completeness than those in urban areas (63.0% vs 60.0%; COR 1.13; 95% CI 1.10–1.18; p<0.001). Record completeness declined with increasing child age, from 62.5% at 0–11 months to 61.3% at 12–35 months (COR 0.95; 95% CI 0.907–0.998) and 60.5% at 36–59 months (COR 0.92; 95% CI 0.88–0.97; p=0.002). In contrast, household head education was not associated with record completeness (p=0.685), with nearly identical proportions across the three education categories (60.8–61.3%). In all variables, the absolute differences in completeness between categories were small (at most 3.2 percentage points).

4. DISCUSSION

This study found that nearly four in ten children aged 0–59 months in Indonesia did not have complete growth monitoring records in the MCH Handbook. This finding is important because the value of the MCH Handbook as a home-based record lies in the continuity of its information. Systematic reviews have shown that home-based health records encourage care seeking, improve child care practices, and facilitate continuity of care [6], [7]. An interrupted growth chart prevents the assessment of weight and height trends, so opportunities to detect growth disorders and provide timely nutritional counselling may be lost. Record completeness is therefore a necessary, although not sufficient, condition for effective growth monitoring: a complete chart does not guarantee that measurements were accurate, that the chart was correctly interpreted, or that appropriate follow-up was provided [9].

The association between economic status and record completeness was not linear. The middle economic group had the highest completeness, whereas the rich group had the lowest. This pattern is consistent with findings from North Aceh that low-income families participated in the posyandu more frequently than high-income families [12]. One possible explanation is that wealthier households may use private health facilities, such as paediatricians or private clinics, that maintain separate medical records and do not always fill in the growth chart in the MCH Handbook. The low use of the MCH Handbook reported in the Greater Jakarta area is consistent with this possibility [13]. However, this explanation could not be directly assessed because information on the type of health facility used was

not included in the present analysis. These findings suggest that incomplete recording is not confined to poorer households; wealthier groups may also be overlooked in the growth recording system.

The higher record completeness in rural areas may reflect the strong role of the posyandu and cadres in these areas. The posyandu has long functioned as a participatory monitoring system that records the weight and height of children under five every month, and cadres are motivated by concern for community health and the support of local leaders [5]. Cadres' capacity in growth monitoring can also be strengthened through short training courses [15]. In contrast, urban communities may have a wider range of service options, greater mobility, and weaker ties to the posyandu, so recording in the MCH Handbook may be more easily missed. However, posyandu visit frequency, cadre capacity, and service availability were not measured in this study; these mechanisms are therefore possible interpretations that should be tested in future research rather than direct explanations of the observed differences.

Children whose household head was working had slightly higher crude odds of complete recording. Household head occupation may reflect economic stability and access to health services. However, this finding should be interpreted with caution because the not-working group accounted for only 2.7% of the sample and the lower bound of the confidence interval was close to one. In addition, the available variable was the occupation of the household head rather than that of the mother, although mothers usually play the main role in bringing children to the posyandu. Household head education was not associated with record completeness. One possible explanation is that the MCH Handbook is distributed universally and the growth chart is completed by health workers or cadres rather than by parents, so its completeness may depend more on the regularity of visits and staff practices than on the family's educational level. This is in line with a previous study that found no association between education and posyandu participation [12]. Another study found that sociodemographic factors, including education, were not associated with mothers' knowledge of the content of the MCH Handbook [14]. This interpretation remains hypothetical: a non-significant result does not show that education is irrelevant in all contexts, and the variable analysed was household head education rather than the education of the mother or primary caregiver.

Record completeness decreased as child age increased. One possible explanation is that, during the first year of life, visits to health services are relatively frequent because of the basic immunisation schedule, and each visit is an opportunity to weigh the child and record their growth; after basic immunisation is complete, families' motivation to attend regularly may decline. Because visit frequency was not measured in this analysis, this explanation remains to be confirmed. However, growth disorders can still occur after the age of two years, so monitoring of preschool-aged children remains necessary. Strategies such as weighing-schedule reminders, integration of growth monitoring with early childhood education, and home visits by cadres could be explored in future studies for this age group; for example, home visits by trained cadres have been used to support stunting reduction efforts [15], [16].

Although statistically significant, the differences between groups were relatively small (at most 3.2 percentage points; COR 0.92–1.13), and this significance was largely driven by the large (weighted) sample size; statistical significance should therefore not be equated with practical importance. This means that incomplete recording is a widespread problem across all socioeconomic and demographic groups rather than one confined to particular groups. Potential implications include strengthening the capacity of health workers and cadres, encouraging private facilities to record growth in the MCH Handbook, and using the digital MCH Handbook, alongside efforts targeted at the groups with the lowest completeness. However, these are potential implications rather than interventions whose effectiveness was evaluated in this study, which did not examine barriers to recording at health facilities.

This study has several limitations. First, the analysis was based on published aggregated tabulations rather than individual-level data; cell counts were reconstructed from weighted totals and rounded percentages, so small inconsistencies between tables exist and the counts should not be interpreted as exact observations. Second, the stratification, clustering, and weighting of the survey could not be incorporated into the inferential analysis, so the confidence intervals and p-values are likely to be too narrow. Third, only crude bivariate associations were estimated; they were not adjusted for potential confounders (for example, economic status and place of residence are interrelated) and should not be interpreted as independent or causal effects. Fourth, socioeconomic position was represented by household head characteristics rather than maternal or caregiver characteristics, and information on the type of health facility used, posyandu visit frequency, and cadre capacity was not available. Fifth, the cross-sectional design precludes conclusions about temporal relationships, and record

completeness reflects documentation only, not the accuracy of measurements or the quality of follow-up. Sixth, because the 2023 SKI assessed record completeness only among children who had and could present an MCH Handbook, the findings do not apply to children without a handbook, whose growth monitoring may be even less complete.

5. CONCLUSIONS

In this analysis of published 2023 Indonesian Health Survey data, 61.2% of children aged 0–59 months were reported to have complete growth monitoring records in the MCH Handbook. In bivariate analyses, record completeness was associated with household head occupation, household economic status, place of residence, and child age, whereas no statistically significant association was observed with household head education. The differences between groups were small, indicating that incomplete recording remains common across socioeconomic and demographic groups. However, the associations should be interpreted cautiously because they were derived from aggregated data, did not account for the complex survey design, and were not adjusted for potential confounders. Further analysis using individual-level 2023 SKI data with design-based multivariable methods, including maternal characteristics and the type of health facility used, is needed to assess the robustness of these findings and to identify the reasons for incomplete recording.

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TOOTHBRUSHING KNOWLEDGE BEFORE AND AFTER HEALTH EDUCATION USING DENTAL PHANTOM AND AUDIOVISUAL MEDIA AMONG STUDENTS AGED 10–12 YEARS AT SDN 25 GADUT, AGAM REGENCY

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Abstract

Proper toothbrushing knowledge is an important factor in maintaining oral health among school-aged children. Dental health education using appropriate media can improve students' understanding of proper toothbrushing techniques. This study aimed to describe students' toothbrushing knowledge before and after dental health education using phantom and audiovisual media among students aged 10–12 years at SDN 25 Gadut, Agam Regency. This descriptive study involved 98 students aged 10–12 years. Total population sampling was used. Data were collected using a questionnaire and analyzed descriptively using frequency distributions and percentages. Before education using the phantom medium, 26 students (53.1%) had moderate knowledge, 22 (44.9%) had good knowledge, and 1 (2.0%) had poor knowledge. After education, 44 students (89.8%) had good knowledge and 5 (10.2%) had moderate knowledge. Before education using audiovisual media, 27 students (55.2%) had moderate knowledge, 20 (40.8%) had good knowledge, and 2 (4.0%) had poor knowledge. After education, 41 students (83.7%) had good knowledge and 8 (16.3%) had moderate knowledge. In conclusion, dental health education using both phantom and audiovisual media was associated with an increase in the proportion of students with good toothbrushing knowledge. Descriptively, the phantom medium showed a greater increase in the proportion of students with good knowledge than the audiovisual medium. However, because the analysis was limited to frequencies and percentages, these findings do not establish statistical significance or confirm the superiority of either medium. Dental health professionals may consider using phantom media as an educational tool in school-based oral health promotion programs, while further studies using appropriate statistical analyses are needed to compare the effectiveness of these media.

Keywords: Knowledge, Toothbrushing, Phantom Media, Audiovisual Media, Elementary School Students

1. INTRODUCTION

Oral health is an important component of overall health and quality of life in children. Oral health problems, particularly dental caries, remain a major public health concern among school-aged children. Dental caries not only causes pain and impaired chewing function but can also affect children's ability to eat, sleep, learn, interact, and participate in daily activities optimally. The Global Oral Health Status Report published by the World Health Organization (WHO) indicates that oral diseases remain a global health problem that requires attention through promotive and preventive approaches, including strengthening health promotion in school settings [1].

In Indonesia, oral health problems also remain a significant concern. According to the 2018 Basic Health Research (Riskesdas), the proportion of the Indonesian population experiencing oral and dental problems reached 57.6%, while only 10.2% received dental care from dental health professionals. One of the major concerns is the low proportion of people who practice proper toothbrushing. The 2018 Riskesdas reported that only 2.8% of the population brushed their teeth correctly. This condition indicates that public knowledge and skills in maintaining oral health still need to be improved, particularly through promotive and preventive efforts beginning during school age [2].

Elementary school-aged children are a strategic target group for improving oral health because they are undergoing cognitive, motor, and social development, as well as the formation of health-related habits. Habits developed during the school years can serve as a foundation for health behaviors later in life. Therefore, schools provide a potential setting for implementing structured oral health education. WHO recommends school-based oral health promotion with key messages including brushing teeth twice a day for at least two minutes with fluoride toothpaste, maintaining a healthy diet, and having regular dental check-ups [3].

Toothbrushing is a simple, inexpensive, and effective measure for maintaining oral hygiene and helping to prevent dental caries. Regular use of fluoride toothpaste plays an important role in caries prevention. WHO recommends brushing teeth twice a day with toothpaste containing 1,000–1,500 ppm fluoride as part of daily self-care to prevent dental caries. However, the effectiveness of toothbrushing is determined not only by frequency but also by proper technique, duration, timing, and the ability to clean all tooth surfaces. Therefore, improving children's knowledge of proper toothbrushing techniques is an important component of oral health education [1].

Oral health education for children should employ methods and media that are appropriate to their developmental characteristics. Health information delivered solely through verbal explanations may be less engaging and more difficult to understand when it is not accompanied by examples or demonstrations. Elementary school children tend to understand information more easily when it is presented through direct experiences, concrete objects, pictures, sounds, movements, and demonstrations. Therefore, the use of appropriate educational media is expected to improve children's attention, comprehension, and ability to receive information related to oral health [4].

One medium that can be used for toothbrushing education is a dental phantom model. A dental phantom provides a three-dimensional representation of the shape and arrangement of teeth, allowing children to directly observe the areas that need to be cleaned. Through demonstrations using a dental phantom, health professionals can demonstrate toothbrushing movements systematically, including toothbrush positioning and the direction of movement, as well as cleaning the outer, inner, and chewing surfaces and areas around the gingival margins. The dental phantom also allows children to observe the movements directly and imitate them. This demonstration-based approach is relevant to skills-oriented learning because children receive not only verbal information but also visual and concrete learning experiences [4].

In addition to dental phantoms, technological developments have created opportunities to use audiovisual media in oral health education. Audiovisual media combine moving images, sound, text, and animation, allowing information to be delivered in a more engaging and multisensory manner. In the context of oral health education, audiovisual materials can present toothbrushing steps sequentially, enabling children to simultaneously see and hear explanations of proper toothbrushing techniques. The use of audiovisual media also allows information to be delivered consistently because the same material can be replayed as needed [4].

The use of educational media in oral health education has been supported by various studies. A systematic review of school-based oral health education among children aged 6–12 years showed that school-based oral health education can improve knowledge and oral health maintenance behaviors, including increased toothbrushing frequency and duration, increased use of fluoride toothpaste, and improvements in oral hygiene indicators. More recent research among elementary school children in Indonesia has also demonstrated that multimedia-based educational interventions can improve oral health knowledge, attitudes, and practices and contribute to positive changes in oral hygiene status [5].

Nevertheless, the effectiveness of educational media may vary depending on the characteristics of the target population, the method of delivery, the content, the duration of the intervention, and the level of children's involvement during the learning process. Dental phantoms and audiovisual media have different characteristics. A dental phantom provides a concrete learning experience through direct

demonstration using a dental model, whereas audiovisual media provide learning experiences through a combination of images, movement, sound, and systematically presented information. These differences may influence how effectively each medium supports children's understanding of proper toothbrushing [6].

The selection of appropriate educational media is increasingly important because oral health education in schools is not intended merely to provide information. It is also expected to improve children's understanding of why teeth need to be cleaned, when to brush their teeth, how long to brush, what tools and materials should be used, and how to perform proper toothbrushing techniques. With better knowledge, children are expected to have a stronger foundation for adopting and maintaining appropriate oral health behaviors in their daily lives [4].

Based on the above considerations, oral health education using appropriate educational media is an important strategy for improving toothbrushing knowledge among elementary school children. Dental phantom media provide a concrete learning experience through direct demonstration, whereas audiovisual media provide visual and auditory stimulation through a combination of images, movement, and sound. However, the use of these two media for improving toothbrushing knowledge among elementary school students warrants further investigation. Therefore, this study was conducted to describe toothbrushing knowledge before and after health education using dental phantom and audiovisual media among elementary school students. The findings are expected to provide a basis for selecting educational media that are appropriate, engaging, and suited to the characteristics of elementary school children, while supporting the implementation of promotive and preventive oral health programs in school settings.

2. METHODOLOGY

This study employed a quasi-experimental pretest–posttest two-group design to describe changes in toothbrushing knowledge among students aged 10–12 years following dental health education using dental phantom and audiovisual media at SDN 25 Gadut, Agam Regency. Knowledge was assessed using a structured questionnaire administered before (pretest) and after (posttest) the educational intervention. Group I comprised 49 students who received education using a dental phantom, while Group II comprised 49 students who received education using audiovisual media. The groups were assigned before the intervention without randomization.

The study population consisted of all 98 students aged 10–12 years enrolled at SDN 25 Gadut. Total population sampling was employed, with all eligible students included as respondents. The inclusion criteria were students aged 10–12 years enrolled at the school, able to understand the instructions and complete the questionnaire, and participating with parental consent and student assent. The exclusion criteria were students who were absent during the intervention or had incomplete questionnaires. Students with cognitive or communication limitations that prevented them from completing the questionnaire were also excluded, if applicable.

Data were analyzed descriptively using frequency distributions and percentages to summarize students' knowledge levels before and after the intervention in each group. No inferential statistical tests were conducted; therefore, the findings were interpreted descriptively and did not establish statistical significance or the superiority of either educational medium.

The research instrument was a toothbrushing knowledge questionnaire covering the definition and purpose of toothbrushing, appropriate toothbrushing times, frequency of toothbrushing, selection of toothbrushes and toothpaste, the appropriate amount of toothpaste, toothbrushing techniques, areas of the teeth and oral cavity that should be cleaned, and toothbrush maintenance. The questionnaire consisted of closed-ended questions with predetermined answer choices. Each correct answer was assigned a score of 1, while an incorrect answer was assigned a score of 0. The total score obtained by each respondent was then calculated to determine their level of knowledge.

Data collection was conducted in several stages. First, coordination was established with the administration of SDN 25 Gadut, Agam Regency, and the objectives and procedures of the study were explained. The respondents were then informed about the research activities and asked to complete an initial questionnaire (pretest) to assess their knowledge before the health education intervention. Following the pretest, the 98 respondents were divided into two groups, each consisting of 49 students.

Group I received health education on proper toothbrushing techniques using a dental phantom, namely a model of the teeth and oral cavity used to demonstrate toothbrushing techniques directly. Group II received the same educational material using audiovisual media in the form of a video or visual presentation containing information and demonstrations of proper toothbrushing techniques. The educational content and duration were kept relatively similar between the two groups.

After the health education sessions were completed, both groups were given the same questionnaire again as a posttest to assess their knowledge after receiving the intervention. The pretest and posttest data were subsequently checked for completeness, coded, processed, and analyzed according to the objectives of the study.

Data were analyzed using univariate analysis to describe respondent characteristics and the distribution of toothbrushing knowledge before and after te health education intervention. Knowledge scores were presented as frequencies and percentages. Knowledge levels were categorized according to the percentage of scores obtained by each respondent as follows: good (76–100%), moderate (56–75%), and poor (≤55%).

Participation in the study was voluntary. Parental consent and student assent were obtained before data collection, where applicable. Respondents' information was handled confidentially and used solely for research purposes.

3. RESULTS

3.1 Frequency Distribution of Students' Toothbrushing Knowledge Before and After Health Education Using Dental Phantom Media

Table 1*. Frequency Distribution of Toothbrushing Knowledge Before and After Health Education Using Dental Phantom Media Among Students Aged 10–12 Years at SDN 25 Gadut, Agam Regency*

Knowledge Level	**Before Health Education**		**After Health Education**	
	f	%	f	%
Good	22	44,9	44	89,8
Moderate	26	53,1	5	10,2
Poor	1	2,0	0	0
Total	49	100	49	100

The results showed that before receiving health education using dental phantom media, the respondents' level of knowledge regarding proper toothbrushing was not yet optimal. Of the 49 respondents, 22 (44.8%) had a good level of knowledge, 26 (53.2%) had a moderate level of knowledge, and 1 (2.0%) had a poor level of knowledge. The predominance of the moderate knowledge category before the intervention indicates that most respondents had basic knowledge about toothbrushing, but their understanding was not yet fully adequate. This condition highlights the importance of providing oral health education supported by learning media appropriate to the characteristics of school-aged children. Oral health education is one of the strategies that can be used to improve children's knowledge and understanding of oral health maintenance, including proper toothbrushing techniques [7,8].

After receiving health education using dental phantom media, a change was observed in the distribution of the respondents' knowledge levels. The number of respondents with a good level of knowledge increased from 22 (44.8%) to 44 (89.8%), while 5 respondents (10.2%) remained in the moderate category, and no respondents were classified as having poor knowledge. Descriptively, these findings indicate an increase in the proportion of respondents with good knowledge after receiving health education using dental phantom media. This change suggests that information regarding proper toothbrushing techniques may have been better received after the respondents participated in health education using a medium that allowed the material to be presented in a concrete and easily observable manner [8,9].

The increase in knowledge observed in this study may be associated with the use of a dental phantom as an educational aid during the health education process. A dental phantom allows educators to directly demonstrate the different parts of the teeth and proper toothbrushing movements. Thus, respondents receive information not only through verbal explanations but also through observation of objects and demonstrations. The use of demonstration methods provides participants with an opportunity to observe the process directly, making the material more concrete and easier to understand. A study by Anwar and Zulkifli among children aged 10–12 years also demonstrated an increase in toothbrushing knowledge after education was provided through a demonstration method using a dental phantom [8].

The findings of this study are also consistent with those of Aritonang and Purba, who compared oral health education using poster and dental phantom media among elementary school students. Their study showed that the use of a dental phantom resulted in 75% of students having a good level of knowledge, while 16.7% had a moderate level and 8.3% had a poor level of knowledge. These findings indicate that a dental phantom can be used as a teaching aid in toothbrushing education because it provides a more concrete representation than information presented through two-dimensional visual media [10]. These findings support the results of the present study, in which the proportion of respondents with good knowledge increased after receiving health education using a dental phantom.

The results of this study are also consistent with those of Gonie, Wowor, and Mariati, who reported that dental health education using a demonstration method with a dental phantom was effective in improving toothbrushing knowledge among elementary school students. Their study used a pretest–posttest design and demonstrated increased knowledge following oral health education accompanied by a demonstration [11]. Similarly, Sulistiani and Hanum reported that health education using a lecture method combined with demonstrations improved toothbrushing knowledge among elementary school children, as indicated by an increase in the mean knowledge score after the intervention [12]. The consistency of these findings suggests that presenting toothbrushing information using a dental phantom can help students understand the material more effectively.

From a pedagogical perspective, the use of a dental phantom in toothbrushing education provides a more concrete learning experience because respondents can directly observe tooth positioning, the direction of brushing movements, and the areas of the teeth that need to be cleaned. School-aged children generally benefit from clear and observable examples so that the information provided can be understood and remembered more easily. Therefore, dental phantom media can serve as an alternative medium for oral health promotion in schools, particularly for educational content related to toothbrushing skills. Studies by Aritonang and Purba, as well as studies on demonstration methods among elementary school children, indicate that the use of teaching aids and demonstrations can support improvements in knowledge regarding proper toothbrushing techniques [8,11].

The increase from 22 respondents (44.8%) with good knowledge before the intervention to 44 respondents (89.8%) after the intervention demonstrates a clear descriptive change in the distribution of knowledge. In addition, the absence of respondents in the poor knowledge category after the intervention indicates that all respondents had achieved at least a moderate level of knowledge. These findings provide a descriptive indication that health education using dental phantom media may help improve children’s understanding of proper toothbrushing techniques [8,9,12].

Based on these findings, dental phantom media may be considered as one of the media options for oral health promotion activities in elementary schools. This medium can support interactive health education because it allows educators to demonstrate toothbrushing techniques directly and enables respondents to observe the steps being explained. Thus, the use of dental phantom media not only facilitates the delivery of information but may also support a more concrete learning process in oral health education for elementary school children [7,9,11].

3.2 Frequency Distribution of Students' Toothbrushing Knowledge Before and After Health Education Using Audiovisual Media

***Table 2**. Frequency Distribution of Toothbrushing Knowledge Before and After Health Education Using Audiovisual Media Among Students Aged 10–12 Years at SDN 25 Gadut, Agam Regency*

Knowledge level	Before Health Education		After Health Education	
	f	%	f	%
Good	20	40,8	41	83,7
Moderate	27	55,2	8	16,3
Poor	2	4,0	0	0
Total	49	100	49	100

The findings showed an improvement in students' tooth-brushing knowledge following health education using audiovisual media. The proportion of students with good knowledge increased from 22 (44.8%) before the intervention to 44 (89.8%) afterward, representing a 45.0 percentage-point increase. Meanwhile, the proportion with moderate knowledge decreased from 53.2% to 10.2%, and no students remained in the poor knowledge category. These descriptive findings indicate a shift toward a higher level of knowledge following the educational intervention.

The improvement in knowledge following education using dental phantom media may be explained by its practical and demonstrative characteristics, which allow students to observe tooth-brushing techniques directly. Dental phantoms provide a concrete representation of oral structures and brushing movements, helping students understand the correct technique. This approach is particularly useful for educational material involving practical skills. Learning media that provide concrete experiences can facilitate students' understanding of educational content [16,17]. However, the effectiveness of phantom media should also be considered in relation to students' baseline knowledge and the educational methods used.

Similarly, the improvement following audiovisual education may be associated with the combination of visual and auditory stimuli provided through animated videos, moving images, and verbal explanations. These features can attract students' attention and help them understand information about tooth-brushing frequency, timing, toothpaste use, and proper brushing techniques. Previous studies by Jelita et al., Haloho et al., and Prasko et al. reported improvements in children's tooth-brushing knowledge following audiovisual or animated-video education [14,17,18]. A systematic review by Daulay and Pakpahan also supported the use of visual and audiovisual media in oral health education for elementary school children [6].

Both phantom and audiovisual media can support oral health education through different learning approaches. Phantom media provide direct demonstrations of tooth-brushing techniques, whereas audiovisual media combine visual and auditory stimuli to present educational information. Harapan et al. reported that animated video media produced a greater improvement in tooth-brushing knowledge than dental phantom media in their study [15]. In the present study, the comparison between the two media was based on descriptive changes in students' knowledge distributions. Therefore, the findings can describe the patterns of knowledge improvement associated with each medium but cannot establish statistical differences or determine the superiority of one medium over the other.

These findings highlight the potential of both phantom and audiovisual media as educational tools for promoting oral and dental health among elementary school students. Selecting media that match children's learning characteristics and the educational objectives may improve the delivery and understanding of health messages [6,13,16]. Dental phantoms may be particularly useful for demonstrating brushing movements, while audiovisual media can support the presentation of information in an engaging and accessible format. Combining the two approaches may also be considered to support both conceptual understanding and practical learning.

This study has limitations. The analysis was based on frequency distributions and percentages without statistical testing; therefore, the observed changes in students' knowledge can only be

interpreted descriptively and cannot be considered statistically significant differences. Furthermore, the study assessed knowledge rather than actual tooth-brushing practices or long-term behavioral changes. Future studies should incorporate appropriate statistical analyses, evaluate practical tooth-brushing skills, and include follow-up assessments to examine the sustainability of knowledge improvement.

4. CONCLUSIONS

Based on the findings of this study, it can be concluded that there was an increase in students' knowledge of tooth brushing after health education was provided using both phantom and audiovisual media. Descriptively, both educational media, namely dental phantom and audiovisual media, demonstrated a shift in students' knowledge levels toward a better category. The increase in the proportion of students with good knowledge by 45.0 percentage points in the phantom group and 42.9 percentage points in the audiovisual group indicates that both media can be used as educational tools to improve students' knowledge regarding tooth brushing.

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LEGAL PROTECTION OF PATIENT PRIVACY RIGHTS AGAINST DISCLOSURE BY HEALTHCARE PROFESSIONALS ON SOCIAL MEDIA

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Abstract

The rapid development of information technology and the increasing use of social media in healthcare services have created significant risks to patients' right to privacy, particularly through the unauthorized disclosure of personal health information by healthcare professionals. This study aims to analyze the legal protection of patients' privacy rights and the legal consequences applicable to healthcare professionals who violate such rights through social media. This research employs a normative juridical method using statutory and conceptual approaches by examining relevant regulations, including the Indonesian Civil Code, Law Number 17 of 2023 on Health, and Law Number 1 of 2024 concerning Electronic Information and Transactions. The study finds that the unauthorized disclosure of patients' personal and health information through social media may constitute an unlawful act and give rise to disciplinary, administrative, civil, and criminal liability. Legal protection available to patients is predominantly repressive and multi-layered, including requests for content removal, complaints to healthcare institutions and professional disciplinary bodies, alternative dispute resolution, civil lawsuits, and criminal proceedings where the statutory elements of an offense are fulfilled. Despite the existing legal framework, its effectiveness remains constrained by implementation challenges, dependence on victims' initiatives, and insufficient regulatory harmonization. Therefore, stronger legal enforcement, comprehensive digital ethics guidelines, increased awareness among healthcare professionals, and better regulatory harmonization are required to ensure effective protection of patients' privacy rights in the digital environment.

Keywords: Patient Privacy; Social Media; Healthcare Professionals; Legal Protection; Legal Liability

1. INTRODUCTION

The development of information technology and social media has significantly changed communication in the healthcare sector. Healthcare professionals increasingly use social media for personal activities, professional communication, health education, and dissemination of medical information. A survey involving approximately 4,000 physicians reported that 90% used social media for personal purposes and 65% for professional purposes [1]. Although social media provides benefits in expanding access to health information and facilitating interaction with the public, its use also creates ethical and legal risks, particularly concerning patient privacy and confidentiality [2].

Patient privacy is an essential element of the relationship between healthcare professionals and patients. Patients disclose personal and medical information based on trust that such information will only be used for legitimate healthcare purposes. Therefore, healthcare professionals are required to maintain the confidentiality of information obtained during healthcare services. Previous studies have identified patient privacy, professional boundaries, and professional reputation as important ethical concerns in the use of social media by healthcare professionals[3]. The issue becomes more serious

when patient information, photographs, videos, diagnoses, or medical procedures are disclosed through social media without the patient's consent.

Several documented cases in Indonesia show that patient privacy violations through social media have produced legal and professional consequences. In April 2022, Kevin Samuel Marpaung posted a video recorded during a vaginal examination of a patient in childbirth, showing inappropriate gestures; the patient was identifiable, no consent had been given, and after the content went viral the Indonesian Nurses Association (PPNI) imposed a disciplinary sanction, the professional was dismissed, and criminal proceedings were initiated under the ITE Law [4].

In May 2022, a nursing student in Yogyakarta disclosed on social media the physical characteristics and medical condition of a male patient whose catheter she had inserted, without consent; she received academic sanctions and mandatory ethics training, while her institution apologised and tightened its social media policy. In Ogan Komering Ulu Timur, a health worker livestreamed a surgical procedure on TikTok to approximately 4,600 viewers without the patient's consent; the Regional Health Office suspended the practice licence and the hospital was ordered to revise its internal device-use policy [5].

These cases share a common pattern: disclosure without informed consent, patient identifiability, wide dissemination through social media, and accountability through disciplinary, administrative or criminal channels following public attention or formal complaint.

Indonesian law provides several legal foundations for protecting patient privacy. Law Number 17 of 2023 concerning Health recognizes the confidentiality of personal health information and establishes obligations for healthcare professionals regarding patient information. In the digital environment, Law Number 1 of 2024 concerning the Second Amendment to Law Number 11 of 2008 concerning Electronic Information and Transactions regulates the use of personal information through electronic media and emphasizes the importance of the consent of the person concerned. Protection is further strengthened by Law Number 27 of 2022 concerning Personal Data Protection, which provides specific protection for personal data, including health information. Accordingly, unauthorized disclosure of patient information through social media may not only constitute an ethical violation but may also give rise to disciplinary, administrative, civil, and criminal consequences.

Nevertheless, the existence of several overlapping legal instruments raises questions regarding how legal protection is applied in practice. A single disclosure of patient information through social media may simultaneously involve professional discipline, healthcare regulations, civil liability, electronic information law, and personal data protection law. Previous studies [2] have largely focused on ethical conduct and professional responsibilities in the use of social media, while the legal remedies available to patients and the sanctions that may be imposed on healthcare professionals require further examination [3].

Therefore, this study focuses on two principal issues: the forms of legal protection available to patients whose privacy rights are violated through social media by healthcare professionals, and the legal sanctions that may be imposed on healthcare professionals who commit such violations. This study is expected to contribute to the development of health law and privacy law in the digital environment and to provide practical legal understanding for patients, healthcare professionals, and healthcare institutions regarding the protection of patient information on social media

2. METHODOLOGY

This study employed a normative juridical research method, also referred to as doctrinal legal research, because the object of the study consists primarily of legal norms, principles, and statutory provisions governing patient privacy and the responsibilities of healthcare professionals.[6]. Normative legal research is conducted through the examination of legal materials and secondary sources relevant to the legal issues being analyzed [7]. This study was descriptive-analytical in nature, as it systematically described the applicable legal framework and subsequently analyzed its application to violations of patient privacy through social media.

The research applied two principal approaches: the statutory approach and the conceptual approach. The statutory approach was used to examine the legal provisions governing patient confidentiality, personal data protection, electronic information, professional responsibility, and

available legal remedies. The principal legal materials included the Indonesian Civil Code, Law Number 17 of 2023 concerning Health, Law Number 1 of 2024 concerning Electronic Information and Transactions, and Law Number 27 of 2022 concerning Personal Data Protection, together with relevant implementing regulations and professional disciplinary provisions. The conceptual approach was used to examine concepts concerning legal protection, patient privacy, therapeutic relationships, confidentiality, and professional responsibility.

The legal materials consisted of primary, secondary, and tertiary legal materials. Primary legal materials comprised legislation and regulations relevant to patient privacy and healthcare professionals. Secondary legal materials included books, journal articles, academic studies, and legal commentaries concerning health law, privacy, professional ethics, and personal data protection. Tertiary materials, including dictionaries and relevant media sources, were used where necessary to provide additional explanation and contextual information. The cases and professional ethical issues discussed in the study were used as supporting contextual materials to illustrate privacy-related conduct by healthcare professionals rather than as empirical samples.

The materials were collected through library research and analyzed qualitatively using normative legal analysis. Relevant statutory provisions, legal principles, concepts, and scholarly opinions were identified, classified, interpreted, and systematically connected to determine the forms of legal protection available to patients and the possible legal consequences for healthcare professionals who disclose patient information through social media. The analysis was then presented systematically to answer the research questions of the study.

3. RESULTS

Based on the analysis of the applicable legal framework, this study finds that violations of patient privacy by healthcare professionals through social media give rise to several interconnected legal consequences. Patient protection is not regulated under a single legal instrument, but is formed through the interaction of civil law, health law, electronic information law, personal data protection law, and professional disciplinary regulations. The findings further show that patients may obtain protection through different mechanisms depending on the nature and impact of the violation, while healthcare professionals may be subject to disciplinary, administrative, civil, and criminal consequences. In addition, patients are provided with several legal remedies, ranging from preservation of electronic evidence and removal of content to professional complaints, dispute resolution, civil claims, and criminal proceedings where the statutory requirements are fulfilled. Accordingly, the results of this study are presented in three main sections: legal protection for patients, legal sanctions for healthcare professionals, and legal remedies available to patients.

3.1 Legal Protection for Patients Against Privacy Violations on Social Media

The results indicate that legal protection for patients whose privacy is violated by healthcare professionals through social media is multi-layered and predominantly repressive. Following Muchsin [8], legal protection may be divided into preventive and repressive protection, the latter operating after a violation has occurred to resolve disputes and provide remedies; in social media disclosure cases, protection generally becomes relevant only once the patient's information has already been published or disseminated.

Preventive protection combines regulatory, institutional, and educational measures. At the regulatory level, Law No. 17 of 2023 on Health recognizes confidentiality as a protected right (Art. 4(1)(i)) and establishes professional accountability (Art. 305), while Government Regulation No. 28 of 2024 imposes corresponding obligations on professionals and healthcare institutions, including internal policies, supervision, and prohibitions on unauthorized recording or photography of patients. Law No. 27 of 2022 on Personal Data Protection adds consent requirements and obliges healthcare institutions, as data controllers, to adopt administrative, technical, and organisational safeguards such as access controls, staff training, and audit mechanisms.

Educationally, professional associations, universities, and employers are expected to provide continuing training on confidentiality, digital ethics, and professional boundaries — an approach reinforced by Minister of Health Regulation No. 3 of 2025, which allows training requirements to form

part of disciplinary sanctions. Comparable international guidance, such as the UK General Medical Council's Doctors' use of social media (2013), shows how clear professional standards can prevent violations, although it is not binding in Indonesia. In practice, however, these mechanisms remain limited: many institutions lack comprehensive social media policies and awareness of legal obligations among professionals is uneven, so stronger institutional commitment, clearer operational guidelines, and sustained education are needed.

Repressive protection becomes relevant after a violation has occurred and focuses on remedies for the patient and accountability for the professional, through several interconnected mechanisms discussed below.

3.1.1 Protection under the Indonesian Civil Code (KUHPerdata)

The relationship between healthcare professionals and patients creates legal rights and obligations through a therapeutic relationship. One of the obligations inherent in this relationship is the obligation to respect the patient's rights and confidentiality. Where a healthcare professional unlawfully discloses patient information and causes harm, such conduct may constitute an unlawful act under Article 1365 of the Indonesian Civil Code.

Article 1365 provides that a person whose unlawful act causes damage to another person is responsible for compensating the injured party. Accordingly, patients whose privacy is violated through the publication of medical information, photographs, videos, or treatment processes may claim compensation for both material and immaterial losses. Article 1367 of the Civil Code may also provide a basis for examining the responsibility of hospitals or healthcare institutions for unlawful acts committed by persons under their responsibility [9].

Therefore, civil law protection places emphasis on restoring the patient's rights through compensation where the elements of unlawful conduct, fault, loss, and causality can be established.

3.1.2 Protection under Law Number 17 of 2023 concerning Health

Law Number 17 of 2023 concerning Health provides more specific protection of patients' health information. Article 4 paragraph (1) letter i recognizes the right to confidentiality over personal health data and information, establishing confidentiality as a legally protected right and imposing a corresponding duty on healthcare professionals. That duty is grounded in the therapeutic relationship, characterized by trust, dependency, and information asymmetry, and is therefore not discretionary but inherent in the provision of healthcare services: patient information may not be disclosed freely, and any disclosure requires a lawful basis such as consent or another ground recognized by legislation.

The protection is operationalized through Article 305, which provides a complaint mechanism for patients or their families harmed by professional conduct and enables accountability through the disciplinary process. The Disciplinary Board (Majelis Kehormatan Disiplin Tenaga Kesehatan) examines complaints, assesses whether professional standards have been breached, and imposes sanctions where violations are established. Minister of Health Regulation Number 3 of 2025 specifies that disclosure of patient confidentiality constitutes a disciplinary violation sanctionable by written warning, mandatory education or training, temporary suspension of professional registration, or a recommendation for license revocation. Government Regulation Number 28 of 2024 reinforces the duty and sets administrative measures oral and written warnings, administrative fines, temporary suspension of practice, and license revocation while holding healthcare institutions responsible for ensuring compliance and liable to institutional sanctions where oversight is inadequate. These sanctions serve not only to punish the violating professional but also to protect future patients and maintain public trust in the healthcare system.

The connection between rights and obligations is thus structured: patients hold a legally recognized right to confidentiality, professionals bear a corresponding duty to protect patient information, and disciplinary, administrative, and judicial mechanisms enforce that duty. The Health Law likewise recognizes patient autonomy through the right to adequate information about health conditions and treatment, a principle closely tied to informed consent. Komalawati explains that adequate information allows the patient to participate actively as a legal subject in medical decision-making, and the same

principle requires professionals to respect the patient's control over information concerning their health [10].

3.1.3 Protection under the ITE Law and Personal Data Protection Law

Protection of patient privacy becomes particularly important where disclosure occurs through electronic media. Article 26 of Law Number 1 of 2024 concerning Electronic Information and Transactions provides that the use of information relating to an individual's personal data through electronic media must generally be based on the consent of the person concerned. Therefore, publication of photographs, videos, diagnoses, medical procedures, or other identifiable patient information through social media without lawful consent may infringe the patient's privacy rights [11] .

Law Number 27 of 2022 concerning Personal Data Protection further strengthens this protection because health information constitutes personal data requiring specific protection. Unauthorized disclosure of such information may therefore constitute not only a breach of professional confidentiality but also an unlawful disclosure or processing of personal data [12].

The interaction between the Civil Code, Health Law, ITE Law, and Personal Data Protection Law demonstrates that patient privacy is protected through complementary legal mechanisms. A single act of unauthorized publication may consequently generate more than one form of legal responsibility.

3.2 Legal Sanctions for Healthcare Professionals

The study finds that a healthcare professional who violates patient confidentiality through social media may face four distinct bodies of legal consequence: professional disciplinary sanctions, administrative sanctions, employment or institutional sanctions, and civil and criminal liability. These regimes rest on different legal bases, are imposed by different authorities through different procedures, and produce different legal effects. They may apply cumulatively to a single act of disclosure, but cumulation does not merge them: a reprimand issued by a hospital, a disciplinary sanction imposed by a professional body, and an administrative sanction imposed by an authorized official remain three separate instruments, each subject to its own grounds of challenge. The analysis therefore proceeds by regime.

3.2.1 Professional Disciplinary Sanctions

Article 305 of Law Number 17 of 2023 concerning Health allows a patient or the patient's family whose interests have been harmed to lodge a complaint with the Majelis Disiplin Profesi (MDP), which assesses professional discipline and fitness to practise rather than awarding compensation. Article 308 reinforces this screening function by requiring an MDP recommendation, issued within fourteen working days, before criminal proceedings may be pursued for conduct arising from service delivery. Where a violation is established, Article 306 provides for a written warning, an obligation to undertake training, temporary deactivation of the Surat Tanda Registrasi (STR), and/or a recommendation for revocation of the Surat Izin Praktik (SIP). Minister of Health Regulation Number 3 of 2025 specifies in Article 4 paragraph (1) letter i that "membuka rahasia kesehatan pasien" constitutes a disciplinary violation, with sanctions set out in Article 28.

3.2.2 Administrative Sanctions

Administrative sanctions are imposed by a government official rather than a professional body, and rest on administrative rather than professional-ethical grounds. Article 735 of Government Regulation Number 28 of 2024 reaffirms the duty to safeguard patient health secrets; Article 736 provides that breach may attract an oral warning, a written warning, an administrative fine, and/or revocation of license; and Article 747 vests the power to impose them in the Central, Provincial, or Regency/Municipal Government according to competence, on the basis of a complaint or official finding. The Health Law adds a more specific basis in Articles 422 to 427, which provide for a written warning, an administrative fine of up to Rp500,000,000 depending on the gravity and impact of the violation, temporary suspension of the practice license or competency certificate, and permanent revocation of

the STR or SIP [13] [14]. Being administrative decisions, these measures are governed by administrative law and may be challenged before the administrative court.

3.2.3 Employment and Institutional Sanctions

Sanctions of the third category are not health law sanctions at all. A hospital's reprimand, reassignment, or termination rests on the employment agreement, internal bylaws and credentialing rules, and employment law, Law Number 13 of 2003 and Government Regulation Number 35 of 2021, or Government Regulation Number 94 of 2021 for civil servants. Such measures regulate the employment relationship; they do not determine fitness to practice and neither substitute for nor preclude disciplinary or administrative determination. The Kevin Samuel Marpaung case illustrates the point: dismissal by the health facility, a measure by the professional association, and criminal proceedings under the ITE Law operated as three separate channels arising from a single act.

3.2.4 Civil Liability

Civil liability arises where unauthorized disclosure causes loss to the patient. Article 1365 of the Civil Code provides the principal basis, requiring an unlawful act, fault, damage, and causation; the losses claimed may be material or immaterial. In social media cases, immaterial losses may be particularly significant, since disclosure can cause embarrassment, psychological distress, damage to reputation and dignity, social stigma, or discrimination. Article 1367 may extend responsibility to the institution employing or supervising the professional [9] , while Article 310 of the Health Law requires disputes over alleged professional error to be resolved first through alternative dispute resolution. Civil liability thus performs a restorative function, focusing on compensation.

3.2.5 Criminal Liability

Criminal liability is the most serious consequence and does not arise automatically from every breach of confidentiality: it requires proof of the statutory elements of a specific offence and must be distinguished from disciplinary, administrative, and civil mechanisms [12]. Under Law Number 27 of 2022, Article 67 paragraph (2) criminalizes the intentional and unlawful disclosure of another person's personal data. Provisions of the ITE Law may also apply where electronic information is unlawfully accessed, transferred, or disclosed — Article 26 (consent), Article 30 (unlawful access), and Article 32 (unlawful alteration, transfer, or disclosure), with penalties in Articles 46 and 48 as amended by Law Number 1 of 2024.

3.3 Legal Remedies Available to Patients

The study further identifies several steps that patients may take to obtain legal protection after their privacy has been violated. The first step is to preserve electronic evidence before requesting deletion of the content. Evidence may include screenshots, screen recordings, links, account identities, publication dates, communications with healthcare professionals or healthcare institutions, and documents demonstrating the resulting losses. Article 64 of the Personal Data Protection Law recognizes electronic information and/or electronic documents as valid evidence in personal data protection disputes [12].

After preserving evidence, the patient may request the healthcare professional or healthcare institution to stop further dissemination and remove the relevant content. The patient may also use the reporting or privacy complaint mechanisms available on the relevant social media platform. Where the healthcare professional is employed by a hospital, clinic, public health center, or another healthcare institution, an internal complaint may also be submitted to request investigation and corrective measures.

Professional remedies may subsequently be pursued through the disciplinary mechanism under Article 305 of the Health Law and Minister of Health Regulation Number 3 of 2025. Administrative complaints may also be submitted to competent health authorities where the conduct constitutes a violation of health-sector regulations [13].

Alternative dispute resolution may also be pursued. Article 64 of the Personal Data Protection Law recognizes dispute settlement through court proceedings, arbitration, or other alternative dispute resolution mechanisms. Furthermore, the Health Law provides a mechanism for resolving certain disputes involving healthcare professionals outside the court. Such settlement may include removal of the content, an undertaking not to republish the information, clarification or apology, compensation, internal investigation, or improvement of institutional privacy procedures.

Where these mechanisms do not provide adequate recovery, patients may file a civil claim. Article 12 of the Personal Data Protection Law provides data subjects with the right to claim compensation for violations involving the processing of their personal data. This claim may be considered together with Article 1365 of the Civil Code where the elements of an unlawful act are established.

Finally, criminal proceedings remain available where the elements of a criminal offense are fulfilled. Therefore, the legal remedies available to patients form a progressive and multi-layered mechanism, beginning with evidence preservation and cessation of dissemination, followed by institutional and disciplinary complaints, alternative dispute resolution, civil proceedings, and criminal proceedings where legally justified.

4. CONCLUSIONS

This study concludes that the unauthorized disclosure of patient information through social media by healthcare professionals constitutes a violation of patient privacy and may amount to an unlawful act when it infringes legally protected rights and causes harm. Patient privacy is not merely an ethical obligation within the healthcare profession but a legally protected right supported by the Indonesian Civil Code, Law Number 17 of 2023 concerning Health, Law Number 1 of 2024 concerning Electronic Information and Transactions, and Law Number 27 of 2022 concerning Personal Data Protection. The legal protection available to patients is predominantly repressive and multi-layered, including requests for cessation and removal of the content, complaints to healthcare institutions and professional disciplinary bodies, alternative dispute resolution, civil claims for compensation, and criminal proceedings where the statutory elements of an offense are fulfilled.

Healthcare professionals who violate patient privacy may consequently face different forms of legal responsibility depending on the nature and severity of the violation. These include professional disciplinary and administrative sanctions, civil liability for material and immaterial damages, and criminal liability where intentional and unlawful disclosure satisfies the relevant criminal provisions. The involvement of several legal regimes demonstrates that protection of patient privacy in the digital environment requires an integrated approach rather than reliance on a single legal mechanism.

Although the existing legal framework provides relatively comprehensive protection, its effectiveness remains affected by practical challenges, particularly dependence on the patient's initiative to report violations, difficulties in controlling information after it has spread through social media, and the need for stronger harmonization between healthcare, electronic information, and personal data protection regulations. Therefore, stronger implementation of existing laws, clearer digital ethics guidelines for healthcare professionals, institutional policies on social media use, and greater awareness of patient privacy rights are necessary to ensure more effective protection of patients in the digital healthcare environment.

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INDONESIAN TRADITIONAL FERMENTED FOODS AND IRON STATUS IN ADOLESCENT GIRLS: A NARRATIVE REVIEW OF MECHANISMS AND AVAILABLE EVIDENCE

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Abstract

Anemia remains a major public health problem among Indonesian adolescent girls, with a national prevalence of 18% in the 2023 Indonesian Health Survey (SKI) and higher figures in the 2018 Basic Health Research (Riskesdas). Compliance with iron-folic acid supplementation remains difficult to sustain, keeping interest alive in food-based strategies that complement existing programs. Among the options available in Indonesia are traditional fermented foods, tempeh, dadih, tape, and oncom, whose fermentation processes are known to alter mineral bioavailability, though their specific contribution to adolescent iron status has received comparatively little attention. This narrative review brings together the scientific evidence and biological mechanisms linking Indonesian fermented foods to iron bioavailability and status, focusing on adolescent girls, drawing on PubMed, Google Scholar, and Scopus for openly accessible studies published between 2016 and 2026. Three mechanisms recur across the evidence: microbial phytase activity lowers phytate content, lactic acid bacteria reduce luminal pH and favor conversion of ferric to ferrous iron, and anti-inflammatory effects may lower hepcidin-mediated suppression of iron absorption. Tempeh carries the strongest support, with several small Indonesian studies linking tempeh-based products to higher hemoglobin levels in anemic adolescent girls. The case for dadih, tape, and oncom remains biologically plausible but rests mainly on mechanistic or preclinical data; dadih from Riau has yet to be tested against any iron-related outcome. Taken together, these fermented foods offer a culturally familiar, affordable complement to existing anemia-control efforts, though confirming their efficacy and establishing effective doses will require well-designed randomized controlled trials in Indonesian adolescent populations.

Keywords: Fermented Foods, Iron Bioavailability, Anemia, Adolescent Girls, Tempeh

1. INTRODUCTION

Anemia is one of the most chronic nutritional concerns among adolescents in Indonesia. The 2023 Indonesian Health Survey (SKI) revealed that 15.5% of individuals aged 15 to 24 were anemic, with adolescent females significantly impacted at 18% compared to 14.4% of boys [1]. Even though it is lower than the 32% reported for this age group in the 2018 Basic Health Research (Riskesdas), when girls reached 27.2% [1], [2], the current number exceeds the 10% threshold that the World Health Organization considers a public health problem [1] [2]. Rapid development, regular iron loss due to menstruation, and often imbalanced and low-bioavailable iron dietary patterns contribute to compounding risk factors for adolescent females [2] [3]. Anemia in this population is linked to a higher risk of complications for both the mother and the expectant child if it persists throughout pregnancy, as well as a diminished physical capacity and impaired cognitive function if left untreated [3].

The most common approach of the Indonesian government to prevent anemia in adolescent girls is the provision of weekly iron-folic acid tablets (TTD) through schools. However, side effects, taste aversion and irregular distribution often compromise compliance [3] [4]. This has maintained interest in complementary food-based strategies to improve dietary iron intake and absorption using locally available foods that are more affordable, culturally embedded and easier to sustain [3], [4].

Indonesia possesses a rich heritage of traditional fermented foods, including tempeh (fermented soybean using Rhizopus oligosporus) [5], dadih (fermented buffalo milk from West Sumatra and Riau) [6], tape (fermented cassava or glutinous rice) [7], and oncom (fermented soybean or tofu pulp) [8]. Fermentation is well established in the food-science literature as a process capable of altering the mineral bioavailability of plant-based staples: microbial phytase activity degrades phytate, the principal antinutrient that binds iron and zinc in legumes and cereals, while lactic acid bacteria (LAB) generate organic acids that further support mineral solubility [9], [10]. A related narrative review of these same Indonesian fermented foods examined their relationship to mental health via the gut-brain axis and found the clearest clinical evidence for tempeh, while evidence for dadih, tape, and oncom remained largely mechanistic. That review did not, however, examine iron-related outcomes, despite anemia being a substantially larger public health burden among Indonesian adolescent girls, and despite iron status and mental health sharing overlapping physiological pathways such as inflammation.

This narrative review aims to: (1) investigate the biological processes by which fermentation might affect iron bioavailability and status; (2) compile existing evidence regarding Indonesian traditional fermented foods (tempeh, dadih, tape, oncom) concerning iron-related outcomes, particularly focusing on adolescent girls; and (3) pinpoint research deficiencies to direct future investigations and enhance local anemia-control initiatives, especially in Riau, where dadih is indigenous.

2. METHODOLOGY

This narrative review used the electronic databases PubMed/MEDLINE, Google Scholar, and Scopus, including literature produced within the past decade (2016-2026) to guaranty the summary information is up-to-date. Search keywords included include "tempe," "tempeh," "dadih," "tape," "oncom," "Indonesian/traditional fermented meal," "phytate," "phytase," "iron bioavailability," "iron absorption," "anemia," "hemoglobin," "adolescent girls," "lactic acid bacteria," and "probiotics. Inclusion criteria consisted of: (1) publication dates from 2016 to 2026; (2) focus on fermented foods, especially traditional Indonesian items or their bioactive/microbial elements; (3) investigation of relationships with iron bioavailability, iron levels, hemoglobin, or anemia; and (4) availability in Indonesian or English. Mechanistic investigations concerning non-Indonesian fermented staples (such as fermented maize, sourdough bread, and lactic-fermented vegetables) were incorporated when they demonstrated a biologically credible mechanism relevant to Indonesian items. Titles, abstracts, and keywords were screened, followed by full- or partial-text review against the criteria above, and reference lists of relevant articles were hand-searched for additional sources.

3. RESULTS AND DISCUSSION

The studies that met the inclusion criteria were grouped into three categories: (1) mechanistic and food-science studies that examined the impact of fermentation on phytate content and mineral bioavailability; (2) a microbiological characterization study of Indonesian dadih, which included local Riau dadih; and (3) small-scale intervention and product development studies that tested the hemoglobin or iron content of adolescent girls using tempeh-based products. In an Indonesian adolescent population, no controlled trial was identified that directly tested dadih, tape, or oncom against iron-related outcomes. Table 1 provides a summary of the primary empirical studies; the following section provides a narrative discussion of broader mechanistic and review-type evidence

Table 1. *Summary of primary empirical studies included in the narrative review.*

No	Title	Study Design	Subject/Material	Results
1	Enhancing iron and zinc bioavailability in maize (*Zea mays)* thougt phytate reduction: the impact of fermentation alone and in combination with soaking and germination [10]	Experimental (fermentation/soaking/germination)	Maize flour	Combined processing reduced phytate by up to 85.6%, lowering phytate iron and phytate, zinc molar ratios toward recommended thresholds
2	Tempeh extract fortified with iron and synbiotic as a strategy against anemia[15]	Experimental (Wistar rats)	24 anemic model rats (3 groups)	Iron- and synbiotic-fortified tempeh extract showed potential to raise hemoglobin levels compared with an untreated control.
3	Effectiveness of Moringa Tempeh Burgers in Increasing Hemoglobin of Anemic Adolescent Girls [16]	Quasi-experimental	51 anemic girls, 13-15y (3 groups)	Hemoglobin rose by 0.46, 0.70, and 2.23 g/dL across control and two Moringa-tempeh burger doses after 30 days.
4	Pemberian Nugget Tempe terhadap Kadar Hemoglobin pada Remaja Putri [17]	Pre-experimental (pretest-posttest)	43 adolescent girls	Mean hemoglobin increase of 0.40 g/dL after one month of tempeh-nugget supplementation ($p < 0.001$).
5	Development of tempe flour-enriched snacks to prevent anemia in adolescent girls [18]	Product development (R&D) study	Adolescent girls (formulation/acceptability)	Best-accepted formula contained 1.46 mg iron per 100 g; proposed as a food-based approach, pending clinical trials.

6	Bacterial biodiversity and metagenomic study of dadih, traditional fermented buffalo milk from Kampar district, Riau, Indonesia [19]	Metagenomic/microbiological	Artisanal dadih from 3 villages	Identified a diverse native lactic acid bacteria community dominated by Lactococcus lactis; iron-related outcomes not yet tested.

3.1 Mechanisms linking fermentation to iron bioavailability

Three complementary mechanisms emerge from the literature. First, fermentation reduces phytate, the principal inhibitor of non-heme iron and zinc absorption in legume and cereal based diets. Phytases produced by Rhizopus oligosporus and associated Bacillus species during tempeh fermentation hydrolyze phytate, releasing bound minerals and improving their theoretical bioaccessibility [9]. This effect is not unique to soy based tempeh: studies on other fermented staples, such as maize, report phytate reductions of up to 85.6% when fermentation is combined with soaking and germination, correspondingly lowering Phytate:Iron and Phytate:Zinc molar ratios toward levels considered adequate for absorption (Table 1) [10]. Because Indonesian traditional fermented foods rely on comparable microbial phytase activity, similar improvements in mineral bioaccessibility are biologically plausible, although direct isotope-tracer or human-absorption data specific to tempeh, dadih, tape, or oncom remain scarce.

Second, lactic acid bacteria (LAB), abundant in dadih, tape, and to a lesser extent tempeh, generate organic acids that lower luminal pH and promote reduction of ferric (Fe^{3+}) to the more absorbable ferrous (Fe^{2+}) form of iron [11]. A recent systematic review of human intervention studies on the fermentation of bread reported an acute increase in non-heme iron bioavailability after meals, especially in low-phytate breads, although the long-term effect on iron status was inconsistent and not always translated into sustained improvement [12]. In contrast, studies on lactic-fermented vegetables report more clear increases in non-heme iron absorption, due to the formation of soluble ferric iron through acidification [13]. This mixed picture suggests that, while the underlying chemistry is plausible, the magnitude of clinical benefit likely depends on the food matrix, the degree of phytate reduction achieved, and the duration of exposure. Ascorbic acid and other organic acids act through a related pathway, forming soluble iron complexes that further enhance absorption when consumed alongside iron-containing foods [11].

Third, LAB and their metabolites may support iron status indirectly by reducing intestinal inflammation and, consequently, hepcidin, the master regulatory hormone that suppresses dietary iron absorption when elevated [11], [14]. By supporting mucosal integrity and dampening inflammatory signaling, regular fermented food consumption could theoretically lower hepcidin mediated iron sequestration, complementing the direct chemical effects of phytate reduction and pH modulation [11], [14].

3.2 Indonesian fermented foods and iron status: available evidence

Tempeh carries the most direct evidence base among Indonesian fermented foods. An iron- and synbiotic-fortified tempeh extract showed potential to raise hemoglobin in an anemic rat model compared with an untreated control (Table 1) [15], while several small human intervention studies have tested tempeh-based products specifically in anemic adolescent girls: tempeh nuggets produced a mean hemoglobin increase of 0.40 g/dL among junior-high students in Gorontalo (Table 1) [17], and a quasi-experimental trial of Moringa-enriched tempeh burgers reported dose-dependent hemoglobin increases over 30 days, from 0.46 g/dL in controls up to 2.23 g/dL in the highest-dose group (Table 1) [16]. A tempeh-flour snack containing 1.46 mg iron per 100 g has also been formulated and piloted specifically as an anemia-prevention product for adolescent girls, though the authors note that clinical

trials are still needed to confirm efficacy (Table 1) [18]. A second narrative literature review also found that the protein, iron, vitamin B12, and folate content of tempeh was adequate to provide it with potential to increase hemoglobin in anemic adolescents [20]. This compilation of evidence indicates that tempeh is a viable and feasible means of enhancing iron levels in adolescents, although the majority of primary studies are limited in size, duration, and geographic scope.

Dadih is a fermented buffalo-milk product from West Sumatra and Riau. It has a strong mechanistic potential but almost no direct evidence on iron outcomes. Metagenomic characterization of dadih produced in Kampar, Riau, confirms a diverse native LAB community dominated by Lactococcus lactis, with composition varying slightly by producer and village (Table 1) [19]. Given that LAB driven acidification and ferric to ferrous reduction are plausible iron-absorption mechanisms documented elsewhere [11]-[13], dadih is a biologically plausible but essentially untested candidate for local anemia-related research, particularly given its cultural relevance and production base within Riau itself.

Tape produced through mixed yeast-LAB fermentation of cassava or glutinous rice [7], offers a distinct potential pathway: cassava is itself a source of vitamin C and organic acids, both established enhancers of non-heme iron absorption when consumed alongside iron-containing foods [11]. However, no studies were identified that directly measured iron bioavailability or status outcomes from tape consumption, and this pathway remains inferential rather than tape-specific.

Oncom fermented from soybean or tofu pulp, is comparatively the least studied of the four in any nutritional context, let alone with regard to iron. Existing literature characterizes its antioxidant and polyphenol content but does not extend to mineral bioavailability or clinical iron outcomes [8].

3.3 Implications and research gaps

Taken together, the evidence positions Indonesian traditional fermented foods, and tempeh in particular, as a culturally accepted, affordable, food-based complement to existing TTD supplementation programs for adolescent girls. Adding products based on tempeh to school nutrition education or feeding programs is a relatively low-barrier intervention because tempeh is already a widely consumed and inexpensive source of iron relative to animal source iron foods. But there are significant gaps. There are almost no controlled trials testing dadih, tape, or oncom versus iron related outcomes in any population, and certainly not in Indonesian adolescents, making this a particularly notable gap for dadih given its established LAB profile and local production in Riau. Current tempeh trials are small, of short duration, and mostly quasi- or pre-experimental rather than randomized, thus limiting causal inference. Recent systematic evidence from non-Indonesian fermented foods also suggests that acute improvements in iron bioavailability do not necessarily translate into sustained gains in iron status . Similar claims for Indonesian fermented foods should be tested rather than assumed [12]. There has not been any systematic research on standardized dosing, processing methods and combination strategies such as combining fermented foods with local vitamin C rich fruits to further improve absorption. Finally, no identified study has directly measured iron absorption using isotope tracer methods in any Indonesian fermented food, meaning current conclusions rest on bioaccessibility proxies and hemoglobin outcomes rather than confirmed absorption data.

4. CONCLUSIONS

Indonesian traditional fermented foods act on iron bioavailability through three overlapping mechanisms: phytate reduction via microbial phytase activity, lactic acid driven acidification that favors absorbable ferrous iron, and potential hepcidin lowering effects via reduced inflammation, although recent human evidence indicates these acute benefits do not always persist over the longer term. Tempeh presents the most robust and unequivocal evidence among the four foods examined, as evidenced by numerous minor Indonesian studies that link tempeh products to improved hemoglobin levels in anemic adolescent females. Dadih, Riau dadih, tape, and oncom are biologically feasible; however, the supporting evidence is substantially mechanistic or composition-based, rather than derived from clinical trials. Consequently, conventional fermented foods represent a promising, locally rooted dietary approach that has the potential to improve the current anemia-management initiatives for Indonesian adolescent females. Nevertheless, definitive dietary guidelines must be established through comprehensive, sufficiently robust trials.

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THE EFFECT OF VARIATIONS IN CONCENTRATION OF BETEL LEAF ETHANOL EXTRACT IN HAND SANITIZER PREPARATIONS ON THE ANTIBACTERIAL ACTIVITY OF ESCHERICHIA COLI AND STAPHYLOCOCCUS AUREUS

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Abstract

Betel leaf (Piper betle L.) contains bioactive compounds with potential antibacterial activity. This study aimed to evaluate the effect of variations in betel leaf ethanol extract concentration in hand sanitizer preparations on antibacterial activity against Staphylococcus aureus and Escherichia coli. Hand sanitizers were formulated with extract concentrations of 5% (F1), 7% (F2), and 9% (F3), alongside a blank formulation (F0). Evaluations included phytochemical screening, organoleptic properties, stability over 12 weeks, pH, foam height, skin irritation, and antibacterial activity using the disc diffusion method. Phytochemical screening confirmed the presence of saponins, flavonoids, alkaloids, tannins, phenols, steroids, and essential oils. All formulations remained homogeneous and physically stable throughout storage, causing no skin irritation. The pH values ranged from 8.0 to 9.5, and foam heights ranged from 70 to 78 mL. Antibacterial testing demonstrated that increasing extract concentration significantly enhanced bacterial inhibition. F1 exhibited inhibition zones of 7.0 mm for both bacteria, while F2 showed 9.0 mm against S. aureus and 9.5 mm against E. coli. The highest antibacterial activity was recorded in F3 (9%), with inhibition zones of 12.9 mm against S. aureus and 12.7 mm against E. coli. Consequently, F3 was identified as the optimal formulation, demonstrating effective antibacterial activity while maintaining good physical stability and skin safety.

Keywords: Betel Leaf, Hand Sanitizer, Ethanol Extract, Antibacterial Activity, Piper Betle

1. INTRODUCTION

Hand hygiene is an important measure for preventing the transmission of pathogenic microorganisms through direct and indirect contact. Hands can become a medium for transferring microorganisms from contaminated surfaces to the body, making proper hand hygiene an important component of infection prevention. Hand sanitizer provides a practical alternative for maintaining hand hygiene when soap and running water are not readily available. The development of hand sanitizer preparations containing natural antibacterial ingredients has therefore received increasing attention, particularly through the utilization of medicinal plants with established antimicrobial potential [1].

One medicinal plant with considerable potential as a natural antibacterial ingredient is betel leaf (*Piper betle* L.). Betel leaf has been traditionally used for various health-related purposes and contains diverse bioactive constituents. Recent reviews have reported that *P. betle* contains phytochemical compounds associated with antimicrobial activity, including phenolic compounds, flavonoids, tannins, alkaloids, saponins, and other secondary metabolites. These constituents contribute to the broad biological activity of betel leaf extracts and support their potential development into pharmaceutical and topical preparations [1].

The antibacterial properties of *P. betle* are associated with the presence of these bioactive compounds, which may interfere with bacterial cell integrity and essential cellular processes. Recent phytochemical and antibacterial investigations demonstrated that alcoholic extracts of *P. betle* contain detectable levels of flavonoids, tannins, saponins, alkaloids, and other phytochemical constituents and exhibit antibacterial activity against several pathogenic bacteria. Ethanol extracts of *P. betle* have also demonstrated antibacterial effects in experimental studies, supporting their potential application as natural antimicrobial agents[2].

The extraction solvent is an important factor in obtaining bioactive compounds from plant materials. Ethanol is commonly used for extracting phytochemicals because it can dissolve a broad range of polar and semi-polar compounds. Studies conducted on *P. betle* have demonstrated that ethanol extracts contain bioactive constituents and possess antibacterial activity. A recent study reported antibacterial activity of ethanol extracts of *P. betle* against several bacterial strains, while another study demonstrated that ethanol leaf extract exhibited antimicrobial and antibiofilm effects. These findings support the selection of ethanol extract as the active botanical ingredient in the present hand sanitizer formulation [2].

The antibacterial activity of *P. betle* is particularly relevant against *Staphylococcus aureus* and *Escherichia coli*, which represent Gram-positive and Gram-negative bacteria, respectively. A 2022 study specifically evaluated extracted *P. betle* leaf materials against *S. aureus* and *E. coli* using the disc diffusion method and demonstrated antibacterial activity against both organisms. A comprehensive review published in 2021 likewise reported that *P. betle* preparations and extracts can inhibit both Gram-positive and Gram-negative bacteria, including *S. aureus* and *E. coli*. These findings provide a scientific basis for selecting both bacteria as test organisms in evaluating the antibacterial activity of the developed hand sanitizer [3].

The concentration of plant extract is an important factor that can influence the antibacterial activity of a formulation. Increasing the concentration of an extract may increase the amount of bioactive compounds available to interact with bacterial cells and may consequently enhance bacterial growth inhibition. However, changes in extract concentration can also affect the physical and chemical characteristics of a topical preparation, including color, odor, pH, homogeneity, stability, and other formulation characteristics. Therefore, formulation studies need to evaluate antibacterial activity together with relevant quality parameters to identify an appropriate concentration of the active extract. Previous studies have demonstrated the feasibility of incorporating *P. betle* ethanol extract into topical preparations, including hand sanitizer formulations [4].

In addition to antibacterial activity, the quality and safety of a hand sanitizer preparation should be evaluated through physical and stability parameters. Organoleptic characteristics, homogeneity, pH, stability, foam characteristics, and skin irritation are relevant parameters for assessing the quality of a topical preparation. Stability evaluation is particularly important because changes during storage may influence the appearance and performance of the formulation. Previous research on *P. betle*-based topical preparations has demonstrated the feasibility of formulating the extract into topical products while maintaining acceptable physical characteristics and antibacterial activity [5].

Previous research has established the antibacterial potential of *P. betle* extract and its application in topical preparations; however, further evaluation of different extract concentrations in hand sanitizer preparations remains relevant to identify a concentration that provides antibacterial activity while maintaining acceptable formulation characteristics. A 2021 literature review specifically highlighted the potential development of *P. betle* extract and essential oil in hand sanitizer products, while subsequent formulation research demonstrated the application of betel leaf ethanol extract in hand sanitizer preparations [6].

Based on these considerations, this study formulated hand sanitizer preparations containing different concentrations of betel leaf ethanol extract, namely F1 (5%), F2 (7%), and F3 (9%). The formulations were evaluated through phytochemical screening, organoleptic examination, homogeneity testing, stability testing during 12 weeks of storage, pH measurement, foam-height evaluation according to the applicable Indonesian National Standard (SNI), and skin irritation testing. Antibacterial activity was evaluated using the diffusion method against *S. aureus* and *E. coli*. This study aimed to determine the effect of variations in the concentration of betel leaf ethanol extract on the antibacterial activity of

hand sanitizer preparations and to identify the best formulation based on antibacterial activity and formulation characteristics.

2. METHODOLOGY

3.1 Research Design

This study used a laboratory experimental method to investigate the effect of variations in the concentration of betel leaf (Piper betle L.) ethanol extract in hand sanitizer preparations on antibacterial activity against Staphylococcus aureus and Escherichia coli. Three formulations were prepared using different concentrations of betel leaf ethanol extract, namely F1 (5%), F2 (7%), and F3 (9%). The experimental approach included preparation of the ethanol extract, formulation of the hand sanitizer, evaluation of physical characteristics and stability, skin irritation testing, and antibacterial activity testing. Similar experimental approaches have previously been applied to the development and evaluation of P. betle ethanol extract hand sanitizer preparations. [7,8]

3.2 Materials and Instruments

The materials used in this study consisted of betel leaves (Piper betle L.), ethanol as the extraction solvent, and other excipients required for the hand sanitizer formulation. The test microorganisms were S. aureus and E. coli. The instruments included laboratory glassware, analytical balance, measuring cylinders, pH meter, stability storage equipment, microbiological culture equipment, sterile Petri dishes, micropipettes, incubator, and measuring instruments for determining the inhibition zone. The selection of S. aureus and E. coli as test organisms was based on their representation of Gram-positive and Gram-negative bacteria and their established use in evaluating the antibacterial activity of P. betle extracts. [8]

3.3 Preparation of Betel Leaf Ethanol Extract

Fresh betel leaves were collected, cleaned, and processed into simplicia before extraction. The plant material was dried and subsequently powdered. The powdered betel leaves were extracted using ethanol as the solvent. The extraction process was continued until the active constituents were sufficiently extracted, after which the extract was separated from the solvent and concentrated to obtain a concentrated ethanol extract of betel leaves. Ethanol extraction is appropriate for obtaining a range of bioactive compounds from P. betle, including phenolic, flavonoid, tannin, and other phytochemical constituents associated with antibacterial activity. [8]

3.4 Phytochemical Screening

Phytochemical screening was performed to identify the major secondary metabolite groups present in the betel leaf ethanol extract. The screening included tests for flavonoids, alkaloids, tannins, saponins, and phenolic compounds using appropriate qualitative reagents. The results were recorded based on characteristic changes in color, precipitate formation, or foam formation. Phytochemical screening was conducted to provide preliminary information regarding the chemical constituents potentially contributing to the antibacterial activity of the extract. Previous research has demonstrated the presence of several bioactive phytochemical groups in P. betle leaves and their association with antibacterial activity. [8]

3.5 Preparation of Hand Sanitizer Formulations

The concentrated betel leaf ethanol extract was incorporated into the hand sanitizer base at three different concentrations: F1 (5%), F2 (7%), and F3 (9%). Each formulation was prepared using the same base composition, while the concentration of betel leaf ethanol extract was varied. The ingredients were mixed gradually until a homogeneous preparation was obtained. The formulations were subsequently transferred into suitable containers and stored under predetermined conditions for further evaluation. Previous formulation studies have demonstrated the feasibility of incorporating ethanol extract of P. betle leaves into hand sanitizer preparations at different concentrations. [7,9]

3.6 Organoleptic and Homogeneity Evaluation

Organoleptic evaluation was performed by observing the physical appearance, color, odor, and consistency of each formulation. The evaluation was conducted immediately after preparation and during the stability study. Particular attention was given to changes in color, odor intensity, and physical

appearance during storage. Homogeneity was evaluated by observing whether the formulation showed uniform distribution of the extract without visible aggregates or phase separation. These parameters are commonly included in the evaluation of topical preparations containing plant extracts. [7,9]

3.7 Stability Testing

Stability testing was conducted by observing changes in the physical characteristics of the hand sanitizer preparations during 12 weeks of storage. The parameters evaluated included organoleptic characteristics, homogeneity, and physical appearance. Observations were performed periodically throughout the storage period to determine whether the formulations remained stable or showed changes such as separation, precipitation, or other visible alterations. The stability evaluation was important to determine the ability of the formulation to maintain its physical characteristics during storage. Previous studies of P. betle hand sanitizer formulations have also included stability evaluation as an important quality parameter. [7]

3.8 pH Evaluation

The pH of each hand sanitizer formulation was determined using a calibrated pH meter. A sufficient amount of sample was prepared according to the measurement procedure, and the pH value was recorded for each formulation. The pH evaluation was performed to characterize the formulation and assess its suitability for topical application. In this study, the highest pH value obtained among the formulations was 10. Changes in pH may occur as a consequence of differences in extract concentration or interactions between the extract and formulation components; therefore, pH was evaluated as one of the important quality parameters. [7,9]

3.9 Foam Height Test

The foam height of each hand sanitizer formulation was evaluated according to the applicable Indonesian National Standard (SNI) procedure for the relevant preparation. A predetermined amount of the formulation was subjected to the specified agitation procedure, after which the height or volume of the resulting foam was measured. The foam characteristics were compared among F1, F2, and F3 to determine the effect of extract concentration on the foaming characteristics of the preparation. The highest foam height obtained in this study was 85 mL.

3.10 Skin Irritation Test

A skin irritation test was conducted to evaluate the safety of the hand sanitizer preparations for topical application. The formulations were applied according to the predetermined irritation-testing procedure, and the skin was observed for signs of irritation, including redness, swelling, itching, or other visible reactions. The results were recorded for each formulation. The irritation evaluation was included because hand sanitizer is intended for repeated contact with the skin and because changes in the concentration of plant extract may influence the tolerability of the preparation. Previous P. betle hand sanitizer formulation research has also included skin irritation testing as part of formulation evaluation. [7]

3.11 Antibacterial Activity Test

The antibacterial activity of the hand sanitizer formulations was evaluated using the diffusion method against S. aureus and E. coli. Bacterial cultures were prepared and inoculated onto appropriate agar media. Each formulation was subsequently applied to the test medium using the selected diffusion technique. After incubation under appropriate microbiological conditions, the diameter of the clear inhibition zone surrounding each test sample was measured in millimeters. Antibacterial activity was determined based on the diameter of the inhibition zone produced by each formulation. The diffusion method has been used in previous studies to evaluate the antibacterial activity of P. betle extracts against S. aureus and E. coli. [8]

3.12 Data Analysis

The results of the physical evaluation, stability testing, irritation testing, and antibacterial activity testing were recorded and presented descriptively. The antibacterial activity of F1, F2, and F3 was compared based on the diameter of the inhibition zones produced against S. aureus and E. coli. The formulation showing the greatest antibacterial activity while maintaining acceptable physical characteristics and stability was designated as the best formulation. In this study, F3 containing 9%

betel leaf ethanol extract was subsequently identified as the best formulation based on the experimental results.

3. RESULTS

a. Phytochemical Screening of Betel Leaf Ethanol Extract

The phytochemical screening of the betel leaf (Piper betle L.) ethanol extract showed positive results for saponins, flavonoids, alkaloids, tannins, phenols, steroids, and essential oils. The presence of these phytochemical constituents indicates that the extract contains several groups of secondary metabolites with potential biological activity, including antibacterial activity. The results of phytochemical compounds can be seen in the table 1

***Table 1**. Phytochemical compounds*

Phytochemical compound	Result
Saponin	Positive
Flavonoid	Positive
Alkaloid	Positive
Tannin	Positive
Phenol	Positive
Steroid	Positive
Essential oil	Positive

b. Organoleptic Evaluation and Stability

Four preparations were evaluated, consisting of F0 as the blank formulation and F1, F2, and F3 containing 5%, 7%, and 9% betel leaf ethanol extract, respectively. Organoleptic evaluation showed that F0 had a yellow color and no characteristic odor, whereas the formulations containing betel leaf ethanol extract showed colors ranging from greenish-brown to brown and had the characteristic odor of betel leaves. During 12 weeks of storage, all preparations maintained their physical form and remained stable, with no observable separation or major changes in the physical characteristics of the preparations. However, a decrease in the intensity of the characteristic odor of betel leaf was observed during storage.

c. pH Evaluation

The pH evaluation showed that F0 had a pH of 9.0, while the pH values of the formulations containing betel leaf ethanol extract were 8.0, 9.5, and 8.8 for F1, F2, and F3, respectively. The results indicate that the variation in betel leaf ethanol extract concentration produced differences in the pH values of the preparations. The pH values of all formulations remained relatively stable during the observation period.

d. Foam Height Evaluation

The foam-height evaluation showed that F0 produced a foam height of 78 mL. Among the formulations containing betel leaf ethanol extract, F1 produced a foam height of 76 mL, F2 produced 70 mL, and F3 produced 72 mL. The highest foam height was observed in the blank formulation F0, while the lowest foam height was observed in F2. The differences in foam height indicate that the addition and variation of betel leaf ethanol extract affected the foaming characteristics of the hand sanitizer preparations.

e. Skin Irritation Test

The skin irritation test showed that neither the blank formulation nor the formulations containing betel leaf ethanol extract produced observable allergic reactions or skin irritation during use. No visible signs of irritation were observed following application of F0, F1, F2, or F3. These results indicate that the tested hand sanitizer preparations did not demonstrate an observable irritating effect under the conditions of the study.

f. Antibacterial Activity

The antibacterial activity of the hand sanitizer formulations was evaluated against Staphylococcus aureus and Escherichia coli using the diffusion method. All formulations containing betel leaf ethanol extract demonstrated antibacterial activity, as indicated by the formation of inhibition zones around the test samples. F1 (5%) produced inhibition zones of 7.0 mm against both S. aureus and E. coli. F2 (7%) produced inhibition zones of 9.0 mm against S. aureus and 9.5 mm against E. coli. The greatest antibacterial activity was observed in F3 (9%), with inhibition zones of 12.9 mm against S. aureus and 12.7 mm against E. coli. The inhibition zone increased as the concentration of betel leaf ethanol extract increased from 5% to 9%.

g. Best Formulation

Based on the overall evaluation, F3 containing 9% betel leaf ethanol extract demonstrated the greatest antibacterial activity among the tested formulations. F3 produced inhibition zones of 12.9 mm against S. aureus and 12.7 mm against E. coli, while maintaining homogeneous and stable physical characteristics during 12 weeks of storage and producing no observable skin irritation. Therefore, F3 (9%) was selected as the best formulation in this study. The results of the parameter evaluation can be seen in the table 2

***Table 2**. Evaluation of stock parameters*

Evaluation parameter	F0 (Blank)	F1 (5%)	F2 (7%)	F3 (9%)
Color	Yellow	Greenish-brown	Greenish-brown/brown	Brown
Odor	Odorless	Betel leaf odor	Betel leaf odor	Betel leaf odor
Ph	9.0	8.0	9.5	8.8
Foam height (mL)	78	76	70	72
Stability (12 weeks)	Stable	Stable	Stable	Stable
Skin irritation	None	None	None	None
S. aureus inhibition zone (mm)	–	7.0	9.0	12.9
E. coli inhibition zone (mm)	–	7.0	9.5	12.7

4. CONCLUSIONS

The variation in the concentration of betel leaf (*Piper betle* L.) ethanol extract affected the antibacterial activity of the hand sanitizer preparations against *Staphylococcus aureus* and *Escherichia coli*. The phytochemical screening showed that the betel leaf ethanol extract contained saponins, flavonoids, alkaloids, tannins, phenols, steroids, and essential oils, which may contribute to its antibacterial activity.

All formulations (F0, F1, F2, and F3) maintained their physical form and stability during 12 weeks of storage. The pH values were 9.0 for F0, 8.0 for F1, 9.5 for F2, and 8.8 for F3, while the foam heights were 78, 76, 70, and 72 mL, respectively. No observable allergic reactions or skin irritation occurred following use of the formulations.

The antibacterial activity increased with increasing betel leaf ethanol extract concentration. F1 (5%) produced inhibition zones of 7.0 mm against both *S. aureus* and *E. coli*, while F2 (7%) produced inhibition zones of 9.0 mm and 9.5 mm, respectively. F3 (9%) produced the largest inhibition zones, measuring 12.9 mm against *S. aureus* and 12.7 mm against *E. coli*. Therefore, F3 (9%) was identified as the best formulation based on its antibacterial activity, physical stability, and absence of observable skin irritation.

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WORK STRESS, WELL-BEING, AND CARE QUALITY AMONG CLINICAL NURSES: A HUMAN RESOURCE PERSPECTIVE

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Abstract

Occupational stress among clinical nurses remains a persistent challenge in health systems worldwide, with important implications for psychological well-being, workforce sustainability, and care quality. This review aimed to synthesise evidence on the interrelationships between work stress, nurse well-being, and care quality through a human resource management (HRM) and organisational governance lens. A structured, purposive literature review with reflexive thematic synthesis was conducted. Targeted searches of Scopus, PubMed, and CINAHL were supplemented by backward citation tracking. Core clinical-nursing evidence was prioritised, while selected methodological and organisational sources were used to support conceptual framing. Where applicable, methodological quality was appraised using design-appropriate Joanna Briggs Institute (JBI) critical appraisal tools. Four interrelated themes were identified: (1) sources of work stress, particularly workload intensity, staffing shortages, long or irregular shifts, and emotional labour; (2) well-being and psychological resilience, with burnout and moral distress as prominent manifestations; (3) effects on care quality, including clinical errors, reduced empathy, impaired attentiveness, and lower patient satisfaction; and (4) HRM and organisational factors, including leadership, performance appraisal, scheduling, support systems, and shared governance. Across the evidence, nurse well-being emerged not only as an individual concern but also as an organisational capability with direct implications for patient safety and workforce retention. Sustainable improvement therefore requires integrated HR strategies, supportive leadership, workload-sensitive staffing, recovery-supportive scheduling, and governance systems that monitor staff well-being alongside patient-safety and quality indicators, particularly in resource-constrained settings such as Indonesia.

Keywords: Care Quality; Clinical Nursing; Human Resource Management; Nurse Well-Being; Work Stress

1. INTRODUCTION

Work-related stress among clinical nurses represents a major challenge to healthcare workforce sustainability, organisational performance, and patient safety. Nurses routinely experience demanding workloads, inadequate staffing, emotional exhaustion, complex clinical responsibilities, and sustained exposure to patient suffering. These occupational pressures may adversely affect psychological well-being, professional engagement, and the delivery of safe, high-quality nursing care. The World Health Organization (WHO) has emphasised the importance of improving nursing working conditions, mental health support, leadership, and workforce retention as essential components of sustainable healthcare systems [1].

Work-related stress is a multidimensional occupational phenomenon involving psychological, emotional, physical, and interpersonal responses to workplace demands. When these demands exceed available resources and coping capacities, prolonged stress may contribute to emotional exhaustion,

reduced professional effectiveness, burnout, and diminished work engagement. A systematic review by Zabin et al. (2023) identified associations between occupational stress, patient safety culture, and patient safety outcomes among nurses [2]. These findings suggest that nursing stress should be considered not only an individual health concern but also an organisational issue with implications for healthcare delivery.

The relationship between occupational stress and care quality is increasingly supported by empirical evidence. Li et al. (2024), in a systematic review and meta-analysis involving 85 studies and 288,581 nurses, reported that nurse burnout was associated with poorer patient safety outcomes, increased adverse events, lower patient satisfaction, and reduced nurse-assessed quality of care [3]. These findings highlight the potential consequences of prolonged occupational strain for healthcare organisations and reinforce the importance of addressing workforce well-being within institutional quality improvement strategies.

Nurse well-being encompasses psychological health, emotional stability, physical functioning, job satisfaction, professional fulfilment, and positive workplace relationships. It is influenced by both individual characteristics and organisational conditions. Adequate staffing, manageable workloads, supportive leadership, professional autonomy, and access to psychological support represent important organisational considerations. Consequently, interventions focusing exclusively on individual stress management may be insufficient when structural sources of occupational stress remain unresolved.

Human resource management (HRM) provides an organisational perspective for understanding and addressing these challenges. Within healthcare institutions, HRM involves workforce planning, recruitment, staffing allocation, workload distribution, performance management, professional development, employee support, and retention strategies. These functions may influence nurses' occupational experiences and their capacity to provide safe and effective care. A systematic review of longitudinal studies by Dall'Ora et al. (2022) identified evidence supporting the importance of adequate registered nurse staffing for patient outcomes [4]. Furthermore, Lee et al. (2023) reported that effective nurse manager leadership was generally associated with favourable patient safety and care quality outcomes [5].

From an organisational governance perspective, work-related stress, nurse well-being, and care quality can be examined through interconnected pathways. Staffing inadequacy, excessive workload, limited managerial support, and insufficient professional participation may increase occupational demands and contribute to psychological strain. Such conditions may subsequently influence professional engagement, communication, clinical performance, and patient safety. Conversely, supportive leadership, equitable workload allocation, organisational justice, and opportunities for professional development may strengthen nurses' working environments and support better care processes. However, these proposed relationships require careful interpretation because much of the available evidence is observational and does not establish causal pathways.

These issues are particularly relevant to healthcare systems facing workforce shortages, resource constraints, and growing service demands, including those in Southeast Asia and Indonesia. Nevertheless, the magnitude and organisational determinants of occupational stress may vary across institutions and healthcare settings. Understanding how HRM practices and governance arrangements interact with nurse well-being and care quality is therefore important for developing context-sensitive organisational strategies.

Although previous reviews have examined relationships between nurse burnout and patient safety, staffing levels and patient outcomes, or leadership and care quality, the available evidence is commonly synthesised within separate conceptual domains [2–5]. A more integrated HRM-oriented synthesis is needed to clarify how organisational workforce practices relate to nurses' occupational stress, well-being, and quality of clinical care. Such integration may help identify modifiable organisational conditions, clarify evidence gaps, and inform nursing management and hospital governance priorities.

Accordingly, this review aimed to synthesise current evidence concerning the relationships among work-related stress, nurse well-being, and care quality in clinical nursing settings, with particular attention to HRM practices and organisational governance mechanisms. Specifically, the review sought to: (1) identify organisational factors associated with work-related stress and nurse well-being; (2) examine reported associations between nurse well-being, patient safety, and care quality; and (3) explore how staffing, leadership, workload management, and workplace support may contribute to

these relationships. The findings are intended to inform evidence-based workforce management, organisational decision-making, and future research on sustainable nursing care delivery.

2. METHODOLOGY

Study Design and Eligibility Criteria

Study Design and Scope

This study employed a structured, purposive literature review with reflexive thematic synthesis. PRISMA 2020 principles were used as a transparency reference for describing eligibility and source identification, but the review was not designed as a full systematic review and therefore does not claim exhaustive database coverage [6].

Core evidence comprised peer-reviewed empirical studies and evidence syntheses addressing work stress, burnout, nurse well-being, care quality, patient safety, retention, or organisational factors in clinical nursing settings. Selected methodological, HRM, and organisational sources were also retained when they contributed directly to conceptual framing or interpretation. Sources from adjacent populations were used only for contextual or conceptual support and were not treated as direct estimates of clinical-nurse outcomes.

Search Strategy and Study Selection

Sources were identified through targeted searches of Scopus, PubMed, and CINAHL using combinations of keywords related to work stress, burnout, nurse well-being, care quality, patient safety, leadership, staffing, empowerment, retention, and human resource management. Backward citation tracking was performed to identify additional relevant publications.

A total of 587 records were identified, comprising 545 records from electronic databases and 42 additional records identified through backward citation tracking. Following the removal of 212 duplicate records, 375 records remained for title and abstract screening.

Of these, 241 records were excluded based on relevance to the review objectives, population, and conceptual scope. Subsequently, 134 reports were sought for full-text retrieval, of which seven could not be obtained. The remaining 127 reports were assessed for eligibility, and 115 were excluded because they did not meet the inclusion criteria, lacked sufficient relevance to clinical nursing, demonstrated methodological limitations, or provided limited conceptual contributions.

Finally, 12 core evidence sources were included in the reflexive thematic synthesis. The identification and selection process is illustrated in Figure 1 using a PRISMA 2020-informed framework. The characteristics and principal contributions of the included sources are summarised in Table 1. Additional methodological and contextual references were used to support the analytical framework and interpretation of findings.

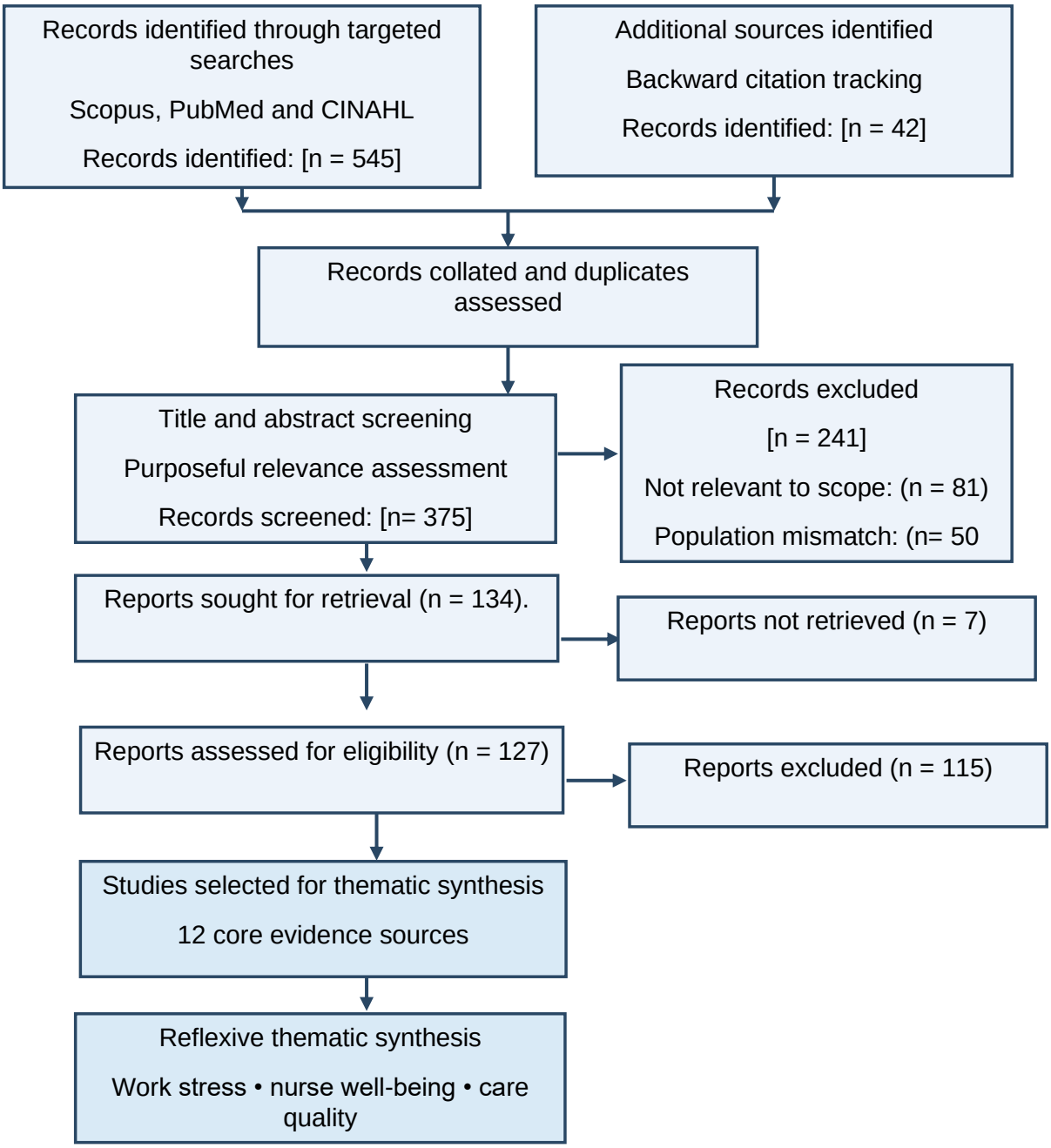


Figure 1 Prisma Flowchart

Quality Appraisal and Data Synthesis

Where applicable, empirical studies and evidence syntheses were critically appraised using design-appropriate Joanna Briggs Institute (JBI) tools. Methodological and conceptual sources that did not fit a JBI empirical-study checklist were used only for contextual framing and were not treated as equivalent to clinical-effect evidence.

Data were analysed using reflexive thematic analysis following Braun and Clarke [7]. Initial coding focused on three domains - work stress, nurse well-being, and care quality - while HRM and governance factors were examined as contextual mechanisms that could amplify or buffer the relationships among those domains. Codes were compared across sources and grouped into higher-order themes. Trustworthiness was supported through cross-source comparison, explicit documentation of the

analytical structure, and separation of core clinical evidence from contextual literature. Because the review used publicly available published sources, ethical approval was not required.

Analytical Framework

The synthesis was organised around a multi-level pathway in which structural work demands (for example staffing shortages, workload, shift patterns, and emotional labour) influence nurse well-being; changes in well-being then affect attention, communication, empathy, decision-making, and retention, which in turn shape care quality and patient safety. HRM and organisational governance practices were treated as modifying factors because leadership, appraisal, scheduling, support, and shared decision-making can either intensify or mitigate these pathways.

3. RESULTS

Characteristics of Core Evidence Sources

The core sources represented multiple study designs and geographic contexts, including multinational evidence syntheses and empirical studies from Africa, Europe, Southeast Asia, and Indonesia. Table 1 presents the twelve sources that most directly informed the thematic findings.

***Table 1**. Core evidence sources informing the thematic synthesis (n = 12).*

Author(s), Year	Design / Source	Country	Key Finding / Contribution
Scott-Marshall, 2024 [8]	Rapid evidence review	Multinational	Staffing shortages and excessive working hours contribute to occupational fatigue and health and safety risks among nurses, highlighting the need for safer work-hour policies and workforce management.
Ditlopo et al., 2024 [9]	Structural equation model	South Africa	Practice environment, workload, and professional support predict job outcomes and standards of care.
Raun et al., 2025 [10]	Mixed-methods	Denmark	Traumatic exposure and moral distress contribute to psychological burden among emergency nurses.
Değirmenci Öz et al., 2023 [11]	Qualitative study	Türkiye	Emotional labour is a substantial and often invisible source of stress; used here as contextual evidence on emotional labour.
Li et al., 2024 [3]	Systematic review & meta-analysis	Multinational	Nurse burnout is associated with adverse events, medication errors, lower patient satisfaction, and poorer care quality.

Bae, 2024 [12]	Systematic review	Multinational literature	Nurse staffing levels and work schedules are important organisational factors associated with nurse turnover, highlighting the relevance of staffing management and scheduling policies to workforce retention.
et al., 2024 [13]	Systematic review & meta-analysis	Multinational	Structural and psychological empowerment are related to lower burnout.
Juanamasta et al., 2024 [14]	Multicentre cross-sectional	Indonesia	Among 900 nurses, more than half reported stress, 7.3% experienced exhaustion symptoms, and approximately 1% had a high likelihood of complete burnout.
Figueiredo et al., 2025 [15]	Umbrella review	Multinational	Supportive nursing practice environments, adequate staffing, leadership, and professional participation contribute to nurse retention and reduced turnover intention.
Bond et al., 2025 [16]	Integrative review	Europe/USA	Organisational factors contribute to nurses' workplace well-being.
Azhari et al., 2026 [17]	Integrative review	Indonesia/Malaysia	Workplace spirituality may buffer emotional and ethical stressors.
Jiménez-García & Flor-Martínez, 2026 [18]	Systematic review & meta-analysis	Multinational	Organisational and individual interventions can reduce or prevent nurse burnout, with implications for workforce policy.

Thematic Findings

1. Sources of Work Stress in Clinical Nursing

Workload intensity—driven by staffing deficits, rising patient acuity, and task saturation—emerged as a prominent occupational stressor, compounded by extended working hours, irregular scheduling, and cumulative fatigue [4,8,9] These pressures may disrupt sleep, recovery, and personal routines, thereby affecting physical endurance and psychological well-being, particularly in demanding clinical environments such as emergency and critical care settings [8,10].

Emotional labour also emerged as an important but less visible component of work-related stress. Nurses are frequently expected to regulate and express emotions appropriately during challenging patient and family interactions, including end-of-life care and other emotionally demanding situations. Qualitative evidence indicates that emotional labour is an important dimension of nurses' professional experiences and may contribute to occupational strain when organisational support is insufficient [11]. Inadequate staffing may further intensify these demands by increasing clinical workloads and limiting opportunities for peer support and recovery [4,9].

2. Well-being and Psychological Resilience

Burnout, commonly characterised by emotional exhaustion, depersonalisation, and reduced personal accomplishment, emerged as an important manifestation of compromised occupational well-being [3,14]. Emergency nursing environments may involve additional psychological demands related to exposure to emotionally challenging clinical situations, unpredictable workloads, and high-pressure decision-making [10].

Organisational support, professional empowerment, and workplace conditions appear to play important roles in nurses' psychological well-being [13,16] Individual coping approaches, including mindfulness, peer support, and spiritual engagement, may provide additional resources for managing occupational demands. However, such approaches should not be considered substitutes for organisational improvements in staffing, workload allocation, and managerial support [16,17].

Supportive leadership, psychologically safe communication, and access to appropriate psychological support may contribute to more favourable working environments. The sustainability of these approaches is likely to depend on their integration with wider organisational strategies addressing structural workplace demands [13,16].

3. Impact on Care Quality

Evidence from a systematic review and meta-analysis indicates that nurse burnout is associated with poorer patient-safety outcomes, increased adverse events, lower patient satisfaction, and reduced nurse-assessed quality of care [3]. Occupational stress and fatigue may also affect attentiveness, concentration, communication, and clinical decision-making, although the strength and direction of these relationships vary across study designs and clinical contexts.

Emotional exhaustion and occupational strain may influence nurses' capacity to maintain therapeutic communication, professional engagement, and responsive patient care [3,11]. Nevertheless, these potential mechanisms should be interpreted cautiously because the reviewed evidence does not consistently establish direct causal relationships.

Evidence concerning nurse staffing and nursing practice environments further indicates that organisational working conditions are relevant to patient outcomes and standards of care [4,9]. These findings suggest that quality of nursing care is influenced not only by professional competence but also by workforce adequacy, organisational support, and the sustainability of nurses' working environments.

4. Human Resource and Organisational Factors

Leadership, staffing management, scheduling, professional empowerment, support systems, and workforce retention emerged as important organisational considerations. Evidence from systematic reviews suggests that nurse manager leadership is associated with patient safety and quality of care, while supportive practice environments may contribute to favourable professional outcomes [3,9,15].

Structural and psychological empowerment are associated with reduced burnout, highlighting the potential importance of professional autonomy, participation in decision-making, and organisational support [13]. In addition, staffing levels and work schedules are relevant to nurse turnover, indicating that workforce planning and scheduling should be considered integral components of HRM strategies [12].

Developmental and context-sensitive performance appraisal may support recognition, professional growth, and perceptions of organisational fairness. However, evidence directly establishing the effects of particular appraisal models on nurse well-being and care quality remains limited within the core sources included in this review.

Workforce management is particularly important during periods of increased healthcare demand. Poortaghi et al. (2021) identified recruitment, flexible workforce allocation and scheduling, and staff retention support as important nursing workforce management strategies during the COVID-19 pandemic [19]. These findings provide contextual evidence that effective HRM requires not only appropriate staffing numbers but also the organisational flexibility to redistribute personnel, adjust schedules, and support nurses during demanding clinical circumstances. Together, these findings position HRM practices as relevant components of organisational and clinical governance rather than solely administrative functions.

Integrative Summary of Results

The four themes suggest an interconnected relationship among organisational working conditions, occupational stress, nurse well-being, and care quality. Staffing shortages, excessive workloads, fatigue, and emotional demands are associated with occupational strain, while compromised well-being is associated with less favourable patient-safety and care-quality outcomes [3,4,9].

Leadership, professional empowerment, staffing management, scheduling, and organisational support may influence these relationships by shaping workload demands, professional autonomy, opportunities for recovery, and nurses' working experiences [3,12,13,16].

These findings support an integrated HRM perspective in which individual well-being initiatives are complemented by organisational approaches to workforce planning, supportive leadership, and clinical governance. However, the proposed relationships represent a thematic interpretation of the available evidence and should not be understood as a fully established causal model.

***Table 2**. HRM and organisational strategies derived from the thematic synthesis.*

Strategy	Expected Mechanism	Potential Indicators	Evidence
Acuity-based staffing and workload review	Reduce excessive workload, improve staffing adequacy, and support recovery opportunities	Patient acuity; nurse-to-patient ratio; overtime; missed breaks; workload indicators	[4,8,9]
Participatory and supportive leadership	Improve managerial support, professional engagement, recognition, and autonomy	Staff engagement; perceived managerial support; turnover intention	[3,9,15]
Developmental performance appraisal	Promote fairness, professional recognition, developmental feedback, and alignment between performance expectations and clinical realities	Appraisal satisfaction; perceived organisational justice; staff engagement	[16]
Flexible and recovery-supportive scheduling	Reduce cumulative fatigue and support work-life balance and workforce retention	Overtime; shift rotation; sick leave; fatigue and burnout indicators	[8,12,19]
Structured debriefing and access to psychological support	Provide organisational support for managing traumatic exposure, moral distress, and psychological burden	Utilisation of psychological support services; distress and burnout scores; absenteeism	[10,16,18]
Shared governance and clinical councils	Promote professional empowerment, organisational participation, and staff involvement in decision-making	Empowerment scores; participation in clinical councils; retention and turnover intention	[13,15]
Well-being indicators in	Integrate workforce well-being monitoring into patient safety and quality governance	Burnout and well-being scores; patient-safety incidents; patient	[3,16]

quality dashboards		satisfaction; nursing-sensitive quality indicators	

4. DISCUSSION

Work Stress as a Structural Organisational Challenge

The prominence of workload intensity, staffing shortages, extended working hours, and emotional labour supports the interpretation of occupational stress as a structural workplace challenge rather than solely a matter of individual vulnerability [4,8,9,11]. Inadequate staffing and excessive workloads may increase clinical demands while reducing opportunities for rest, peer support, reflection, and professional development. These findings suggest that sustainable stress reduction requires workforce planning, equitable workload distribution, and operational redesign alongside individual coping interventions.

From an HRM perspective, organisational policies concerning staffing adequacy, shift duration, workload allocation, and access to professional support are particularly relevant. Although individual stress-management strategies may provide benefits, they cannot independently resolve persistent structural workplace pressures.

Nurse Well-being as an Organisational Capability

Nurse well-being is influenced by leadership engagement, organisational support, professional recognition, empowerment, and the broader nursing practice environment [13,16]. These findings support the interpretation of nurse well-being as an organisational capability that can be strengthened through appropriate management and governance practices.

Hospitals influence nurses' opportunities to recover from occupational demands, access psychological support, participate in organisational decisions, and maintain professional engagement. Structural and psychological empowerment have been associated with lower burnout, indicating the potential importance of professional autonomy, shared decision-making, and supportive management [13].

Although individual resilience and coping strategies remain useful, they should complement rather than replace organisational improvements in staffing, workload management, managerial support, and occupational well-being initiatives.

Implications for Care Quality and Human Resource Governance

The relationship between nurse well-being and care quality has important implications for healthcare management and clinical governance. A systematic review and meta-analysis reported that nurse burnout was associated with poorer patient-safety outcomes, lower patient satisfaction, and reduced nurse-assessed quality of care [3]. Evidence concerning nurse staffing and nursing practice environments further indicates that organisational working conditions are associated with patient outcomes and standards of care [4,9].

These findings suggest that workforce well-being should be incorporated into clinical governance and quality-improvement systems rather than addressed exclusively through individual employee-wellness programmes.

From an HRM perspective, staffing allocation, scheduling, leadership development, performance appraisal, professional recognition, leave policies, and shared governance represent interconnected organisational strategies. For example, resilience training may offer limited long-term benefits if chronic understaffing, excessive workloads, and unsupportive management practices remain unaddressed.

A more integrated strategy involves aligning workforce policies with patient acuity, adequate recovery opportunities, professional autonomy, and institutional quality objectives. Nevertheless, the proposed relationships should be interpreted cautiously because much of the underlying evidence is observational and does not establish direct causality.

Regional Considerations in Asian Healthcare Systems

The findings are particularly relevant to resource-constrained healthcare systems in Southeast Asia, including Indonesia. A multicentre study among Indonesian nurses identified occupational stress and burnout-related concerns, highlighting the importance of examining organisational and workforce factors within local healthcare settings [14].

Organisational interventions should therefore consider staffing availability, institutional resources, workload distribution, workplace hierarchy, and managerial practices. Context-sensitive approaches may be particularly important in healthcare facilities where resource limitations restrict the implementation of workforce improvement strategies.

Workplace spirituality and collective social support may also provide contextual resources for promoting psychological well-being [17]. However, these approaches should complement rather than substitute for adequate staffing, equitable management, supportive leadership, and safe working conditions.

Strengths and Limitations

This review integrates quantitative, qualitative, and review-level evidence within an HRM and organisational governance framework. It offers an interdisciplinary interpretation of the relationships among occupational stress, nurse well-being, and care quality while distinguishing direct clinical-nursing evidence from contextual and conceptual sources.

Several limitations should be acknowledged. First, the structured purposive literature selection process may have omitted relevant studies. Second, heterogeneity in research designs, clinical settings, and geographic contexts limits direct comparison of findings. Third, the predominance of observational evidence restricts causal interpretation. Finally, the use of selected contextual studies limits the direct generalisability of some findings to clinical nursing populations.

The synthesis should therefore be interpreted as a structured thematic review rather than an exhaustive systematic review.

Future systematic reviews should adopt registered protocols, comprehensive and reproducible search strategies, independent screening, standardised quality appraisal, and complete PRISMA reporting.

Practical and Policy Implications

For hospital managers, addressing chronic workload pressure requires staffing policies that consider patient acuity, clinical complexity, nurse-to-patient ratios, overtime, missed breaks, and workforce retention. Scheduling policies should provide adequate recovery opportunities and reduce preventable occupational fatigue.

For nursing leaders, staff well-being should become part of routine quality governance. Indicators such as burnout, psychological safety, professional engagement, absenteeism, and turnover intention may be monitored alongside patient-safety incidents, patient satisfaction, and nursing-sensitive quality outcomes. Structured psychological support, professional supervision, and debriefing opportunities should be considered for nurses exposed to traumatic events and sustained emotional demands.

For HRM units, performance appraisal should emphasise professional development, fairness, recognition, teamwork, and contributions to care quality rather than relying solely on productivity. Shared governance and participatory leadership may strengthen nurses' involvement in organisational decisions and improve the relevance of workforce policies to clinical practice.

For policymakers and accreditation bodies, workforce well-being should be considered within broader standards for patient safety, staffing governance, leadership development, and healthcare quality improvement, particularly in health systems facing persistent workforce and resource constraints.

5. CONCLUSIONS

Occupational stress among clinical nurses is closely linked to workload pressure, staffing shortages, demanding work schedules, emotional labour, and exposure to high-stakes clinical situations. Compromised well-being can affect communication, empathy, attentiveness, decision-making, retention, and patient-safety outcomes. Leadership, organisational support, performance management, scheduling, and shared governance shape the extent to which these pressures translate into burnout and care-quality problems. The central implication is that nurse well-being should be treated as a governed organisational capability rather than solely as an individual responsibility. Sustainable improvement requires coordinated system-level interventions that align workforce planning, supportive leadership, fair HR practices, staff recovery, and quality governance.

6. RECOMMENDATIONS FOR FUTURE RESEARCH

Future studies should conduct a full systematic review with a registered protocol, comprehensive and reproducible search strategies, duplicate study selection, and complete PRISMA reporting to establish more precise estimates of the relationships among work stress, nurse well-being, and care quality.

Longitudinal and intervention studies in Indonesia and other Southeast Asian settings are needed to clarify causal pathways between HR governance practices and clinical outcomes. Priority areas include acuity-based staffing, scheduling redesign, participatory leadership, shared governance, appraisal reform, structured debriefing, and organisational well-being dashboards.

Future research should also test multi-level models in which nurse well-being functions as a mediator between structural work demands and patient outcomes, while leadership, empowerment, and organisational support operate as moderators. Such designs would help move the field from descriptive burnout research toward testable workforce-governance interventions.

7. IMPLICATIONS FOR NURSING PRACTICE AND EDUCATION

For nurse managers and hospital administrators, reducing work stress requires coordinated redesign of staffing, scheduling, support, appraisal, and staff-participation systems rather than reliance on resilience training alone. For nursing education, curricula should address emotional labour, moral distress, teamwork, communication, self-care, leadership, organisational behaviour, and clinical governance so that graduates can recognise both individual and systemic contributors to workplace stress. Preparing nurses to participate in shared governance and quality-improvement processes may also strengthen their ability to influence safer work environments.

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Author Contributions

DS, L, and AW contributed to the conceptualization and design of the review. DS conducted the initial literature search and prepared the first draft of the manuscript. L and AW contributed to the literature evaluation, data synthesis, interpretation of the findings, and critical revision of the manuscript. All authors reviewed and approved the final manuscript and agreed to be accountable for the content of the work.

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Conflict of Interest

The authors declare no conflict of interest.

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HOLISTIC APPROACH AT PATUK COMMUNITY HEALTH CENTER GUNUNG KIDUL YOGYAKARTA: TREATING ANXIETY WITH PSYCHORELIGIOUS DZIKIR

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Abstract

Anxiety Disorder is a mental disorder characterized by excessive anxiety, with symptoms such as restlessness, difficulty concentrating, palpitations, tremors, and dizziness. Psycho-religious dzikir therapy can be a non-pharmacological intervention to help reduce anxiety through a calming and relaxing spiritual approach. This study aims to describe the application of dzikir psychoreligious therapy in reducing anxiety levels in patients with Anxiety Disorder. This study uses a descriptive case study on two outpatient respondents at Puskesmas Patuk I Gunungkidul. The level of anxiety was measured using the Depression Anxiety Stress Scale-21 (DASS-21) questionnaire before and after the intervention. The dzikir therapy was administered for three consecutive days, with a duration of 10-20 minutes per session, according to the Standard Operating Procedure. Data were collected through interviews, observation sheets, evaluation sheets, assessments, and documentation. Both respondents complained of palpitations, overthinking, restlessness, tremors, panic, and difficulty concentrating, dizziness. The nursing diagnosis established is anxiety related to situational crisis (D.0080). The DASS-21 scores before the intervention for both respondents were 15 (moderate category). After the dzikir psychoreligious therapy, the DASS-21 questionnaire scores decreased to 8 and 7 (mild category). The respondents appeared calmer, more relaxed, with reduced tremors, decreased complaints of dizziness, and improved concentration. The three-day dzikir psychoreligious therapy effectively helps reduce anxiety in patients with Anxiety Disorder and can be applied as a non-pharmacological nursing intervention..

Keywords: Anxiety Disorder, Dzikir, DASS-21

1. INTRODUCTION

Mental health is an important component of overall well-being, enabling individuals to function adaptively and respond appropriately to psychological and environmental demands. In mental health nursing, anxiety disorder is a psychological condition commonly characterized by fear, worry, excessive tension, and physiological responses to perceived threats. Symptoms may include restlessness, difficulty concentrating, palpitations, tremors, dizziness, sleep disturbances, and persistent feelings of insecurity, which can disrupt daily functioning and quality of life [1], [2]. Persistent or severe anxiety can further impair psychological and social functioning and increase vulnerability to other mental health issues.

The prevalence of anxiety has significantly increased worldwide. In 2021, anxiety disorders affected approximately 76.2 million people, an increase from 53.2 million people, with women contributing a larger proportion compared to men [3]. Southeast Asia accounts for approximately 29.1 million cases, making anxiety one of the most prevalent mental health conditions in the region [3]. In Indonesia, the Basic Health Research of 2018 reported that emotional mental disorders characterized by symptoms of depression and anxiety were experienced by 9.8% of the population aged 15 years and older, equivalent to around 14 million people, an increase from 6.0% in 2013 [4]. In the Special Region of Yogyakarta, the prevalence reached 10.07% in 2018, compared to 8.10% in 2013, while

Gunungkidul Regency recorded a figure of 13.60%, indicating a significant burden of mental health issues at the regional level [5].

The local situation indicates the need for easily accessible and comprehensive interventions. According to the Gunungkidul Health Profile, mental health services for people with severe mental disorders reached 89.4% in 2023. As of May 2026, Puskesmas Patuk One has provided services to 36 out of 47 patients with severe mental disorders who are the target, representing 76.60% of the annual target. The existing gap emphasizes the importance of strengthening community-based interventions alongside conventional treatment. Although pharmacological and psychological approaches are important in the management of anxiety, their application can be limited by stigma, limited access to mental health services, medication-related side effects, and differences in cultural and religious beliefs. Therefore, complementary interventions that are easily accessible, culturally acceptable, and aligned with patients' values are needed to support holistic mental health care [6].

Spirituality is one of the potential components in holistic care for individuals experiencing psychological stress. Spiritual practices can enhance inner peace, strengthen coping mechanisms, and help individuals face stressful experiences. In the context of Islam, dzikir or the remembrance of Allah can be integrated into nursing care according to the beliefs and preferences of the patient. Dzikir therapy involves the repetition of religious phrases with focused attention and spiritual reflection, aimed at enhancing tranquility, relaxation, positive thinking, and spiritual coping [7], [8]. Its repetitive and focused nature can divert attention from excessive worries and negative thoughts, while the relaxation response can reduce physiological arousal related to anxiety [9], [10].

Previous research has reported the benefits of dzikir and other Islamic spiritual interventions on anxiety. Hafil and Ningrum [11] found that dzikir therapy for 10–15 minutes can reduce anxiety in hospitalized patients, with anxiety levels decreasing from moderate to mild and, in some cases, becoming nonexistent. Jaelani et al. [12] also reported a decrease in anxiety and an increase in psychological calmness among students after participating in regular dzikir sessions, while Fitria et al. [13] found a decrease in anxiety after administering dzikir therapy for 10–15 minutes to hospitalized patients. Massuhartono and Mulyanti [14] also reported improvements in behavioral and psychosocial functions after the administration of religious therapy involving dzikir. These findings support dzikir as a potential complementary intervention, although evidence regarding its direct application in community-based nursing care for patients with anxiety disorders is still limited.

Therefore, this study examines the application of psychoreligious dzikir therapy as a complementary nursing intervention for patients with anxiety disorders in the community health service environment. This study aims to describe the application of the therapy and the changes in anxiety levels among patients with anxiety disorders at Puskesmas Patuk One, Gunungkidul, Yogyakarta, Indonesia. The research results are expected to provide practical evidence regarding the potential use of culturally relevant, low-cost, and easily accessible spiritual interventions in community mental health nursing.

2. METHODS

This research is an observational study using a case report design, focusing on two participants. The objective of the study is to describe the clinical response of patients with anxiety disorders to a standardized psychoreligious Dzikir therapy. Patient progress was monitored by comparing anxiety level measurements taken at the initial assessment (pre-test) and the final assessment (post-test)[15]. The research was conducted at Puskesmas Patuk 1, Gunungkidul, Yogyakarta, from May to July 2026. Two patients who have been diagnosed with anxiety disorder and reside within the working area of the health center were selected as research subjects. Inclusion criteria include patients who have been diagnosed with anxiety disorder, Muslim patients who can accept dzikir therapy, and patients or families who are willing to provide informed consent and participate in the intervention until completion. Patients experiencing panic-level anxiety, severe disorientation, or acute agitation that hinders two-way communication are excluded from the study.

The level of anxiety was assessed using the Indonesian version of the Depression Anxiety Stress Scales-21 (DASS-21), specifically the seven anxiety items. The Indonesian version of DASS-21 has demonstrated good psychometric properties, including a Cronbach's alpha value of 0.91, which supports its validity and reliability for mental health screening [16]. Data were collected through interviews, observations, questionnaires, and evaluation sheets. Anxiety was measured before and

after the intervention, while observation was used to document anxiety symptoms and patient responses. Psycho-religious dzikir therapy was administered based on standard operating procedures for 10–20 minutes each session over three days, using a digital rosary to help participants count their dzikir recitations.

The data obtained from the pre-test and post-test results were compared descriptively to identify changes in anxiety levels after the intervention was given. Data collection and nursing care include assessment, diagnosis, planning, implementation, and evaluation, with all findings systematically documented. The ethical principles applied include informed consent, confidentiality, anonymity, and non-maleficence. Participants' identities are protected using codes or initials, and participation is voluntary with consideration for the safety and comfort of the patients.

3. RESULTS

3.1 Respondent Characteristics

This study involves two respondents with anxiety disorder in the working area of Puskesmas Patuk One, Gunungkidul, Yogyakarta. Respondent 1 is a 20-year-old woman diagnosed with Mixed Anxiety and Depressive Disorder, with a history of anxiety for approximately six months and a comorbid condition of gastroesophageal reflux disease (GERD). Respondent 2 is a 34-year-old woman diagnosed with Generalized Anxiety Disorder, with a history of anxiety for approximately four years and GERD. Both respondents experienced moderate anxiety before the intervention and were receiving pharmacological therapy.

Tabel 1. *Respondent Characteristics*

Characteristics	**Respondent 1**	**Respondent 2**
Age	20 years old	34 years old
Gender	Women	Women
History of anxiety	About 6 months	About 4 years
Comorbid condition	GERD	GERD
Diagnostic	Mixed Anxiety and Depressive Disorder	Generalized Anxiety Disorder
Anxiety before the intervention	Moderate	Moderate

3.2 Implementation of Psychoreligious Dzikir Therapy

Psycho-religious dzikir therapy is conducted individually through home visits for three consecutive days. Each session lasts for 10–20 minutes and begins with an explanation of the intervention, informed consent, and an anxiety assessment using the Depression Anxiety Stress Scale-21 (DASS-21). The intervention was conducted on Respondent 1 from June 26–28, 2026, and on Respondent 2 from June 28–30, 2026. The therapy consists of an orientation stage, preparation through ablution, dhuha prayer, deep breathing exercises, and guided recitation of dzikir, followed by evaluation and reinforcement.

This intervention was chosen as a non-pharmacological nursing approach because it can be applied simply and is in line with spiritual care. The duration and frequency are also in accordance with the interventions reported by Fitria et al. [13], while the use of dzikir as a complementary intervention is supported by Permata and Susanto [10].

3.3 Changes in Anxiety Levels

The DASS-21 results show a decrease in anxiety levels in both respondents after three days of psychoreligious dzikir therapy. Both respondents initially scored 15, which falls into the moderate anxiety category. After the intervention, Respondent 1's score decreased to 8 and Respondent 2's score decreased to 7, placing both in the mild anxiety category.

Tabel 2. *Anxiety Levels Before and After Psychoreligious Dzikir Therapy*

Respondent	Pre-test	Category	Post-test	Category	Decrease
Respondent 1	15	Moderate	8	Mild	7
Respondent 2	15	Moderate	7	Mild	8

The decrease in DASS-21 scores is accompanied by a specific reduction in anxiety symptoms. In Respondent 1, the seven anxiety items initially showed symptoms, including dry mouth, difficulty breathing, tremors, palpitations, fear, fear of panic, and a feeling of approaching a panic condition. After the intervention, only dry mouth, difficulty breathing, and tremors were still felt, each with a lower frequency, while fear, fear of panic, feeling of approaching a panic condition, and awareness of palpitations were no longer reported.

The results show that the intervention is specifically related to the improvement of anxiety symptoms and not just changes in the total score. The practice of dzikir, when performed repeatedly and with focus, can help shift attention away from excessive worries and negative thoughts toward a more tranquil mental state. This interpretation is in line with Yasipin [8], who explains that dzikir can strengthen spiritual coping and enhance relaxation. Permata and Susanto [10] also reported that psychoreligious dzikir can contribute to the reduction of anxiety.

3.1 Observational Changes During the Intervention

Daily observation results show gradual changes in behavioral, cognitive-verbal, and affective responses in both respondents. Respondent 1 initially showed tremors in the hands, restlessness, fear, and excessive vigilance. On the second day, the tremors decreased although restlessness was still evident, while on the third day the respondent appeared calmer and more relaxed, with no tremors observed.

Respondent 2 also showed gradual improvement. On the first day, the respondent appeared anxious, fearful, and occasionally experienced panic. On the second day, the anxiety and panic decreased, while on the third day, the respondent appeared relaxed, more confident, and better able to control emotional responses. Negative thoughts and excessive fear also decreased, accompanied by the emergence of more positive and realistic thinking.

Tabel 3. Changes in observations over three days of intervention

Observasi	Day 1	Day 2	Day 3
Motor/behavioral response	Tremor/anxiety	Symptoms are decreasing	Calm and relaxed
Verbal/cognitive response	Fear and negative thoughts	Complaints are decreasing.	More positive thinking
Affective response	Excessive caution/panic	Anxiety decreases	Relaxed and able to control emotions
Facial expression	Neutral	Neutral	cheerful
General condition	Weak/restless	Getting better	Fresher

The observed changes are also reflected in the facial expressions, general condition, and feelings of both respondents. On the third day, both respondents appeared cheerful and reported feeling more comfortable and relaxed. Their ability to recite Arabic dzikir also improved; the difficulties in pronunciation on the first day decreased on the second day and remained smooth on the third day, indicating an increase in concentration and engagement in the intervention.

3.4 Interpretation of Intervention Results

The decrease in anxiety scores and the improvement in behavioral and emotional responses indicate that psychoreligious dzikir therapy can support anxiety management in community-based nursing care. The reduction in tremors, restlessness, fear, and excessive vigilance corresponds to the relaxation response associated with contemplative practices. Crosswell and Mayer [17] explain that practices such as prayer and meditation can enhance parasympathetic activity and reduce physiological stress responses. Similarly, Pihasniwati et al. [19] explain the potential role of psychoreligious dzikir in reducing fear-related activation and supporting relaxation.

Improvement in cognitive and affective responses may also be related to the nature of dzikir performed repeatedly and with focus. Repetition of recitation can provide structured focus, thereby reducing attention to negative thoughts and excessive worries. Calderone et al. [19] reported that contemplative practices can support emotional regulation and reduce anxiety through changes related to relaxation, attention, and emotional response regulation. In this study, this is reflected in the development of respondents who initially showed fear, negative thoughts, and excessive vigilance, becoming calmer, having positive thoughts, and being able to control their emotions.

Overall, the research results show a consistent improvement pattern in subjective anxiety scores and observational indicators. Respondent 1 experienced a score decrease from 15 to 8, while Respondent 2 experienced a decrease from 15 to 7, with both showing a change from moderate anxiety to mild anxiety. These findings support the potential use of psychoreligious dzikir as a non-pharmacological complementary nursing intervention, although the results obtained may also be influenced by the individual's psychological condition, family support, care environment, and the respondent's ability to concentrate during therapy.

4. CONCLUSION

The application of psychoreligious dzikir therapy on patients with anxiety disorder at Puskesmas Patuk One, Gunungkidul, showed a decrease in anxiety levels after three consecutive days of intervention. Both respondents initially experienced moderate anxiety with a DASS-21 score of 15; after receiving psychoreligious dzikir therapy for 10–20 minutes per session, the score decreased to 8 for Respondent 1 and 7 for Respondent 2, indicating a change from moderate anxiety to mild anxiety. The decrease was accompanied by an improvement in anxiety-related symptoms and observable behavioral, cognitive, and emotional responses, including reduced tremors, restlessness, fear, excessive vigilance, and negative thoughts, as well as increased calmness, positive thinking, and emotional control. These findings suggest that psychoreligious dzikir therapy has the potential to serve as a simple complementary non-pharmacological nursing intervention to support anxiety management in community-based mental health services.

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INNOVATIVE EDUCATIONAL MEDIA FOR IMPROVING ADOLESCENT REPRODUCTIVE HEALTH KNOWLEDGE : A LITERATURE REVIEW

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Abstract

Adolescent reproductive health knowledge is essential for informed decision-making regarding puberty, menstruation, contraception, and sexually transmitted infections (STIs). This literature review aimed to synthesize evidence on educational media used to improve reproductive health knowledge among adolescents. A structured search was conducted in PubMed, ScienceDirect, and Google Scholar for studies published between January 1, 2020, and October 19, 2026. Of the 86 records identified, 44 came from PubMed, 36 from ScienceDirect, and 6 from Google Scholar. Nineteen reports underwent full-text eligibility assessment. Three were excluded for being outside the review scope, leaving 16 primary studies for synthesis. The included studies evaluated messaging platforms, mobile applications, short message service (SMS), animated videos, interactive electronic modules, social media, web-based interventions, and blended educational approaches. Several studies reported improvements in short-term knowledge outcomes, although comparative effectiveness varied across interventions and comparators. A digital menstrual hygiene intervention reported a difference-in-differences estimate of 12.5 points (95% confidence interval [CI], 10.2–14.7; $p < 0.001$), whereas the HEROIC application did not demonstrate a statistically significant advantage over a printed booklet. Interpretation of the findings is limited by heterogeneity in study designs, knowledge measurement instruments, follow-up periods, and intervention components. Overall, educational media represent potentially useful complements to school- and community-based reproductive health education, but the available evidence does not establish the superiority of a single format. Further comparative studies using validated knowledge measures and longer follow-up periods are needed to determine the sustainability of knowledge gains and their relationship with subsequent health behaviors.'

Keywords: Adolescent Reproductive Health; Reproductive Health Knowledge; Educational Media; Digital Education; Health Education.

1. INTRODUCTION

Adolescence is a critical developmental period characterized by physical, psychological, and social changes, including puberty and reproductive maturation. During this stage, adequate reproductive health knowledge is essential for understanding bodily changes, making informed decisions, and developing healthy behaviors. Knowledge of puberty, menstruation, contraception, sexually transmitted infections (STIs), and sexual and reproductive health rights is particularly important for enabling adolescents to access reliable information and make informed health-related decisions. Comprehensive, age-appropriate, and evidence-informed sexuality education therefore represents an important component of adolescent health promotion [1]. However, access to accurate and adolescent-friendly educational information remains an important consideration when designing effective reproductive health education programs.

Conventional reproductive health education, including classroom lectures and printed educational materials, continues to provide a foundation for school- and community-based health promotion. Nevertheless, educational delivery methods differ in their opportunities for interaction, repeated exposure, accessibility, and learner engagement. Advances in digital technology have expanded the range of educational media available to adolescents, including mobile applications, messaging

platforms, websites, social media, animated videos, interactive electronic modules, and other multimedia resources. Previous reviews have examined digital applications, web-based interventions, and other educational media for sexual and reproductive health education among adolescents [6]–[10]. These approaches offer alternative ways to present health information, although their educational value needs to be assessed through measured learning outcomes rather than technological features or user engagement alone.

Primary intervention studies have evaluated different educational media and reported varying knowledge-related outcomes. Messaging platforms such as LINE and WhatsApp have been investigated for reproductive health education [11], while animated videos, mobile applications, and interactive electronic modules have been examined in relation to reproductive health and menstrual hygiene knowledge [12]–[17]. Other studies have evaluated short-message service (SMS), web-based programs, social media, and on-demand mobile health services [18]–[26]. Although several studies have reported improvements in knowledge following educational interventions, the comparative advantages of different media are not consistent across studies. Some interventions have demonstrated favorable outcomes relative to their comparators, whereas others have not established statistically significant superiority over printed educational materials or alternative educational approaches. These differences indicate the need to examine both the knowledge outcomes reported by individual studies and the conditions under which the interventions were implemented.

Despite the expanding evidence base, several issues require further synthesis. First, existing studies differ in educational media, intervention duration, participant characteristics, study design, and knowledge assessment instruments. Such heterogeneity complicates direct comparisons of reported outcomes. Second, knowledge is frequently discussed alongside related outcomes, including attitudes, engagement, usability, accessibility, and health-related behaviors. Although these outcomes provide useful information about educational interventions, they are conceptually distinct from measured reproductive health knowledge [2]. Third, the evidence remains insufficiently consolidated regarding the educational approaches evaluated, their comparative knowledge outcomes, and the contextual factors that influence their implementation. Evidence on sustained knowledge retention is also limited in comparison with short-term post-intervention assessment. A focused synthesis of primary intervention studies is therefore needed to distinguish direct knowledge outcomes from related educational outcomes and to identify limitations in the available evidence.

The potential contribution of innovative educational media can be examined through multimedia learning principles, which explain how learners process verbal and visual information during learning [3], [4]. These principles provide a theoretical basis for examining the presentation and organization of educational content, but they do not independently establish the effectiveness of a particular reproductive health intervention. Features such as interactivity, feedback, repeated access, and age-appropriate presentation may offer educational benefits, while their practical value depends on content accuracy, cultural relevance, digital accessibility, and the needs of the target population. Accordingly, evaluating educational media requires attention to measured knowledge outcomes, intervention characteristics, comparison conditions, and implementation context rather than assuming that digital delivery is inherently more effective than conventional education.

This literature review aimed to synthesize evidence from primary intervention studies on educational media used to improve reproductive health knowledge among adolescents. Specifically, the review examined the types of educational media evaluated, the knowledge outcomes reported, differences in findings across interventions and comparators, and the methodological and contextual factors relevant to interpreting their effectiveness. By distinguishing knowledge outcomes from related educational and behavioral measures, this review seeks to provide an evidence-informed comparison of available approaches and identify priorities for future research and the implementation of adolescent-friendly reproductive health education in school and community settings.

2. METHODOLOGY

2.1 Study Design

This study employed a structured literature review with a narrative thematic synthesis to examine educational media used to improve reproductive health knowledge among adolescents. The review focused on the types and characteristics of educational media, reported changes in knowledge outcomes, comparative findings across interventions, and contextual factors relevant to

implementation. A structured approach was used to organize literature identification, eligibility assessment, data extraction, and evidence synthesis. The findings were interpreted descriptively because the included studies differed in intervention characteristics, study designs, knowledge measurement instruments, and follow-up periods.

2.2 Literature Search Strategy

The literature search was conducted during September 15–October 19, 2026, covering publications dated January 1, 2020, through October 19, 2026. PubMed, ScienceDirect, and Google Scholar were searched to identify studies on adolescent reproductive health education and educational media. The search yielded 86 records in total: 44 from PubMed, 36 from ScienceDirect, and 6 from Google Scholar.

The search strategy covered four concepts: adolescent populations, sexual or reproductive health, educational media, and knowledge outcomes. Search terms were combined and adapted to the search functions of PubMed, ScienceDirect, and Google Scholar. The following search strings present the terms and combinations used to identify potentially relevant studies.

Conceptual search string recorded in the original notes: (adolescent* OR teenager* OR teen* OR youth) AND ("reproductive health" OR "sexual health" OR "menstrual health" OR "menstrual hygiene") AND ("educational media" OR "health education" OR "digital education" OR "mobile application" OR "web-based education" OR animation OR "educational video" OR "interactive e-module" OR SMS OR "social media") AND (knowledge OR awareness OR understanding).

Search strings were organized according to each platform's search functionality. PubMed supports MeSH and title/abstract terms, while ScienceDirect and Google Scholar use platform-specific query functions and may process long Boolean expressions differently. PubMed search string: (("Adolescent"[Mesh] OR adolescent*[tiab] OR teenager*[tiab] OR teen*[tiab] OR youth[tiab]) AND ("Reproductive Health"[Mesh] OR "Sexual Health"[Mesh] OR "reproductive health"[tiab] OR "sexual health"[tiab] OR "menstrual health"[tiab] OR "menstrual hygiene"[tiab]) AND ("Health Education"[Mesh] OR "educational media"[tiab] OR "health education"[tiab] OR "digital education"[tiab] OR "mobile application"[tiab] OR "mobile applications"[tiab] OR "web-based education"[tiab] OR animation[tiab] OR "educational video"[tiab] OR "interactive e-module"[tiab] OR SMS[tiab] OR "social media"[tiab]) AND (knowledge[tiab] OR awareness[tiab] OR understanding[tiab])) AND ("2020/01/01"[Date - Publication] : "2026/10/19"[Date - Publication]).

ScienceDirect search string: (adolescent OR adolescents OR teenager OR teenagers OR youth) AND ("reproductive health" OR "sexual health" OR "menstrual health" OR "menstrual hygiene") AND ("educational media" OR "health education" OR "digital education" OR "mobile application" OR "web-based education" OR animation OR "educational video" OR "interactive e-module" OR SMS OR "social media") AND (knowledge OR awareness OR understanding). Apply the publication-year/date limits for January 1, 2020, through October 19, 2026, where the platform interface supports them.

Google Scholar search string: adolescent OR teenager OR youth combined with reproductive health OR sexual health OR menstrual health and education OR mobile application OR educational video OR e-module and knowledge. Search phrase: (adolescent OR teenager OR youth) ("reproductive health" OR "sexual health" OR "menstrual health") (education OR "mobile application" OR video OR "e-module" OR SMS OR "social media") knowledge. Apply the custom date range 2020–October 19, 2026, where supported. Because Google Scholar does not consistently process long Boolean strings, use the documented query in manageable keyword combinations and record each query separately.

Publication date limits were set from January 1, 2020, through October 19, 2026. The search returned 86 records: 44 from PubMed, 36 from ScienceDirect, and 6 from Google Scholar.

2.3 Inclusion and Exclusion Criteria

Studies were eligible for the primary evidence synthesis when they met the following criteria:

1. Published between January 1, 2020, and October 19, 2026.
2. Involved adolescents aged 10–19 years or provided separately extractable findings for this population.
3. Evaluated an educational intervention addressing sexual or reproductive health, including menstrual health and hygiene.
4. Measured reproductive health knowledge as an outcome.
5. Provided sufficient information about the study population, intervention, research design, and knowledge-related findings for interpretation.

Primary intervention studies, including randomized, quasi-experimental, and other experimental or non-randomized intervention designs, were considered for inclusion when relevant knowledge outcomes were reported. Studies involving mixed-age populations were eligible only when adolescent-specific findings were available.

Studies were excluded when they focused on populations outside the review scope, addressed topics unrelated to adolescent sexual or reproductive health, did not measure a relevant knowledge outcome, or lacked sufficient methodological information for meaningful interpretation. Studies reporting only usability, satisfaction, engagement, accessibility, or behavioral intentions without a relevant knowledge outcome were not included in the primary synthesis.

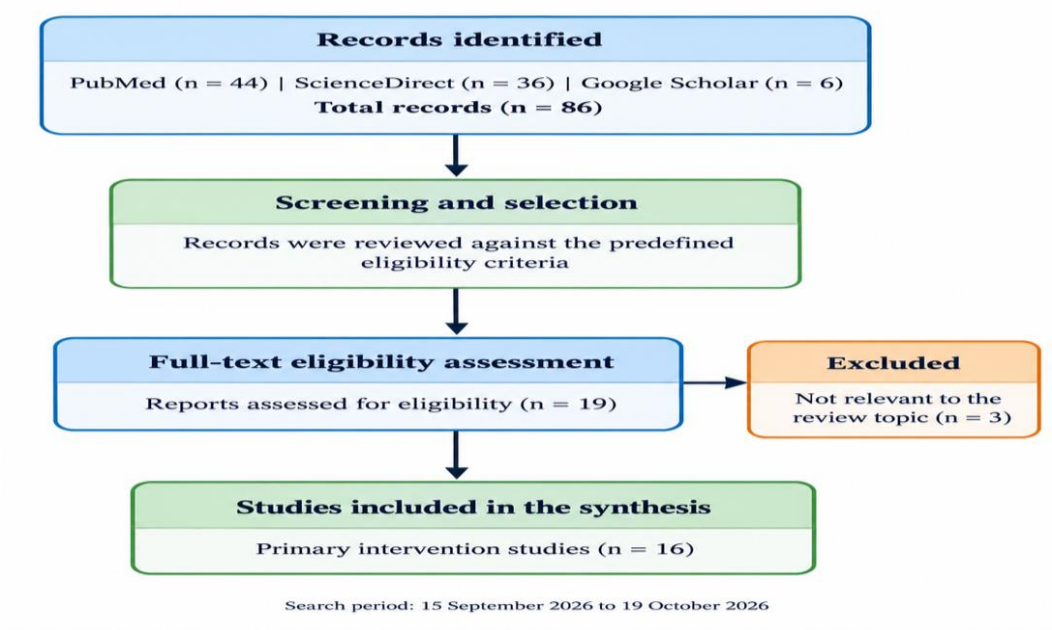
The screening decisions and reasons for exclusion were documented in the Excel selection sheet. Systematic reviews, scoping reviews, and other secondary research were used as contextual sources where relevant but were not counted among the primary studies included in the synthesis.

2.4 Study Selection Process

The study selection process was documented in an Excel worksheet. A total of 86 records were identified from three sources: PubMed (n = 44), ScienceDirect (n = 36), and Google Scholar (n = 6). Of these, 19 reports proceeded to full-text eligibility assessment. Three reports were excluded because they did not meet the review topic criteria, resulting in 16 primary intervention studies being included in the final synthesis.

Full-text eligibility was assessed based on three main criteria: relevance to the target adolescent population, evaluation of an educational intervention related to sexual or reproductive health, and measurement of reproductive health knowledge as an outcome. Studies meeting these criteria were retained for synthesis. The study selection process is illustrated in Figure 1, following the PRISMA 2020 reporting framework [5].

Figure 1. Study Selection Flow Diagram



Following the study selection process presented in Figure 1, 16 primary intervention studies were included in the final synthesis. Data were extracted from each study, including the authors and year of publication, country and participant characteristics, study design and sample size, type of educational media, knowledge assessment instruments, principal knowledge-related findings, and reported limitations. The extracted data were organized and compared to identify patterns in the reported effectiveness of educational media, differences in knowledge outcomes, and methodological limitations across the included studies.

2.5 Data Extraction

A structured data-extraction framework was used to organize information from the 16 included primary studies. The extracted variables comprised author and publication year, study country, participant characteristics, sample size, study design, intervention and comparison conditions, educational media, intervention duration, knowledge measurement instruments, reported knowledge outcomes, and study limitations.

Educational media were categorized according to their principal delivery format, including mobile applications, messaging platforms, SMS-based interventions, social media, animated videos, interactive electronic modules, web-based education, and blended educational approaches integrating digital technology with other instructional activities.

Reproductive health knowledge was treated as the primary outcome. Knowledge outcomes were distinguished from attitudes, motivation, engagement, satisfaction, usability, health literacy, and self-reported reproductive health practices. These related outcomes were considered where relevant but were not interpreted as direct measures of knowledge improvement.

Reported pre-intervention and post-intervention scores, between-group differences, effect estimates, confidence intervals, and statistical significance were extracted when available in the accessible study reports. Information not reported in the source material was identified as unavailable rather than inferred. Bibliographic details and quantitative findings were checked against available article texts and publication records.

2.6 Data Synthesis and Analysis

A narrative thematic synthesis was conducted to compare educational media and their reported reproductive health knowledge outcomes. The synthesis was organized around four themes:

1. Characteristics and delivery formats of educational media.
2. Reported changes in reproductive health knowledge and comparative intervention findings.
3. Educational features potentially relevant to knowledge acquisition.
4. Contextual factors and methodological limitations affecting interpretation and implementation.

Where data were available, findings were compared using pre-intervention and post-intervention knowledge scores, between-group differences, effect estimates, confidence intervals, and reported statistical significance. Interpretation considered study design, participant characteristics, comparison conditions, intervention duration, and the specific knowledge domains measured.

Within-group improvements were distinguished from evidence of superiority over a comparison group. A statistically significant pre-intervention to post-intervention change within an intervention group was not treated as sufficient evidence that the intervention was more effective than an alternative educational approach. Studies without an appropriate comparison group were interpreted cautiously.

A quantitative meta-analysis was not conducted. The included studies differed in educational content, delivery formats, research designs, knowledge assessment instruments, and outcome reporting. A narrative synthesis was therefore used to describe the available findings without combining results that were not sufficiently comparable.

2.7 Methodological Considerations

Several methodological considerations informed the interpretation of the findings. These included differences in study design, sample characteristics, educational content, delivery methods, knowledge measurement instruments, comparison conditions, and follow-up duration. Potential sources of bias, including selection bias, self-reported outcome measurement, and incomplete follow-up, were considered when such limitations were reported by the original studies.

A formal risk-of-bias assessment using a standardized appraisal tool was not conducted. Consequently, the review does not assign an overall certainty rating to the included evidence. The findings should be interpreted as a structured narrative synthesis of the available primary intervention studies rather than a pooled quantitative estimate of educational effectiveness.

Search results, study-selection decisions, and reasons for exclusion were organized in the Excel screening file. The final selection comprised 19 reports assessed at full text, three reports excluded as outside the review topic, and 16 primary intervention studies included in the synthesis.

3. RESULTS

3.1 Study Selection and Characteristics

The search identified 86 records: 44 from PubMed, 36 from ScienceDirect, and 6 from Google Scholar. The Excel selection sheet records 19 reports assessed at full text, three reports excluded because they did not match the review topic, and 16 primary intervention studies included in the synthesis.

The 16 included studies were conducted in Indonesia, Bangladesh, Kenya, and the United States. They examined school-based or service-linked adolescent populations and evaluated mobile health applications, messaging platforms, SMS, animated videos, interactive digital booklets and e-modules, social media, web-based programs, on-demand mobile services, and blended educational approaches. Study designs included quasi-experimental pretest–posttest studies, individual randomized controlled trials, and a cluster randomized trial. Table 1 summarizes the characteristics, educational media, principal knowledge findings, and limitations of all 16 studies.

Table 1. Summary of Included Primary Intervention Studies

Author and year	Country and sample	Study design	Educational media	Main knowledge findings	Limitations
Kosasih et al. (2024) [11]	Indonesia; n = 154 (LINE n = 78; WhatsApp n = 76)	Quasi-experimental, two groups	LINE and WhatsApp	Mean knowledge scores increased from 15.68 to 20.21 in the LINE group and from 15.16 to 19.67 in the WhatsApp group (both within-group p = 0.001). The difference in knowledge gain between groups was not significant (p = 0.973).	Two schools; one-month follow-up.
Linsqy et al. (2025) [12]	Indonesia; n = 50 female Grade XI students (25 per group)	Quasi-experimental with control group	Animated video on vulva hygiene	Mean score increased from 5.20 to 6.92 in the intervention group (p < 0.001); the control score changed from 4.80 to 4.64 (p = 0.54). The between-group comparison was significant (reported p = 0.00).	Small sample; single-school setting.
Nurhaeni et al. (2025) [13]	Indonesia; n = 120 adolescents (60 per group)	Quasi-experimental pretest–posttest with control group	Digital application with family nursing support	The intervention group's knowledge score increased by 12.4 points (p < 0.001; Cohen's d = 1.45). The adjusted between-group difference was significant (p < 0.001).	The independent effect of the application cannot be separated from family support.
Sari et al. (2026) [14]	Indonesia; n = 140 adolescents (70 per group)	Quasi-experimental controlled study, three-month follow-up	Teen Health application	Knowledge-score gain was 4.36 points in the intervention group versus 0.86 in the control group (p < 0.001).	Non-randomized design; follow-up was three months.
Agustini et al. (2026) [15]	Indonesia; n = 156 adolescents (HEROIC n = 85; booklet n = 71)	Quasi-experimental pretest–posttest	HEROIC application and printed booklet	Knowledge improved in both groups (within-group p < 0.001), but the difference in knowledge improvement between groups was not significant.	Non-randomized allocation; short-term outcome assessment.
Fuadah et al. (2026) [16]	Indonesia, Bandung Regency; n = 180 female students (90 per condition)	Quasi-experimental with control group	Animated video plus interactive digital booklet	The difference-in-differences estimate was 12.5 points (95% CI: 10.2–14.7; p < 0.001).	Combined intervention prevents isolation of each medium's effect.
Noviani et al. (2026) [17]	Indonesia; n = 70 female students (35 per group)	Quasi-experimental pretest–posttest, two groups	Interactive e-module versus educational video	Median knowledge score increased from 50 to 95 in the e-module group and from 50 to 90 in the video group; both within-group changes and the between-group difference were significant (p < 0.001).	Purposive sampling; single-district setting; short follow-up.

Author and year	Country and sample	Study design	Educational media	Main knowledge findings	Limitations
Ahmed (2020) [18]	Bangladesh; n = 400 adolescent girls aged 14–19 years at baseline	Uncontrolled before-and-after quasi-experimental study; eight-week intervention	SMS-based reproductive health education	Mean knowledge score increased from 44.71% (SD 9.13) at baseline to 70.8% (SD 9.7) post-intervention ($p < 0.001$; Cohen's $d = 3.6$). Post-intervention data were available for 381 participants.	No control group; one geographic area; 4.8% missing at post-test.
Martínez-García et al. (2023) [19]	United States; n = 1,210 females aged 14–18 years in the final analytic sample	Randomized controlled trial; three- and six-month follow-up	Crush mobile application versus wellness app	At three months, the adjusted effect estimate for contraceptive knowledge was 0.03 (SE 0.007; $p < 0.001$; marginal effect 0.029). The study also assessed outcomes at six months.	Female-only sample; recruitment through social media; outcomes included self-reported measures.
Sumarmi et al. (2026) [20]	Indonesia, Takalar; n = 100 female high-school students (50 per group)	Quasi-experimental pretest–posttest with control group	Android-based reproductive health education	Mean score increased from 11.52 (SD 3.04) to 17.54 (SD 2.29) in the intervention group, compared with 12.86 (SD 3.74) to 13.24 (SD 4.22) in the control group.	Single-school setting; non-random allocation.
McCrimmon et al. (2024) [21]	United States; n = 457 high-school students (HEART n = 233; control n = 224)	Randomized controlled trial; immediate post-test	HEART web-based sexual health program	At post-test, HIV/STI knowledge was higher in the HEART group than in control (means 7.03 vs. 4.61; adjusted B = 2.42, SE 0.16; $p < 0.001$; Cohen's $d = 1.17$).	Immediate post-test; long-term knowledge retention was not assessed.
Yarger et al. (2024) [22]	United States; n = 1,263 adolescents across 95 cohorts	Cluster randomized trial; three-month follow-up	In-person sexual health education integrating digital technologies	At three months, 57.6% of sexual-health knowledge items were answered correctly in the intervention group versus 50.7% in control ($p = 0.001$).	The independent effect of digital technology cannot be isolated from the in-person program.
Macharia et al. (2022) [23]	Kenya; n = 300 randomized (USSD n = 146; control n = 154)	Randomized controlled trial; three-month follow-up	USSD-based on-demand mobile information service	Among the analyzed knowledge scores, the intervention mean was 10.77 (SD 2.01) versus 10.17 (SD 2.41) in control ($t = 2.197$; $p = 0.03$). The paper reports 54.9% (62/109) used the app at least once.	App uptake was limited; knowledge analysis had fewer observations than the 300 randomized participants.

Author and year	Country and sample	Study design	Educational media	Main knowledge findings	Limitations
Haninuna et al. (2023) [24]	Indonesia, Semau Island; n = 78 junior-high-school students (39 per group)	Quasi-experimental pretest–posttest, two groups	TikTok versus leaflet	Knowledge scores increased from 11.15 to 17.20 in the TikTok group (gain 6.05) and from 10.20 to 15.90 in the leaflet group (gain 5.70); both within-group tests reported p = 0.0001.	Small sample; single-location setting.
Parimayuna et al. (2023) [25]	Indonesia, Bali; n = 50 students aged 12–17 years	Quasi-experimental, two-group pretest–posttest	Local-language versus national-language education	Knowledge improved in both groups (local language p < 0.001; national language p = 0.004); the between-group difference favored local-language delivery (p = 0.005).	Small purposive sample from one village.
Jenner et al. (2023) [26]	United States; n = 1,770 Black and Hispanic females aged 18–19 years (Plan A n = 886; control n = 884)	Individual randomized controlled trial; three-month follow-up	Plan A sexual health video versus control video	At three months, contraceptive knowledge was significantly higher in the Plan A group (adjusted effect estimate 0.03, SE 0.007; p < 0.001; marginal effect 0.029).	Population restricted to Black and Hispanic females aged 18–19 years; self-reported outcomes.

Note: CI = confidence interval; HIV = human immunodeficiency virus; STI = sexually transmitted infection; SMS = short message service; USSD = unstructured supplementary service data.

3.2 Knowledge-Related Outcomes

The findings indicated that several educational interventions were associated with short-term improvements in adolescent reproductive health knowledge. However, the magnitude of change and evidence of superiority over comparison conditions varied.

Mobile applications showed mixed comparative outcomes. Teen Health reported a greater knowledge gain in the intervention group than in the control group, whereas the HEROIC application did not demonstrate statistically significant superiority over a printed booklet [14], [15]. Nurhaeni et al. also reported a significant knowledge improvement following an application intervention combined with family nursing support, although the independent contribution of the application could not be isolated [13].

Visual and interactive media showed favorable outcomes in studies of vulva hygiene and menstrual hygiene. The combined animated-video and digital-booklet intervention reported a difference-in-differences estimate of 12.5 points (95% CI: 10.2–14.7; p < 0.001). A separate study reported a greater median knowledge gain with an interactive e-module than with an educational video [12], [16], [17]. Because the interventions and measurement instruments differed, these findings should not be treated as direct comparisons across studies. Messaging and social-media interventions were also associated with knowledge improvement, although comparative advantages were inconsistent. LINE and WhatsApp did not differ significantly in knowledge gain, while both TikTok and leaflet groups improved [11], [24]. Studies examining SMS, USSD-based services, web-based education, and blended programs extended the evidence to other settings, but used different outcomes and knowledge instruments [18], [21]–[23].

Overall, the evidence suggests that several educational media may support short-term gains in adolescent reproductive health knowledge. However, improvement within an intervention group does

not establish superiority over an alternative approach. Differences in study design, knowledge instruments, comparator conditions, and intervention components limit conclusions about the relative effectiveness of individual media formats.

3.3 Educational Media Characteristics and Potential Learning Mechanisms

Mobile applications and on-demand mobile services provided structured or on-demand access to educational content, while messaging platforms distributed information through familiar communication channels [11], [13]–[15], [18], [19], [23]. Animated videos and interactive e-modules presented information through visual content and structured learning sequences [12], [16], [17].

Blended programs integrated face-to-face instruction with digital technologies, although the independent contribution of the digital components cannot be isolated in such designs [22]. These features offer plausible ways to support learning, but the available findings do not establish that any single feature independently caused the observed improvements.

3.4 Contextual Factors and Limitations of the Evidence

Implementation may depend on access to digital devices and internet connectivity, content accuracy, cultural relevance, age appropriateness, language, privacy, and support from teachers, families, or healthcare professionals. These are practical considerations and were not necessarily measured as outcomes in every included study.

Methodological limitations included non-randomized designs, purposive sampling, small or context-specific samples, and variation in knowledge assessment instruments. Several interventions combined more than one educational component, making it difficult to isolate the effect of a single medium. Most studies assessed immediate or short-term outcomes, and evidence on sustained knowledge retention and subsequent reproductive health behaviors remained limited.

The results should therefore be interpreted as a synthesis of heterogeneous studies rather than evidence that one educational format is universally superior. Further comparative studies using robust designs, clearly described knowledge measures, and longer follow-up periods are needed.

4. DISCUSSION

This literature review synthesized 16 primary intervention studies examining educational media and adolescent knowledge of sexual, reproductive, or menstrual health. The studies evaluated messaging platforms, mobile applications, SMS, animated videos, interactive e-modules, social media, web-based programs, USSD-based information services, and blended education. Overall, several interventions were associated with short-term improvements in knowledge, but comparative results varied. The findings do not establish that digital media are consistently superior to printed materials or other educational approaches [11]–[26].

4.1 Educational Mechanisms and Knowledge Acquisition

The reviewed interventions delivered information through different formats and levels of interaction. Mobile applications and digital services offered structured or on-demand access to content, while messaging platforms distributed information through familiar communication channels. Animated videos and interactive e-modules presented information through visual and structured learning sequences [11]–[18], [20], [23], [24]. These characteristics provide plausible explanations for how educational media might support learning, but the included studies generally evaluated complete interventions rather than isolating the effects of individual features.

The possible value of combining verbal and visual information is consistent with multimedia learning principles, which emphasize the organization and integration of relevant words and images during learning [3], [4]. Interactive quizzes, feedback, and repeated access might also encourage learners to revisit educational material. Nevertheless, these mechanisms should be treated as explanatory interpretations rather than demonstrated causal effects, because the available studies did not consistently compare individual design components under controlled conditions.

4.2 Comparative Effectiveness of Educational Media

The comparative findings for mobile applications were mixed. Teen Health was associated with a larger reported knowledge gain than routine education, while the HEROIC application did not significantly outperform a printed booklet [14], [15]. Nurhaeni et al. reported favorable knowledge outcomes after an application intervention integrated with family nursing support, but the contribution of the application cannot be separated from the accompanying support [13]. These results indicate that the effectiveness of an application depends on the intervention and comparator, and should not be inferred from the digital format alone.

Messaging and social-media studies also showed varied comparative results. Knowledge scores increased in both the LINE and WhatsApp groups, but the difference in knowledge gain was not statistically significant ($p = 0.973$). The TikTok and leaflet groups both improved in the study by Haninuna et al. [11], [24]. The evidence therefore does not establish a consistent advantage for one messaging or social-media platform.

Visual and interactive interventions reported promising findings for specific knowledge domains. Linsqy et al. reported an increase in vulva-hygiene knowledge following animated-video education. Fuadah et al. reported a difference-in-differences estimate of 12.5 points (95% CI: 10.2–14.7; $p < 0.001$) for a combined animated-video and interactive digital-booklet intervention. Noviani et al. reported greater median knowledge gain in the interactive e-module group than in the video group [12], [16], [17]. The Fuadah findings reflect the combined intervention and do not identify the separate effect of either medium.

Evidence from SMS, USSD-based services, web-based education, and blended programs broadens the range of delivery models represented in the review [18], [21]–[23]. However, outcomes were measured using different instruments and scoring systems. Numerical results should therefore be interpreted within each study rather than ranked directly across studies. In addition, improvement within an intervention group does not by itself demonstrate superiority over a comparator.

4.3 Implementation Conditions and Target Populations

The practical suitability of educational media may depend on access to devices and internet connectivity, language, privacy, content accuracy, cultural relevance, and the availability of educational or healthcare support. These considerations are relevant when selecting an intervention for a particular setting, but they were not measured consistently across the 16 studies and should not be interpreted as comparative findings from the review.

Developmental appropriateness is also important when presenting information about puberty, menstruation, contraception, and sexually transmitted infections. Short, clearly structured materials may be suitable for some learning contexts, while other contexts may require more detailed information or opportunities to ask questions. The included evidence does not establish a universal age-specific advantage for any medium, so these choices should be guided by the target population and the educational objective.

Blended approaches may be useful where digital resources are combined with face-to-face education. However, the Yarger et al. study evaluated an in-person program integrating digital technologies, so the independent contribution of the digital component cannot be determined from that comparison alone [22]. Similarly, the ReproCare intervention included family nursing support, which limits attribution of its findings to the application alone [13].

4.4 Methodological Limitations and Interpretation of Evidence

The evidence base was heterogeneous in study design, sample characteristics, intervention duration, comparator conditions, and knowledge measurement. Eleven studies used quasi-experimental designs, including one uncontrolled before-and-after study, while four used individual randomized controlled trials and one used a cluster randomized trial, accounting for all 16 included studies [11]–[26]. Non-random allocation and purposive sampling in several studies may increase the risk of selection bias and confounding.

Knowledge outcomes were measured with different questionnaires, item sets, and score ranges. Source-text checks confirmed the baseline and post-intervention scores reported by Ahmed, the adjusted contraceptive-knowledge estimate reported by Martínez-García et al., and the three-month contraceptive-knowledge effect reported by Jenner et al. These estimates should be interpreted within each study because the outcome scales and statistical models differ.

Several interventions included more than one component, including family support, counseling, videos, or face-to-face instruction. This makes it difficult to attribute observed outcomes to one medium. Follow-up periods also varied, and many studies focused on immediate or short-term knowledge outcomes. The evidence is therefore insufficient to conclude that observed knowledge gains persist over time or lead to changes in reproductive health behavior.

The review used a structured search and predefined eligibility criteria, followed by narrative synthesis rather than quantitative meta-analysis. The results should be interpreted as a synthesis of the included studies, not as a pooled estimate of intervention effectiveness.

4.5 Implications for Future Research and Practice

Future studies should compare educational media using clearly defined knowledge outcomes, validated and reliable instruments, and transparent reporting of baseline scores, post-intervention results, between-group differences, confidence intervals, and effect estimates. Comparative designs should, where feasible, control for content, intervention duration, and accompanying support so that the contribution of the medium can be assessed more clearly.

Longer follow-up is needed to examine knowledge retention and to determine whether knowledge gains are associated with subsequent decision-making or health behaviors. Researchers should also report intervention content, frequency, duration, participant engagement, and implementation context in sufficient detail to support replication and comparison.

In practice, educational media should be selected according to the learning objective, content quality, accessibility, developmental suitability, privacy requirements, and available support. Digital approaches may complement school- and community-based reproductive health education, while printed and blended formats may remain appropriate in settings with limited digital access. Based on the current evidence, no single educational format can be considered universally superior.

5. CONCLUSIONS

This literature review identified mobile applications, animated videos, and interactive e-modules as promising educational media for improving adolescent reproductive health knowledge. However, no single format demonstrated consistent superiority across studies. Interactive e-modules showed greater knowledge gains than educational videos in one direct comparison, while the HEROIC application did not significantly outperform a printed booklet. A combined animated-video and interactive digital-booklet intervention also reported a significant improvement in menstrual hygiene knowledge. These findings suggest that educational design and intervention content are important considerations when selecting educational media.

Short-term improvement in reproductive health knowledge was the most consistently reported outcome across the included studies. Nevertheless, the evidence was limited by heterogeneous study designs and knowledge assessment instruments, non-randomized allocation in several studies, and interventions combining multiple educational components. Evidence regarding long-term knowledge retention and subsequent reproductive health behaviors remained insufficient.

In practice, mobile and multimedia educational media should complement school- and community-based reproductive health education. Selection should consider content accuracy, developmental appropriateness, cultural relevance, digital accessibility, and available educational support. Future research should prioritize rigorous comparative trials, validated knowledge assessment instruments, and longitudinal follow-up to establish whether knowledge gains are sustained and which approaches are most effective for different adolescent populations and implementation settings.

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BETWEEN KNOWING AND DOING: A PHENOMENOLOGICAL EXPLORATION OF SELF-MANAGEMENT BARRIERS AMONG PEOPLE WITH TYPE 2 DIABETES

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Abstract

Background: Type 2 diabetes mellitus (T2DM) requires sustained self-management, yet understanding care recommendations does not ensure consistent action. Here, the knowing–doing gap concerns patients' experiences of difficulty enacting understood care, extending attention beyond adherence to everyday circumstances. Although previous studies identify individual and social barriers, how these intersect in patients' experiences of translating understanding into action remains insufficiently understood.
Objective: To explore how people with T2DM experience difficulties translating their understanding of recommended care into consistent daily self-management.
Methods: A descriptive phenomenological study was conducted in Pasar Rebo, East Jakarta, from March to July 2025. Twelve participants with T2DM who could communicate effectively and consented to participate were recruited through purposive sampling until data saturation. Semi-structured, in-depth interviews were analyzed using Colaizzi's seven-step method. Trustworthiness was addressed through credibility, dependability, confirmability, and transferability.
Results: Six themes emerged: knowing but finding it difficult to do; struggling against oneself; daily life demands overriding the care plan; family and social environment as both supporters and barriers; living with diabetes as a burden that never ends; and needing more than just knowing. Across participants' accounts, understood care became difficult to sustain amid personal struggles, competing responsibilities, social circumstances, and the continuing burden of care. General understanding also coexisted with uncertainty about practical implementation.
Conclusion: Participants experienced the knowing–doing gap as difficulty sustaining understood care within everyday circumstances. These findings highlight the relevance of patients' lived contexts when considering self-management support, without establishing the effectiveness of specific interventions.

Keywords: Type 2 Diabetes Mellitus; Self-Management; Barriers; Knowing–Doing Gap; Phenomenology.

1. INTRODUCTION

Type 2 diabetes mellitus (T2DM) is a chronic disease that requires active patient involvement in lifelong care. Successful management depends not only on pharmacological treatment and healthcare services but also on patients' ability to sustain self-management in everyday life. Self-management encompasses dietary management, physical activity, medication-taking, blood glucose monitoring, foot care, and recognizing and responding to changes in health conditions. Because most of these activities take place outside healthcare facilities, patients have a central role in maintaining disease control and preventing complications [1], [2].

However, knowledge of diabetes management does not necessarily translate into consistent everyday practice. A mixed-methods study [3] reported moderate knowledge, more favorable attitudes, and lower self-management practice scores: only 38.35% exercised regularly, and 22.33% performed routine foot care. An Indonesian cross-sectional study reported an association between self-management dietary behaviors and dietary concordance [4]. A systematic review further highlighted the importance of self-regulation and family involvement in self-management interventions [5]. Together,

these studies indicate the need to examine how patients experience difficulties putting their understanding of diabetes care into practice.

In this study, the knowing–doing gap refers to the lived experience of understanding recommended diabetes self-management while encountering difficulty enacting and sustaining it in everyday circumstances. The term is used as an experiential focus rather than as an entirely separate or mutually exclusive construct. Non-adherence describes a mismatch between actions and agreed recommendations, while a knowledge–practice gap describes a discrepancy between knowledge and practice. Here, attention is directed to how that discrepancy is experienced within everyday life. An intention–behavior gap concerns difficulty enacting an intended action; knowing a recommendation does not necessarily establish an intention to follow it. The study therefore distinguishes reported understanding, intention, and practical capacity without assuming that these are equivalent.

Previous research has identified psychological factors, self-regulation, social support, relationships with healthcare professionals, and everyday circumstances as relevant influences on self-management [6]. A qualitative study of medication self-management described barriers involving habits, work responsibilities, beliefs, emotional responses, and healthcare resources [7]. In Indonesia, cultural practices and family life also shape patients' needs for education and self-management support [8]. Diabetes-related distress and the continuing demands of disease management introduce additional challenges to self-care [9]. These findings provide important accounts of the barriers patients encounter. However, identifying barriers does not fully explain how patients experience the tension between understanding recommended care and finding it difficult to sustain, how they negotiate competing care and everyday demands, or what meaning they attach to repeated difficulties despite knowing what is recommended. The question addressed in this study concerns how these influences are experienced together in the everyday lives of patients who report understanding diabetes care recommendations.

Accordingly, this descriptive phenomenological study aimed to explore how people with T2DM experience and describe difficulties translating their understanding of recommended care into consistent daily self-management. Rather than treating the knowing–doing gap as a predetermined explanation, the study sought to describe this experience through participants' accounts, including the circumstances in which understood care became difficult to enact and the meanings participants attributed to those difficulties.

2. METHODOLOGY

This qualitative study used a descriptive phenomenological approach to explore the experiences of people with type 2 diabetes mellitus (T2DM) in translating their understanding of care into everyday self-management. The study was conducted in Pasar Rebo District, East Jakarta, from March to July 2026.

Participants were recruited progressively through purposive sampling based on the inclusion criteria until data saturation was reached. Twelve participants were included: seven men and five women, aged 45–63 years, who had lived with T2DM for 2–12 years. Inclusion criteria were having T2DM, being able to communicate effectively, and being willing to participate. Potential participants were identified through local community health volunteers and subsequently contacted by the researcher, who explained the study and assessed their eligibility. Of 16 potential participants contacted, four declined or withdrew because of competing commitments.

Data were collected through semi-structured, in-depth interviews conducted in Indonesian by the researcher. Interviews lasted 30–45 minutes and took place in participants' homes, with attention to privacy. Open-ended questions and follow-up probes explored participants' understanding of care, experiences of difficulty implementing recommendations, barriers, and the meanings attributed to these experiences. Interviews were audio-recorded with participants' consent, transcribed verbatim, and supplemented with field notes documenting the interview context.

Reflexivity involved examining how the researcher's background as a nursing lecturer with experience in teaching and diabetes self-management education could influence interviewing and interpretation. Bracketing was undertaken by documenting initial assumptions and maintaining reflexive notes, which were reviewed throughout the study to recognize preconceptions and maintain attention to participants' accounts.

Data were analyzed manually using Colaizzi's seven-step method: repeatedly reading the transcripts, identifying significant statements, formulating meanings, organizing meanings into themes, developing an exhaustive description, formulating the fundamental structure of the experience, and returning the findings to participants for validation [10]. Interpretations were checked against the transcripts to ensure that they remained grounded in the data. Member checking involved sharing summaries of themes and descriptions of experiences with participants during face-to-face meetings. Saturation was assessed by comparing significant statements, meanings, and themes across interviews during concurrent data collection and analysis. No new relevant meanings or themes emerged in the tenth interview. Two subsequent interviews enriched the descriptions and confirmed the existing themes; data collection therefore ended after 12 participants.

Trustworthiness was addressed through four criteria [11]. Credibility was supported by in-depth probing and participant validation of the findings. Dependability was maintained through documentation of procedures and analytical decisions. Confirmability was supported by records of initial assumptions, reflexive notes, and tracing interpretations back to the transcripts. Transferability was supported by descriptions of the study context, participant characteristics, and illustrative quotations.

The study respected autonomy, confidentiality, and voluntary participation. Informed consent was obtained before the interviews, and participants were informed of their right to decline or withdraw. Audio recordings, transcripts, and field notes were stored in a password-protected folder on the researcher's computer, accessible only to the research team. Participants' identities were protected using codes P1–P12.

3. RESULTS

3.1 Participant Characteristics

The study included 12 participants with T2DM, aged 45–63 years: seven men (58.3%) and five women (41.7%).

Participants had lived with T2DM for 2–12 years. Seven had a disease duration of more than five years, and five had a duration of 2–5 years. P6 reported the longest duration (12 years), followed by P10 (10 years); P4 and P9 each reported the shortest duration (two years).

Eight participants (66.7%) used oral hypoglycemic agents (OHAs), and four (33.3%) used OHAs combined with insulin. None used insulin alone. These characteristics provided varied contexts for exploring everyday self-management experiences.

3.2 Thematic Analysis Using Colaizzi's Method

Table 1. Coding Process and Theme Development

Significant Statement	Formulated Meaning	Subtheme	Theme
"I actually know that sugary foods should be reduced. The doctor and nurse have also told me many times, but when there is food that I like, sometimes I still eat it." (P3)	Awareness of dietary advice coexists with difficulty limiting preferred foods.	Difficulty applying dietary knowledge	1. Knowing but Finding It Difficult to Do
"Actually, I already know that I should reduce sugary foods, but putting it into practice is what is difficult. Especially when my favorite food is available, sometimes I cannot resist." (P7)	Understanding general advice does not always translate into consistent dietary action.	Difficulty resisting preferred foods	1. Knowing but Finding It Difficult to Do
"When I have just come back from a check-up, I am usually disciplined. After a few weeks, I start becoming less strict again." (P4)	Discipline improves after receiving reinforcement from healthcare professionals but is difficult to maintain.	Motivation does not last	2. Struggling Against Oneself

Significant Statement	Formulated Meaning	Subtheme	Theme
“After seeing the doctor, I usually follow all the recommendations. But after a few weeks, sometimes I go back to my old habits.” (P9)	The participant experienced difficulty maintaining behavioral changes over the long term.	Returning to old habits	2. Struggling Against Oneself
“I know I should exercise, but I have to work in the morning. When I get home in the afternoon, I am already tired, so I end up not doing it.” (P1)	Work demands and fatigue hinder physical activity despite awareness of its benefits.	Busyness and fatigue	3. Daily Life Demands Overriding the Care Plan
“At home, everyone eats rice as usual. If I have to eat separately with a different menu, it is also difficult.” (P2)	Family eating habits make it difficult for the participant to follow the recommended diet.	Family eating patterns	4. Family and Social Environment as Both Supporters and Barriers
“When there is a family event and everyone is eating, sometimes I feel uncomfortable refusing.” (P5)	Social norms and discomfort in refusing food influence dietary adherence.	Social pressure related to eating	4. Family and Social Environment as Both Supporters and Barriers
“Sometimes I also feel tired; every day I have to remember my medication, and I have to keep watching what I eat. Diabetes never really ends.” (P10)	The ongoing demands of self-management cause boredom and emotional exhaustion.	Fatigue with ongoing care	5. Living with Diabetes as a Burden That Never Ends
“I already know that I should reduce my food intake, but sometimes I am confused about what the appropriate portion for me actually looks like.” (P6)	General knowledge does not provide practical guidance that meets individual needs.	Need for practical and individualized education	6. Needing More Than Just Knowing
“The doctor has told me that I should exercise regularly. I know it is important, but sometimes I am confused about what type of exercise is suitable for my condition.” (P3)	The participant needs specific recommendations that can be applied according to their individual condition.	Individualized support for behavioral implementation	6. Needing More Than Just Knowing

3.3 Thematic Analysis Results

Analysis using Colaizzi’s phenomenological method generated six themes: (1) knowing but finding it difficult to do; (2) struggling against oneself; (3) daily life demands overriding the care plan; (4) family and social environment as both supporters and barriers; (5) living with diabetes as a burden that never ends; and (6) needing more than just knowing. Across these accounts, participants described understanding general care recommendations while encountering difficulty sustaining them within everyday circumstances. The final theme also revealed uncertainty about how to implement general recommendations in practice.

3.3.1 Knowing but Finding It Difficult to Do

This theme describes participants’ reported understanding of general diabetes care recommendations and difficulties applying them in everyday life. Participants described knowing that dietary changes and other self-management activities were important, but this understanding did not always translate into consistent action. This was reflected in the following statements:

“I actually know that sugary foods should be reduced. The doctor and nurse have also told me many times, but when there is food that I like, sometimes I still eat it.” (P3)

“Actually, I already know that I should reduce sugary foods, but putting it into practice is what is difficult. Especially when my favorite food is available, sometimes I cannot resist.” (P7)

These statements describe a tension between understanding general dietary advice and putting it into practice when preferred foods were available.

3.3.2 Struggling Against Oneself

This theme describes participants' internal struggle to maintain self-management behaviors. Fluctuating motivation, difficulty controlling desires, and the tendency to return to previous habits became barriers to sustaining behavioral changes. Participants expressed:

"When I have just come back from a check-up, I am usually disciplined. After a few weeks, I start becoming less strict again." (P4)

"After seeing the doctor, I usually follow all the recommendations. But after a few weeks, sometimes I go back to my old habits." (P9)

"Actually, I try to follow the doctor's and nurse's recommendations, but over time I get bored and return to my previous habits." (P12)

These accounts describe renewed efforts after healthcare visits followed by difficulty sustaining changes over time.

3.3.3 Daily Life Demands Overriding the Care Plan

This theme describes how daily life demands became barriers for participants in implementing self-management behaviors. Work commitments, household responsibilities, fatigue, limited time, and irregular routines caused some self-care activities to be performed differently from what had been planned or not performed at all.

Participants stated:

"I know I should exercise, but I have to work in the morning. When I get home in the afternoon, I am already tired, so I end up not doing it." (P1)

"I know exercise is important for diabetes, but finding the time is difficult. There are many activities throughout the day, so when I finally have free time, I am usually already exhausted." (P8)

These accounts describe how work demands, limited time, and fatigue made physical activity difficult despite participants' awareness of its importance.

3.3.4 Family and Social Environment as Both Supporters and Barriers

This theme describes the dual role of family and the social environment in the implementation of self-management. Family members became a source of support by reminding participants to take their medication, preparing food, accompanying them during check-ups, and providing emotional support. However, family eating habits and certain social situations also became barriers for participants in following diabetes management recommendations.

Participants stated:

"At home, everyone eats rice as usual. If I have to eat separately with a different menu, it is also difficult." (P2)

"When there is a family event and everyone is eating, sometimes I feel uncomfortable refusing." (P5)

These experiences indicate that the implementation of self-management is not determined solely by individual decisions, but is also influenced by family lifestyle patterns, eating habits, and participants' social interactions.

3.3.5 Living with Diabetes as a Burden That Never Ends

This theme describes the physical and emotional burden experienced by participants when they have to manage diabetes continuously. Regulating their diet, taking medication every day, undergoing health

examinations, and maintaining blood glucose levels became long-term routines that, for some participants, generated boredom and fatigue.

“Sometimes I also feel tired; every day I have to remember my medication, and I have to keep watching what I eat. Diabetes never really ends.” (P10)

“Over time, I also get bored. I have to take medication every day, and I always have to watch what I eat. Sometimes I feel tired of having to go through all of this continuously.” (P11)

These statements describe boredom and fatigue associated with the continuing demands of diabetes care, alongside difficulty sustaining self-management.

3.3.6 Needing More Than Just Knowing

This theme describes participants’ need for support that goes beyond the provision of information about diabetes management. Although they had knowledge of various recommendations related to diet, physical activity, medication, and health monitoring, participants still experienced difficulties translating this information into actions appropriate to their individual circumstances.

Participants stated:

“I already know that I should reduce my food intake, but sometimes I am confused about what the appropriate portion for me actually looks like.” (P6)

“The doctor has told me that I should exercise regularly. I know it is important, but sometimes I am confused about what type of exercise is suitable for my condition.” (P3)

These accounts distinguish awareness of general recommendations from practical understanding of how to apply them in an individual’s circumstances.

4. DISCUSSION

Participants’ accounts describe the knowing–doing gap as the experience of understanding recommended diabetes care while finding it difficult to sustain within everyday life. Knowing remained present even when action became inconsistent: participants recognized what they should do but encountered difficulties involving personal struggles, competing responsibilities, family and social circumstances, and the continuing burden of care. The gap therefore concerns how understood care becomes difficult to enact, rather than simply whether recommendations are followed. This interpretation is consistent with previous research reporting discrepancies between diabetes knowledge and self-management practices [3]. It also complements a meta-synthesis identifying cognitive-emotional factors, behavioral challenges, social support, and patient–healthcare professional relationships as influences on self-management [6]. The present findings bring these influences together through participants’ descriptions of living with, and attempting to act on, their understanding of diabetes care.

The themes “knowing but finding it difficult to do” and “struggling against oneself” describe a tension between recognizing the importance of care and sustaining the effort required to perform it. Participants’ difficulties suggest that understanding a recommendation did not make its implementation automatic or habitual. Instead, self-management involved repeated decisions in which established preferences and immediate desires could compete with longer-term health concerns. Although participants described struggles with motivation and discipline, interpreting these accounts solely as a lack of willpower would overlook the circumstances surrounding their actions. Previous research has highlighted self-regulation and family involvement [5], alongside self-efficacy, habits, work, beliefs, and emotional responses in medication self-management [7]. The present study adds an experiential account of this tension: participants could remain aware of recommended care while repeatedly finding it difficult to follow.

The themes “daily life demands overriding the care plan” and “family and social environment as both supporters and barriers” situate this tension within everyday responsibilities and relationships. Busyness, fatigue, limited time, family eating habits, and social activities made diabetes care one demand among several. From this perspective, inconsistent self-management could be experienced as difficulty accommodating care within daily life, even when its importance was understood. Family

relationships also had a dual role: the same social environment could support care while making some recommendations difficult to maintain. This finding is consistent with previous accounts of social influences on diabetes management [6] and the importance of autonomy support, communication, and family involvement [12]. An Indonesian cross-sectional study similarly reported an association between self-management dietary behaviors and dietary concordance [4]. These comparisons suggest that the meaning of family support depends on how it operates within patients' actual routines and preferences.

The theme "living with diabetes as a burden that never ends" adds a temporal and emotional dimension to the knowing–doing gap. Participants described the continuing demands of care as a source of boredom and emotional burden. The difficulty therefore extended beyond performing an individual action to facing its repeated necessity over time. Knowing what to do could coexist with weariness about having to keep doing it. This interpretation resonates with qualitative findings concerning emotional distress, adaptation difficulties, and the exhausting nature of diabetes care [9], as well as evidence linking diabetes distress with well-being and self-management [13]. However, participants' descriptions of burden should not automatically be equated with a clinically assessed level of diabetes distress. They primarily illuminate how the ongoing nature of care was experienced within this study.

The theme "needing more than just knowing" connects these experiences by expressing the limits of information when patients struggle to incorporate recommendations into their lives. Participants' accounts suggest a distinction between understanding general care recommendations and finding workable ways to sustain them. Reported understanding did not necessarily indicate detailed practical knowledge or independently assessed diabetes knowledge. Read alongside the other themes, this need concerns support with everyday implementation, including personal struggles, competing demands, social circumstances, and emotional burden. It is consistent with person-centered approaches that attend to patients' needs, values, experiences, and relationships [1], [12]. Nevertheless, the findings describe participants' experiences and perceived support needs; they do not establish which educational or supportive interventions would be effective.

Orem's Self-Care Deficit Nursing Theory offers a useful perspective for discussing these findings. Within this framework, self-care agency concerns the capability to perform self-care, whereas therapeutic self-care demand concerns the actions required to meet self-care needs [2]. Participants' accounts illustrate why reported knowledge alone should not be treated as evidence of sufficient capacity to sustain those actions. Their experiences can be interpreted as difficulties bringing available capabilities and resources into alignment with continuing care demands. However, this study did not formally assess self-care agency or therapeutic self-care demand and therefore cannot establish an Orem-defined self-care deficit. The theory serves as an interpretive lens for discussing the findings, rather than as a framework tested or extended by the study.

The contribution of this study lies in describing how previously recognized barriers are experienced together within the tension between understanding care and sustaining it. Across the six themes, the knowing–doing gap emerges as a recurring difficulty accommodating diabetes care within personal efforts, everyday responsibilities, social relationships, and the continuing burden of illness. This description moves beyond listing separate barriers by showing their connections within participants' accounts. It also distinguishes the phenomenon from an intention–behavior gap, because understanding a recommendation does not necessarily establish an intention to enact it, and from non-adherence, because the focus is on the experience surrounding inconsistent action rather than its classification.

For nursing practice, these findings suggest the value of exploring what patients understand alongside what makes that understanding difficult to enact. Orem's supportive-educative nursing system and person-centered diabetes care provide relevant frameworks for considering such support [1], [2], [12]. Practical assistance, collaborative problem-solving, emotional support, and family involvement where desired by patients are possible implications for further consideration. Their suitability and effectiveness, however, require assessment beyond this descriptive study. The findings are situated in the experiences of 12 participants in Pasar Rebo and do not establish causal relationships or the prevalence of these experiences among people with T2DM. Participants were not selected through a formal assessment of diabetes knowledge; consequently, the findings concern reported understanding rather than objectively established knowledge sufficiency.

5. CONCLUSIONS

This study describes the knowing–doing gap as experienced by 12 people with T2DM: understanding recommended diabetes care while struggling to sustain it in everyday life. Across six themes, participants' accounts situated this difficulty within personal struggles, competing daily demands, family and social relationships, and the continuing emotional burden of care. These findings offer a contextual understanding of how knowledge and inconsistent action can coexist.

The findings suggest the value of considering patients' lived circumstances alongside their understanding of diabetes care when discussing self-management support. They do not establish causal relationships or the effectiveness of specific nursing interventions. Further research could explore how support responsive to these experiences can be developed and evaluated.

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DEVELOPMENTAL CHANGES IN CHILDREN WITH AUTISM SPECTRUM DISORDER FOLLOWING HIGH-SELENIUM FUNCTIONAL FOOD INTERVENTION: A ONE-GROUP PRETEST-POSTTEST STUDY

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Abstract

One approach within Complementary and Alternative Medicine (CAM) involves the use of High Selenium Functional Food (HSFF) to improve immunity and antioxidant status in children with Autism Spectrum Disorder (ASD). This study aimed to assess improvements in the development of children with ASD following an intervention using HSFF.
The study employed a pre-experimental, one-group pretest-posttest design. Under this design, the participants' development was assessed initially, followed by a one-month intervention period, after which their development was re-assessed. The results were then compared with the pre-intervention baseline. The study population consisted of 33 children with ASD; a sample of 25 children was determined using Slovin's formula with a 10% margin of error. Inclusion criteria were a diagnosis of ASD, an age of 2–6 years, and receipt of both pharmacological and non-pharmacological therapies. Exclusion criteria included children with ASD who were not present at the study site or who had severe congenital abnormalities. Consecutive sampling was used, whereby subjects who presented sequentially and met the selection criteria were enrolled until the required sample size was reached. The HSFF intervention consisted of a daily 50g serving of a high-selenium beef liver dish, administered over a period of one month. Developmental progress in children with ASD was assessed using the ATEC score, a standardized instrument with established reliability, administered by teachers or therapists. Data were analyzed using a paired-samples t-test with a 95% significance level.
The study results showed significant improvement in the development (communication, social interaction, sensory, physical, and behavioral aspects) of children with ASD (p-value 0.036 < 0.05). The mean developmental score for children with ASD was 96.50 prior to the intervention and 76.00 following the intervention.
The HSFF intervention can significantly improve the development of children with ASD. It is recommended that parents maintain a Casein-Free, Gluten-Free, and Sugar-Free (CFGFSF) diet throughout the intervention period; adherence to the CFGFSF diet can help manage the child's behavior in addition to improving immunity and antioxidant status.

Keywords: Developmental Improvement, ASD, HSFF

1. INTRODUCTION

Autism Spectrum Disorder (ASD) is a developmental disorder characterized by two main symptoms: impairments in communication and social interaction, and restricted or repetitive behaviors (1). Parents typically first recognize and report ASD in their children around the age of 18 months, noting delays in verbal and non-verbal communication compared to peers. To identify children with ASD as early as possible, screening should be conducted at 18 and 24 months of age, prior to establishing a formal diagnosis based on the DSM-5 (Diagnostic and Statistical Manual of Mental Disorders, 5th Edition) (2). Early detection enables intensive early intervention to address the developmental disorder (3).

Children with ASD experience inflammation in the neurons (nerve cells) and glial cells of the hypothalamus, particularly in the anterior region. This triggers microglia to physiologically stimulate the production of pro-inflammatory cytokines—specifically IL-6, IL-β, and TNF-α—as a defense mechanism against invading foreign substances. These foreign substances may originate from toxins, microbes, or fungi in the digestive tract—stemming from abnormal gut flora and inefficient digestive enzymes—which leads to intestinal hyperpermeability. Intestinal hyperpermeability allows incompletely digested casein and gluten peptides to pass through the intestinal wall and bind to opioid receptors in the brain. Improving the methylation pathway is a strategy to enhance inter-neuronal signaling or facilitate the early formation of new neurons(4).

The methylation pathway, which boosts levels of S-Adenosylhomocysteine (SAH) and S-Adenosylmethionine (SAM), produces two amino acids: taurine and cysteine. Cysteine directly influences the production of glutathione peroxidase (GPx)—an antioxidant—as well as DNA/RNA protection, heavy metal detoxification, and immune support. Selenium-based amino acid components, specifically selenocysteine and selenomethionine, serve as a foundation for optimizing the methylation cycle to enhance SAH or SAM levels. Improving the methylation cycle reduces inflammation in neurons (nerve cells) and fosters developmental progress in children(5).

Development is closely linked to the nervous system, particularly the cerebrum. Abnormalities in children with ASD affect both the right and left hemispheres, with each hemisphere divided into four lobes corresponding to specific functional areas. The frontal lobe regulates behavior, language, and memory. The temporal lobe controls hearing and language comprehension. The parietal lobe interprets sensations (pain, temperature, and touch), while the occipital lobe interprets visual stimuli(6).

The prevalence of ASD is increasing annually. Data from the Centers for Disease Control and Prevention (CDC) reported a prevalence of 1 in 68 in 2016—meaning one child in 68 had ASD—whereas in 2017, the figure rose to 1 in 36, meaning one child in 36 had ASD(7). The prevalence of ASD is four times higher in males than in females(8). Causative factors for ASD include neuroinflammation and neuroimmune issues(9),(10), as well as gastrointestinal disorders, particularly those affecting the small intestine(11),(12),(13). Immune system dysfunction and neuroinflammation in children with ASD lead to increased production of pro-inflammatory cytokines(14). The cytokines involved in ASD-related neurological processes include IL-1β, IL-6, and TNF-α. These cytokines can cross the blood-brain barrier, thereby influencing the hypothalamus to affect body temperature and behavior associated with ASD. Children with ASD also exhibit abnormalities in their fecal microbiota; research involving fecal bacterial cultures from children with ASD has shown significant findings regarding *Bifidobacterium*, *Escherichia coli*, *Lactobacillus*, and *Enterococcus*(12).

This alteration in fecal flora indicates the presence of intestinal inflammation in children with ASD; this disrupts the blood-brain barrier, as intestinal function—which supplies nutrients to neurons—is compromised. Consequently, the functioning of the nervous system is affected, triggering neuroinflammation(9). Another causative factor for ASD is heavy metal toxicity. In ASD cases, elevated mercury (Hg) concentrations in hair are significantly associated with ASD symptoms, and a significant positive correlation exists between lead content in the hair of individuals with ASD and verbal communication development ($p = 0.020$)(15). Genetics also play a role; currently, approximately 15% of ASD cases are linked to genetic mutations, specifically involving *de novo* genetic variations or mutations. Research estimates indicate that 37%–90% of siblings of individuals with ASD are at risk of developing the condition themselves(16).

Interprofessional management of ASD involves collaboration among pediatricians, psychologists, nurses, medical rehabilitation specialists, and nutritionists working as a team to assist families with children who have ASD(17). Early intervention—prior to the age of three—is highly recommended(7). The goal of ASD management is to maximize the child's independence and quality of life by minimizing symptoms associated with the condition's development. Complementary and Alternative Medicine (CAM) is utilized for prevention, treatment, and health promotion in the context of ASD. CAM is categorized into two types: biological therapies and non-biological therapies. Biological therapies include dietary interventions—such as casein-free, gluten-free, and sugar-free (CFGFSF) diets—and supplementation. Non-biological therapies include social therapy, auditory integration training, sensory integration therapy, drama therapy, dance therapy, acupuncture, massage therapy, yoga, and animal-assisted therapy(18), (19).

One approach to managing Autism Spectrum Disorder (ASD) using biological therapy involves selenium supplementation(20). Selenium is essential for specific and non-specific immune responses

as well as antioxidant activity(18). When administered for ASD, selenium functions as a component of selenoproteins, specifically the enzyme glutathione peroxidase (GPx). GPx acts to reduce hydrogen peroxide (H_2O_2) into water (H_2O)(21), repair neuronal degeneration, and eliminate reactive oxygen species (ROS) caused by oxidative stress(22). Selenium acts as an antioxidant compound; it functions by donating an electron to an oxidizing agent, thereby inhibiting the latter's activity(12).

This study proposes a selenium intervention using a natural alternative rich in selenium. This alternative source is expected to operate similarly and target brain growth factors, serving as an antioxidant and immune system booster; one such source is beef liver, a protein-rich food(23). Beef liver is an excellent alternative source of selenium as it is easily digested, readily available, and easily consumed by the Indonesian population. The body adapts well to digesting beef liver, making it a viable alternative for improving development in individuals with ASD. Beef liver contains 59.19 µg (micrograms) of selenium per 100 g(23). The daily selenium requirement for children with ASD aged 4 to under 7 years is 20 µg(24).

Based on the background above, the researcher is interested in conducting a study on the intervention of High Selenium Functional Food (HSFF) to improve development in children with Autism Spectrum Disorder (ASD).

2. METHODOLOGY

This study employed a pre-experimental, one-group pretest-posttest design. In this design, a group of participants underwent an initial developmental assessment, followed by a one-month intervention. After the designated one-month intervention period, their development was assessed again, and the results were compared with the pre-intervention baseline.

The high-selenium functional food (HSFF) intervention consisted of a variety of side dishes made from high-selenium beef liver, rotated on a weekly basis; a 50-gram portion was consumed once daily. The daily selenium requirement for children with ASD aged 4 to under 7 years is 20 µg. The target population comprised all children with ASD (both male and female). The accessible population consisted of children with ASD attending the Cahaya Harapan Clinic (Mrican, Ngronggo), AGCA Center (Kediri City), the Medical Rehabilitation units at Gambiran Regional General Hospital (RSUD) and Baptis Hospital (Kediri City), and Adib Center (Pare, Kediri) who met the inclusion and exclusion criteria. Consecutive sampling was used, meaning subjects were enrolled sequentially as they presented and met the selection criteria until the required sample size was reached. From a population of 33 children with ASD, a sample of 25 was determined using Slovin's formula with a 10% margin of error. Participants were recruited from ASD clinics in Kediri City and Regency. Inclusion criteria were a diagnosis of ASD, age 2–6 years, and receipt of both pharmacological and non-pharmacological therapies. Exclusion criteria were absence from the study site and the presence of severe congenital abnormalities. The HSFF intervention consisted of a 50-gram serving of a high-selenium beef liver dish administered daily for one month. Developmental progress was measured using the Autism Treatment Evaluation Checklist (ATEC) score, assessed by teachers or therapists. Data were analyzed using a paired-samples t-test to determine improvements in the children's development, with a 95% confidence interval. This study has undergone ethical review by the Ethical Clearance team at STIKES Karya Husada Kediri, under reference number 158/EC/LPPM/STIKES/KH/VIII/2026, dated August 1, 2026.

3. RESULTS

Based on the research findings regarding the 25 child respondents with ASD, the following respondent characteristics were identified:

Table 1. Characteristics of respondents based on the age of the child with ASD

Age	Frequency	%
3 Tahun	3	12
4 Tahun	5	20
5 Tahun	12	48
6 Tahun	5	20
Jumlah	25	100

Based on the research findings involving 25 respondents with ASD, nearly half were 5 years old (48%), and a small proportion were 3 years old (12%).

Table 2. Characteristics of respondents based on the gender of the child with ASD

Gender	Frequency	%
Laki-laki	21	84
Perempuan	4	16
Jumlah	25	100

Based on the research findings involving 25 child respondents with ASD, the vast majority were male (84%), while a small minority were female (16%).

Table 3. Results of the paired-sample t-test on the development of children with ASD (pre- and post-intervention)

Development score ATEC 0-179	
Pre	96,68±13,88; 96,50(72,00-122,00)
Post	76,40±15,21; 76,00(45,00-102,00)
ρ	0,036
Comunication (0-28)	
Pre	23,86±5,81; 25,00(5,00-32,00)
Post	16,31±6,83; 16,50(2,00-28,00)
ρ	0,000
Social interaction (0-40)	
Pre	24,18±9,42; 22,50(9,00-45,00)
Post	18,68±8,43; 19,00(2,00-34,00)
ρ	0,001
Sensori (0-36)	
Pre	21,13±4,68; 22,00(11,00-32,00)
Post	16,18±4,85; 16,50(6,00-27,00)
ρ	0,001

Fisical, behavior (0-75)	
Pre	29,68±10,76; 29,00(14,00-49,00)
Post	23,18±8,57; 22,00(12,00-41,00)
ρ	0,000

P paired sample t-test

4. DISCUSION

Based on the study results, nearly half of the respondents were 5 years old (48%), while a small proportion were 3 years old (12%). Consistent with established theory, the prevalence of ASD was higher in males than in females (a 4:1 ratio), with 21 male respondents (84%) and 4 female respondents (16%)(1),(2). Improvements were observed in ATEC scores across the subscales of communication, social interaction, sensory/health, and physical/behavioral functioning. The HSFF intervention in this study consisted of a beef liver dish (50g/day) providing 20 µg of selenium—meeting the selenium requirements for children with ASD aged 4 to under 7 years—though the children experienced boredom with the HSFF despite variations in the dish's presentation. The intervention for the HSFF group was based on the methylation cycle. Improving the methylation pathway can enhance the activity of S-Adenosylhomocysteine (SAH) and S-Adenosylmethionine (SAM), thereby reducing inflammation in brain nerve cells or tissue, as selenium supplementation influences ASD progression(5). SAH and SAM facilitate the production of taurine and cysteine; these two amino acids support antioxidant activity, immune function, and protection against DNA/RNA damage(4).

Selenoproteins aid in brain development and the prevention or repair of oxidative damage in brain tissue(21). Selenium acts as an antioxidant and supports the enhancement of brain neurochemistry (such as brain growth factors). It facilitates the proper functioning of the nervous and sensory systems, which operate through vision, hearing, smell, taste, and touch. The sensory component transmits information and stimuli from the body's surface and internal structures to the nervous system via spinal and cranial nerves. These signals are relayed to various parts of the nervous system, where the information is analyzed and processed. Motor functions involve controlling the contraction of all body muscles—including smooth muscles and internal organs—as well as exocrine and endocrine gland secretions. Motor activity is executed by transmitting information (neural signals) from the central nervous system to motor components throughout the body. The integration component relies on the coordination of memory, sensory stimuli, and motor activity(25). Regarding behavioral functions, the limbic cortex—a central structure of the basal cerebrum surrounded by the cerebral cortex—plays a key role in behavioral control. The limbic system comprises the hippocampus, amygdala, and thalamus; the amygdala works in conjunction with the hypothalamus to regulate behavior(25). Intellectual functions are mediated by the prefrontal cortex (the anterior part of the cerebral cortex), while communication functions are regulated and integrated within the cerebrum. The hippocampus, a component of the limbic system, plays a role in facilitating reciprocal communication(25).

Brain tissue consists of millions of interconnected nerve cells. As the central nervous system, the brain regulates all bodily activities. Various stimuli received by the body are transmitted to and processed by the brain, eliciting a bodily response. Brain cell dysfunction in children with ASD leads to developmental impairments—such as difficulties in communication, social interaction, and sensory and cognitive awareness, as well as physical and behavioral issues (26). The HSFF formulation, with a selenium content of 59.19 µg, is expected to support bodily metabolism and address mineral deficiencies—particularly selenium—in children with ASD (17, 18).

A paired-sample t-test regarding the development of children with ASD yielded a significant result (ρ = 0.036), indicating a reduction in developmental symptoms and, consequently, an improvement in the ASD developmental profile.

This developmental improvement was assessed using the Autism Treatment Evaluation Checklist (ATEC); the mean ATEC score was 70.2 prior to the intervention and 50.8 following the intervention (27).

Developmental improvements in children with ASD must be accompanied by a strict Casein-free, Gluten-free, and Sugar-free (CFGFSF) diet. The intervention for the HSFF group is based on the methylation cycle. Improving the methylation pathway can enhance the activity of S-Adenosylhomocysteine (SAH) and S-Adenosylmethionine (SAM), thereby reducing inflammation in brain nerve cells or tissue, as selenium supplementation influences ASD progression (5). SAH and SAM facilitate the production of taurine and cysteine; these two amino acids support antioxidant activity, immune function, and protection against DNA/RNA damage (4). Selenoproteins aid in brain development and help prevent or repair oxidative damage in brain tissue (17). Selenium acts as an antioxidant and modulates brain neurochemistry (specifically brain growth factors). The sensory function of the nervous system operates through vision, hearing, olfaction, gustation, and tactile sensation. The sensory component transmits information and stimuli from the entire body surface and internal structures to the nervous system via spinal and cranial nerves. These signals are relayed to the parts of the nervous system responsible for analyzing and processing the information. The motor function involves controlling the contraction of all body muscles—including smooth muscles and internal organs—as well as exocrine and endocrine gland secretions. This function is executed by transmitting information (neural signals) from the central nervous system to motor components throughout the body. The integration function relies on the coordination of memory, sensory stimuli, and motor activity(25)

5. CONCLUSIONS

There was an improvement in development (communication, social interaction, sensory, physical, and behavioral aspects) following the intervention involving a selenium-rich beef liver dish (p-value 0.036 < 0.05). Selenium acts as an antioxidant and enhances brain neurochemistry (specifically, brain growth factors). It supports key nervous system functions, including sensory processes involving vision, hearing, smell, taste, and touch. The sensory component transmits information and stimuli from the body's entire surface and internal structures to the nervous system via spinal and cranial nerves. These signals are relayed to the nervous system, which analyzes and processes the information. Motor functions involve controlling the contraction of all body muscles—including smooth muscles and internal organs—as well as exocrine and endocrine gland secretions. Motor activity is executed by transmitting information (nerve signals) from the central nervous system to motor components throughout the body. The integration component relies on the coordination of memory, sensory stimuli, and motor activity(25).

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THE EFFECT OF KOREAN POP (K-POP) MUSIC ON REDUCING STRESS LEVELS AMONG FIRST-YEAR UNIVERSITY STUDENTS

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Abstract

New students must adapt to both academic demands and the higher education environment, a process that can trigger stress. Music serves as an accessible, non-pharmacological intervention for stress management; this includes Korean Pop (K-Pop) music, which is highly popular among students. This study aimed to determine the effect of K-Pop music on reducing stress levels among first-year nursing students at the Health Polytechnic of the Ministry of Health in Surakarta (Poltekkes Kemenkes Surakarta). A one-group pretest-posttest design was employed. The sample consisted of 42 first-year nursing students, selected from a total population of 255. Stress levels were measured using the Depression Anxiety Stress Scale-42 (DASS-42) before and after a six-day K-Pop music intervention. Changes in stress levels were analyzed using the Wilcoxon Signed-Rank Test. Prior to the intervention, the majority of respondents experienced mild stress (n=27; 64.3%), followed by moderate stress (n=10; 23.8%) and severe stress (n=5; 11.9%). Following the intervention, 30 respondents (71.4%) fell into the normal category, while 7 (16.7%) experienced mild stress, 3 (7.1%) moderate stress, and 2 (4.8%) severe stress. The Wilcoxon test yielded a Z-value of -4.311 ($p < 0.001$). Specifically, 31 respondents (73.8%) showed a decrease in stress scores, 4 (9.5%) showed an increase, and 7 (16.7%) showed no change. There is a significant difference in stress levels among first-year nursing students before and after exposure to K-Pop music. K-Pop music has the potential to be utilized as a non-pharmacological approach to assist students in managing stress..

Keywords: DASS-42, K-Pop, New Students, Nursing Students, Music, Stress.

1. INTRODUCTION

Transition period from teenager to mature early , especially moment enter level college high, is full period challenge psychosocial . Students new students (maba) often face various pressure that comes from from demands increased academics , changes method learning , demands independence , until need For adapt with environment new social (1,2). Pressure This often manifests become stress academic , which includes concern to value , load excessive workload, and strictness deadline time (deadlines) (1,3–5).

Stress experienced student new If No handled with the right strategy can lower welfare subjective well-being and triggers problem better mental health serious , like anxiety and depression (4,6). In effort manage stress said , listening music has long been identified as one of the mechanism the most effective and easiest coping accessible (7). Study during the COVID-19 pandemic shows existence improvement significant in behavior musical students , with 79% of participants report use music as method For overcome challenges and boredom during learning distance Far (4,8).

One of phenomenon culture evolving music fast and have influence big on style life generation young , including students in Indonesia, is Korean Pop or K-Pop (9,10), K-Pop is not only just a music genre , but rather A ecosystem that includes visual content , social media , and a close -knit fandom community . scientific , listener K-Pop content has proven own connection negative or significant

opposite with stress academic , which means habit listen K-Pop content *increases* , then level stress academic somebody will *decrease* (5). K-Pop music works as a coping strategy effective emotional through energetic melody , relevant lyrics with struggle live , and provision of " space" safe " for his fans For run self moment (1). However , the effectiveness music as coping can varies . There are difference motivation and effectiveness coping music between student domestic and international (1). In addition , excessive involvement without control good self risky trigger behavior consumerism and negligence to not quite enough answer academic (10,11). Therefore that , research that is specific test How K-Pop music plays a role in mitigate stress in the phase beginning lectures are very important For done as effort promoting adaptive mental health strategies for student new .

2. METHODOLOGY

Study This use approach quantitative with design **quasi-experimental one-group pretest-posttest** For know influence K-Pop music towards decline level stress in students new . Population study is **255 students new Poltekkes** , with sample as much as **42 students** were selected based on criteria study. Stress level respondents measured use **Depression Anxiety Stress Scale (DASS-42)** at the time before (*pretest*) and after (*posttest*) administration intervention K-Pop music . Intervention done with give chance to respondents For listen K-Pop music according to procedures that have been set during research . Data analyzed in a way univariate For describe characteristics respondents and levels stress before as well as after intervention . Analysis bivariate done use **Wilcoxon Signed-Rank test** because the data analyzed is paired data and/ or No fulfil assumptions normality . Statistical decisions set at the level meaning **α = 0.05** . Research implemented after get **ethical clearance (EC) from Dr. Moewardi Regional Hospital** with Number : 2.635/XI / HREC / 2024.

3. RESULTS AND DISCUSSION

3.1 RESULTS

3.1.1 Stress Level Before and after Intervention

Students new before given therapy K-Pop music , all over respondents (100%) experienced stress with proportion most at the level stress light (64.3%) and stress moderate (23.8%). After undergo intervention for 6 days , some big respondents is in the category level normal stress (71.4%), and the number of student with stress critical decrease from 5 people (11.9%) to 2 people (4.8%). Distribution level stress respondents shown in Table 1.

Table 1. Distribution Stress Level Frequency Before and after Intervention K-Pop Music Therapy

Category Stres	Pre-Test		Post-Test	
	(n)	(%)	(n)	(%)
Normal	0	0	30	71.4
Light	27	64.3	7	16.7
Currently	10	23.8	3	7.1
Critical	5	11.9	2	4.8
Total	42	100	42	100

3.1.2 Influence K-Pop Music Therapy for Decline Stres

Test results Wilcoxon Table 2 shows mark $Z = -4{,}311$ with p-value $< 0{,}05$. A total of 31 respondents (73.8%) experienced a decrease in stress scores (negative ranks), 4 respondents experience increase (positive ranks), and 7 respondents No experience change level stress (ties). Because $p < 0{,}05$, then the null hypothesis (H_0) is rejected and the alternative hypothesis (H_a) is

accepted, which means that there is a significant influence of providing K-Pop music therapy on reducing stress levels in students. new Nursing.

Table 2. Results of *the Wilcoxon Signed-Rank Test for* Pre-Test and Post-Test Stress Levels

Changes in Stress Levels	n	Mean Rank	Sum of Ranks	Z	p-value
Negative Ranks (Decrease)	31	18.4	570.5	-4,311	0
Positive Ranks (Improvement)	4	14.88	59.5		
Ties (Fixed)	7	-	-		
Total	42				

3.2 Discussion

3.2.1 Stress Level Before And After Intervention

Student new is groups that can experience stress in facing the transition process going to education height , thing This due to face change environment learning , demands academic , pattern interaction social , as well as need For adapt self with environment new . Condition the can become source pressure psychological research (1) find that student year First show that listen music including assessed coping strategies effective For help student manage stress . Research it also shows that effectiveness listen music related with welfare student .

The height proportion stress light in study This show that part big respondents experience pressure psychological but Still is at a relative level low . Although Thus , the condition the still need get attention Because stress that is not managed can bother comfort psychology and adaptation processes students . Therefore Therefore , a management strategy is needed easy stress done and in accordance with characteristics student (4).

After giving intervention K-Pop music during six day , found change level enough stress significant . Amount respondents in the normal category increased to 30 students (71.4%), while stress light decrease to 7 students (16.7%), stress currently to 3 students (7.1%), and stress critical to 2 students (4.8%). Change the show that after follow intervention , partly big respondents experience decline level stress . This result in line with study (12) that student college high that finds that intervention music can lower score stress and anxiety after session intervention .

K-Pop music is one of the form music popular that has characteristics rhythm , melody , lyrics , and diverse arrangements . In study This , the use of K-Pop as a musical stimulus can give experience positive emotions for respondents , especially if type music the in accordance with preference listener . Effect music to stress No only determined by type music in a way general , but can also influenced by preferences individual , experience previously to music , context listening , and characteristics music used . Research (1) show that student use music as a coping strategy with characteristics different songs , so that response to music No always the same in every individual .

In a way physiological and psychological , music Work as stimulation auditory influences system nerve center . Exposure to pitch, harmony , and rhythm music stimulate activity hypothalamus For pressing expenditure Corticotropin-Releasing Factor (CRF). The obstacles in this CRF lower release Adrenocorticotropic Hormone (ACTH) by the glands pituitary gland , which in turn pressing production hormone stress like cortisol , adrenaline, and noradrenaline from adrenal glands . Decreased level cortisol and stimulation system nerve parasympathetic trigger response relaxation body , relieve tension muscles , as well as lower pressure blood and frequency pulse heart (4,12,13).

In a way psychological , listening music can be a helpful coping strategy individual divert attention from source stress , manage emotions , and provide a pleasant experience . In context study this , K-Pop can become form familiar and catchy music for student so that activity listen music potential more easy accepted as activity relaxation . Systematic review by Wong et al. (2021), which showed that intervention music potential lower stress psychological at a time several stress biomarkers . In a number of the research reviewed , decreased stress biomarkers like cortisol and α-amylase accompanied by with decline stress psychological . Although Thus , the author also emphasizes existence variation protocol intervention so that size effect music to stress No can equalized For all condition.

Change level stress in research This possibility No only related with characteristics of K-Pop as a music genre , but also with activity listen music That alone and possible suitability music with preference respondents , research Hernandez-Ruiz, (2022) about use music For lower anxiety in students also shows that music can used as one of the approach For help student face pressure psychological . Students is groups that face various pressure during the education period , so activity music can be one of the strategies that can implemented in a way practical.

Research result This in line with study previous which shows existence benefit intervention music to stress in students , among others Finnerty et al., (2023) find decline stress and anxiety in students after follow session therapy music .(1) show that listen music is one of the many coping strategies used student year First For manage stress . Results of systematic review and meta-analysisDe Witte et al., (2022) report effect currently until big from therapy music to external related stress , whereas (13,16), find that intervention music potential give change good at stress psychological as well as stress biomarkers .

Research result show that giving K-Pop music during six day followed by a decline level stress in some big respondents , which is proven with Wilcoxon test results P<0.05. K-Pop music can considered as a simple and easy non - pharmacological strategy implemented For help student in manage stress . However , research furthermore with group control , amount more samples large , duration more interventions long , and measurement based on types and preferences music required For strengthen proof about the effectiveness of K-Pop in management stress student .

3.2.2 Influence K-Pop Music Therapy For Decline Stres

Analysis results bivariate prove that therapy K-Pop music in general significant capable lower level stress student new ($p < 0{,}05$). Before intervention , no There is respondents who are at the level normal stress . However after intervention 6 days of K-Pop music respectively , as many as 71.4% of respondents succeed reach level normal stress . The results of the Wilcoxon Signed-Rank Test show Z value = -4.311 with p = 0.000 (p < 0.05). Of the 42 respondents, 31 respondents (73.8 %) experienced decline score stress , 4 respondents (9.5%) experienced improvement score stress , and 7 respondents (16.7%) did not experience changes . The results show there is significant difference between score stress before and after intervention K-Pop music . Research results This consistent with proof scientific about use music as intervention For reduce stress . Meta- analysis de Witte et al., (2022) show that intervention based music have effect currently until big to various external related stress . Analysis the includes 47 studies with 2,747 participants and found effect overall of d = 0.723 against external stress -related

In a way physiological and psychological , music Work as stimulation auditory influences system nerve center . Exposure to pitch, harmony , and rhythm music stimulate activity hypothalamus For pressing expenditure Corticotropin-Releasing Factor (CRF). The obstacles in this CRF lower release Adrenocorticotropic Hormone (ACTH) by the glands pituitary gland , which in turn pressing production hormone stress like cortisol , adrenaline, and noradrenaline from adrenal glands . Decreased level cortisol and stimulation system nerve parasympathetic trigger response relaxation body , relieve tension muscles , as well as lower pressure blood and frequency pulse heart.

Besides the mechanism neurobiological general therapy music , characteristics typical from K-Pop music provides mark plus psychological . K-Pop music in general has an energetic tempo (up-beat), cheerful melody , and combination element catchy modern pop music . The elements This stimulate release neurotransmitters dopamine and endorphins in the brain are responsible answer create feeling happy , excited , and excited.

Findings This in line with study Satriaanti Mulya et al., (2024), who found that therapy effective K-Pop music lower level stress student with mark $p = 0{,}000$. The results of this study also support studies Fajariyah & Utami, (2024), who reported The effectiveness of K-Pop music in reducing anxiety levels. Effects damper stress from this K-Pop music equivalent with effectiveness modality other music that has been Lots researched, such as therapy music classics Mozart (3,17,19).

4. CONCLUSION

K-Pop music therapy has an effect on reducing stress levels. This is evidenced by the results of the Wilcoxon Signed-rank test, with a p-value of 0.000 (< 0.05), indicating a significant decrease in stress levels between the pre-test and post-test score

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THE RELATIONSHIP BETWEEN PRACTICES FOOT CARE AND THE SEVERITY OF DIABETIC ULCERS AT KARANG SAMBUNG COMMUNITY HEALTH CENTER, KEDUNGWARINGIN DISTRICT, BEKASI REGENCY

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Abstract

Introduction: Diabetes Mellitus (DM) is a chronic metabolic disease marked by hyperglycemia. Diabetic foot ulcer is one of the major microvascular complications, with a risk of 30% and a mortality rate of 32% in Indonesia. Objective: This study aimed to determine the association between foot care practices among DM patients and the severity of diabetic ulcers. Methods: This analytical observational study used a cross-sectional design involving 93 patients at Karang Sambung Public Health Center, Kedung Waringin. Wound severity was assessed using the Bates-Jensen Wound Assessment Tool (BWAT), and foot care practices were measured using the Nottingham Assessment of Functional Footcare (NAFF). Data were analyzed using the Chi-square test. Results: Among patients with good foot care practices, 52% had mild ulcers. Conversely, among patients with poor foot care practices, only 1% had mild ulcers while 47% had severe ulcers. Diabetic ulcers are difficult to heal due to impaired blood circulation, particularly in the distal lower extremities. Besides glycemic control, improving foot circulation through routine foot care is essential. Irregular foot care may worsen ulcer severity, potentially leading to tissue necrosis and amputation. Nurses play a vital role in educating patients on proper foot care techniques. Patient understanding and motivation significantly influence the accuracy and frequency of foot care practices. The Chi-square test showed $p=0.001$ ($p<0.05$), indicating a significant association. Conclusion: Foot care practices are significantly associated with the severity of diabetic foot ulcers. Regular and proper foot care is crucial to prevent progression and reduce ulcer severity.

Keywords: Diabetes Mellitus, Foot Care, Diabetic Ulcer

1. INTRODUCTION

Diabetes mellitus is a chronic metabolic disease characterized by elevated blood glucose levels. Over the long term, it can cause serious damage to blood vessels, eyes, kidneys, nerves, and other organs. In the past three decades, the prevalence of type 2 diabetes has increased significantly in all countries. Globally, approximately 830 million people have diabetes, most of them in low- and middle-income countries. The number of people with diabetes, and the number of people with untreated diabetes, has continued to rise over the past few decades (1).

Several epidemiological studies have shown that the incidence and prevalence of type 2 diabetes mellitus tend to increase worldwide. There are approximately 415 million people with diabetes mellitus worldwide, with a predicted increase of 642 million (55%) by 2040 (2). In 2021, approximately 6.7 million people aged 20-79 years are likely to die from diabetes or its complications (3). The 2026 IDF report indicates that 589 million people worldwide suffer from diabetes, with 215 million in the Western Pacific region. By 2050, this figure is projected to rise to 254 million (4). The 2018 Basic Health Research (Riskesdas) showed that the prevalence of diabetes based on age ≥ 15 years increased from 1.5% to 2% (5). The number of DM patients globally and nationally has increased and was predicted to

continue to increase in the following years.. Diabetes symptoms develop progressively and are associated with microvascular and macrovascular complications. Microvascular complications can include nephropathy, retinopathy, and peripheral neuropathy (6) (7). Microvascular complications that damage blood vessels and nerves, especially in the feet, are commonly called diabetic neuropathy, which occurs due to nerve damage, either due to high blood sugar or due to decreased blood flow to the nerves (8) (9).

Research by Ni Made Dyah Ayu in 2021 showed that risk factors associated with diabetic foot ulcers are age > 50 years, history of diabetes > 10 years, history of ulcers, self-care for the feet. The most dominant factor is peripheral neuropathy (10). The risk of increasing diabetic foot ulcers in Indonesia reaches 30% and causes death due to diabetic foot ulcers by 32% (11). That figure indicated that almost one-third of DM patients experienced diabetic ulcers and almost one-third of DM patients who experienced diabetic ulcers died due to the ulcers. Research by Fakhrizal in 2025 found that 15-25% of diabetes mellitus (DM) patients suffer from diabetic foot ulcers (12). Diabetic feet that become injured will experience difficulty in healing, due to nerve damage due to elevated blood sugar levels over a long period of time (13). Prevention of this condition is important to prevent disability in patients who have experienced complications, called tertiary prevention (14).

Diabetic ulcer complications can be prevented by conducting regular foot examinations and foot care (15). Irregular foot care can lead to further complications, even leading to foot amputation (16). Research by Anggraini Puspita Ayu in 2024 found that there was an effect of Foot Care Training on the incidence of Diabetic Foot Ulcers (17). Research by Rima Rahmanita and Kharina Indira Astuti in 2024 also stated that there was a relationship between foot care behavior and the incidence of diabetic ulcers (18) (19). A study by Siti Salsa in 2023 found that 73.3% of patients with good foot care behavior had mild-degree ulcers at 23.3% (20). This showed evidence that foot care practices affected the degree of diabetic ulcers. Research on the association between foot care practices and ulcer severity is still relatively less common than research on foot care and ulcer risk, therefore this study was crucial to provide scientific evidence that foot care behavior or practices affected ulcer severity. As explained above, diabetic ulcers posed a high risk of disability and mortality, therefore when DM patients had developed ulcers, it was essential to prevent further severity. One of the efforts that could be undertaken was to perform foot care practices to prevent existing ulcers from worsening. The results of this study would serve as a basis for health workers, especially nurses, to promote foot care practices in the community, so that the community would be more motivated to prevent the severity of diabetic ulcers, one of which was by performing foot care.

2. METHODOLOGY

This study employed a quantitative method with a correlational approach to measure the extent to which one factor was associated with another factor. The study was conducted from May to August 2025 in Karangsambung. The sample size was calculated using the Slovin formula, resulting in 93 respondents. The respondents in this study were patients who visited the Karang Sambung Community Health Center (Puskesmas) in Kedung Waringin. Respondents were selected using purposive sampling based on initial data collected by the health center staff. Patients were considered eligible as respondents based on the following criteria: having a history of diabetes mellitus, residing in the Karang Sambung health center area, and having a foot ulcer wound. Patients who met the selection criteria were given the opportunity to participate in the study and were willing to provide informed consent after receiving an explanation.

The researcher assessed foot ulcers using the Bates-Jensen Wound Assessment Tool (BWAT) classification, where scores ranged from 13 to 65, with 13-30 categorized as mild degree and 31-65 as severe degree (21). Patients were asked to remove clothing up to the knee. The researcher examined the foot by assessing tissue depth, from the superficial layer to the muscle level. Wounds were categorized into mild and severe wounds. Mild wounds were characterized by healthy tissue, epithelialization (healing process), minimal or no exudate (wound fluid), and absence of severe infection. The appearance of these wounds included periwound skin that appeared normal/pinkish, bright red granulation tissue, and signs of wound healing. Severe wounds were characterized by slow healing process, presence of some necrotic tissue, exudate, and signs of moderate to severe infection. Severe wounds involved the dermal layer, reduced granulation tissue, presence of exudate, necrosis, possible serosanguineous lesions (blood-mixed wound fluid), and irregular wound edges.

Measurement of foot care practices in patients was essential to assess the behavior of diabetic patients in performing protective actions to maintain foot health. In this study, self-care practices were measured using the Nottingham Assessment of Functional Footcare (NAFF) (22). NAFF is an evaluation instrument or questionnaire used to measure and assess foot care behaviors and habits in patients with diabetes mellitus. This questionnaire consists of several main aspects of foot care practices, namely routine foot examination, foot hygiene such as washing, drying, and maintaining foot moisture, use of safe footwear for DM patients, and prevention of injury in daily activities. The assessment classification was carried out through a self-administered questionnaire or interview containing 29 questions. Each question in the NAFF instrument was measured using a scale of always, sometimes, rarely, never with a score of 0-3. The NAFF score classification was divided into two categories: a score of 0-40 indicated poor foot care practice, while a score of more than 41 indicated good practice.

3. RESULTS

The research results have been obtained and will be detailed below.

3.1 Results of Univariat

The research results analyzed sing univariate analysis consist of respondent characteristics, foot care, and wound classification

3.1.1 Respondent Characteristics

The respondents of this study were village residents in the working area of Karangsambung

Public Health Center who had characteristics as described below.

Table 1 Respondent Characteristics

Characteristic		Frequency	Percent
Gender	Female	47	50.5
	Male	46	49.5
	Total	93	100.0
Age	35-45	23	24.7
	46-55	40	43.0
	56-65	18	19.4
	66-75	12	12.9
	Total	93	100.0
Education	Elementary School	53	57.0
	Junior High School	16	17.2
	Senior High School	24	25.8
	Total	93	100.0
Occupation	Farmer	53	57.0
	Laborer	17	18.3
	Housewife	22	23.7
	Entrepreneur	1	1.1
	Total	93	100.0

The frequency distribution of respondents' age was dominated by females, with 47 people (50.5%), while males accounted for 46 people (49.5%).

In terms of age, it was dominated by the range of 46-55 years with 40 people (43.0%), while 24.7% were in the age group of 35-45 years.

The respondents' education had the highest percentage at the elementary school level at 57% with 53 respondents and at the senior high school level at 25.8% with 24 respondents.

The largest type of occupation among respondents was farmer at 57% with 53 respondents, while the category of housewives had a percentage of 23.7% with 22 respondents.

3.1.2 Results of the Association between Foot Care Practices and the Severity of Diabetic Ulcers

The results of the association between foot care practices and the severity of ulcers among respondents studied in the working area of Karang Sambung Community Health Center (Puskesmas) are described below :

Table 2 The relationship between foot care practices and diabetic ulcers

Variable	Category	Frequency	Percent
Foot Care Practices	Good	48	52 %
	Poor	45	48 %
	Total	93	100 %
		100.0%	
Ulcer Clasification	Mild	49	53 %
	Severity	44	47 %
	Total	93	100 %
		100.0%	

Foot care practices in diabetic patients in the working area of Karangsambung Public Health Center in the good category ranked top with a percentage of 52%, while poor practices was at 48%. The classification of mild ulcer wounds was at a percentage of 53% and severe wounds were below it at 47%.

3.2 Results of Bivariat

Table 3 Foot Care Practices dan Severity of Diabetic Ulcers

Variable	Category	Severity of Diabetic Ulcers		Total	pvalue
		Mild	Severity		
Foot Care Practices	Good	48	0	48	0,0001
		100 %	0 %	100 %	
	Poor	1	44	45	
		2,2 %	97.8 %	100 %	
	Total	49 %			
		52,7 %	47,3 %	100 %	

From the results above, it was found that on average, in the category of good foot care practices, there were 48 people with 100% mild wound condition and 0% severe wound, while poor foot care practices was in 45 people with details of 2.2% mild ulcer condition and 97.8% severe. The total number of respondents with mild wound condition was 52.7% and severe was

47.3%. The p-value of this study was 0.001 which indicated a significant effect.

The results of the chi-square test showed a p-value of <0.001, so it could be said that there was a significant relationship between foot care practices and the severity of diabetic ulcer wounds in diabetes mellitus patients at Karangsambung Public Health Center, Bekasi Regency. Respondents with good foot care practices were more in the category of mild diabetic ulcer wound conditions compared to respondents with poor foot care practices. The results of this study indicated periodic foot care at health services. Diabetes mellitus patients needed to perform daily foot examinations, maintain foot hygiene, and immediately go to health services if foot conditions were found to have changes in color, shape, and wounds.

4. CONCLUSIONS

Foot care practice in Diabetes Mellitus patients is one of the preventive measures to avoid severity of wounds, especially in diabetic ulcers. This study showed that Diabetes Mellitus patients should continuously perform routine foot care practices every day.

Prevention of ulcer severity by performing foot care practices will automatically prevent disability and even death. Therefore, health workers, especially in primary health care services, need to understand, implement, and improve the ability of Diabetes Mellitus patients to perform foot care, while maintaining their motivation to remain consistent and not discontinue care practices.

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INTEGRATIONG NUTRITIONAL AND PSYCHOLOGICAL ASSESSMENTS INTO ANTENATAL CARE: A QUALITATIVE NEEDS ASSESSMENT INVOLVING STAKEHOLDERS, MIDWIVES, AND PREGNANT WOMEN

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Abstract

Comprehensive antenatal care (ANC) addresses maternal physical health, nutritional status, psychological well-being, family support, and fetal health. This study explored the need to integrate nutritional and psychological assessments into routine ANC and identified service design requirements to inform an integrated ANC model for primary healthcare.
An exploratory qualitative study constituted the needs assessment phase of a research and development project at Kota Ternate and Kalumpang Community Health Centres (Puskesmas), Indonesia. Separate focus group discussions involved 42 purposively selected participants: four stakeholders, 20 midwives, and 18 pregnant women. Data were analysed thematically through coding, category formation, theme development, and interpretation.
Four themes emerged: support for integrating nutritional and psychological assessments; recognition of psychological concerns alongside barriers to follow-up; pregnant women's need for holistic and responsive care; and the need to connect assessment with intervention, collaboration, referral, and monitoring. Stakeholders emphasised organisational support, midwives prioritised practical tools and clear follow-up procedures, and pregnant women valued nutritional guidance and attention to emotional well-being. The synthesis informed an initial framework comprising multidimensional assessment, interpretation and risk classification, intervention planning, multidisciplinary role allocation, referral mechanisms, and ongoing monitoring and evaluation.
Integration was perceived as relevant and acceptable by participants. The findings provide a context-specific basis for developing a structured, woman-centred ANC framework that extends beyond screening to continuity of care. The framework remains conceptual and requires expert validation and feasibility testing before effectiveness evaluation or wider implementation.

Keywords: antenatal care; needs assessment; nutritional assessment; psychological assessment; integrated care..

1. INTRODUCTION

Antenatal care (ANC) supports maternal and fetal health through assessment, early identification of risks, and timely intervention. Beyond physical and obstetric examinations, comprehensive ANC should address women's broader needs and promote well-being and a positive pregnancy experience [1]. Nutritional assessment and appropriate interventions are integral to this approach, alongside attention to maternal psychological health [2], [7].

Anxiety and depressive symptoms during pregnancy warrant appropriate assessment. Validated screening tools can support identification, although their accuracy varies and they should complement clinical dialogue rather than replace it [3]. Identification alone, however, does not ensure access to care. Evidence indicates gaps between perinatal depression screening recommendations and routine practice, alongside barriers involving provider training, consultation time, resources, stigma, and referral arrangements [4]–[6].

Midwives' repeated contact with pregnant women offers opportunities to recognise nutritional and psychological concerns. Translating recognition into care requires clear procedures for interpreting findings, classifying risks, planning interventions within professional competencies, and coordinating collaboration, referral, and follow-up. WHO guidance supports embedding perinatal mental healthcare within maternal and child health services through locally appropriate service arrangements [7]. A context-specific needs assessment is therefore necessary to align the proposed model with women's priorities, providers' capacity, and available services.

This study explored stakeholders', midwives', and pregnant women's perspectives on integrating nutritional and psychological assessments into ANC. It aimed to identify service needs and operational design requirements as a foundation for an integrated ANC framework linking multidimensional assessment with intervention, multidisciplinary collaboration, referral, and ongoing monitoring in primary healthcare.

2. METHODOLOGY

2.1 Design and development stage of the study

The study was conducted from April to August 2026 at two community health centres, Kota Ternate and Kalumpang Puskesmas, in Central Ternate District, Ternate City. Ethical approval was granted under approval number UM.0203/F.XLVII.21/003/2026, dated 28 April 2026. This study constitutes the exploratory needs assessment phase of a research and development (R&D) programme aimed at developing a framework for an integrated antenatal care (ANC) model. An exploratory qualitative design was used to understand service users' needs, midwives' experiences and capacity, and the readiness of the primary healthcare system to integrate nutritional and psychological assessments into ANC. Data were collected through focus group discussions (FGDs) involving three participant groups: stakeholders, midwives, and pregnant women. Data were analysed using codebook thematic analysis, which involved reading the transcripts, identifying meaning units, assigning codes, grouping codes into categories, developing themes, and interpreting the findings..

2.2 Participants and data collection

Data were collected through separate focus group discussions (FGDs) with 42 purposively selected participants: four stakeholders, 20 midwives, and 18 pregnant women. Selection considered participants' involvement, experience, and knowledge of maternal health and ANC services [8]. Stakeholders comprised the Head of the Ternate City Health Office, the Head of the Public Health Services Division, and the heads of the two participating Puskesmas. Midwives included two coordinating midwives and 18 village midwives from the catchment areas of Kota Ternate and Kalumpang Puskesmas. Pregnant women represented these catchment areas and had varying gestational ages.

Eligibility criteria were: (1) stakeholders involved in maternal and child health programme management and decision-making; (2) midwives with more than three years of active ANC provision at the study sites; and (3) pregnant women residing within the participating Puskesmas' catchment areas who had accessed ANC. Individuals without relevant involvement or experience, or who were unwilling or unable to participate, were excluded. All participants provided informed consent.

Separate FGDs encouraged open discussion and reduced hierarchical influences. Using a guide informed by the study objectives and literature review, the midwife and pregnant women's FGDs were held at the multipurpose hall of Poltekkes Kemenkes Ternate on 4 and 20 June 2026, respectively. The stakeholder FGD took place at the Ternate City Health Office on 24 June 2026. Each session lasted approximately 90–120 minutes and was facilitated by the principal investigator with a note-taker. Discussions were recorded and/or documented verbatim and transcribed immediately afterwards.

Topics covered existing ANC experiences, nutritional assessment, recognition and screening of psychological concerns, follow-up barriers, family involvement, interprofessional collaboration, and expectations for an integrated ANC framework.

2.3 Data analysis

Data were analysed qualitatively using thematic analysis with explicit stages. First, open coding was undertaken by the researcher and an enumerator, involving a thorough reading of the transcripts and the assignment of initial codes to each meaning unit. Second, axial coding involved grouping related codes into categories. Third, selective coding involved integrating the main categories to generate core themes that would inform the development of a comprehensive ANC model. Core themes and subthemes were developed, reviewed against the data, and interpreted in relation to the study objectives. Cross-group comparisons were conducted to identify convergence and differences among stakeholders, midwives, and pregnant women. The credibility of the findings was strengthened through triangulation of perspectives by comparing information across the three participant groups. These comparisons identified similarities, differences, and complementary needs regarding the integration of nutritional and psychological assessments into ANC services.

3. RESULTS

Thematic analysis yielded four interrelated themes. Across all three participant groups, findings converged around the need for more comprehensive antenatal care (ANC) and for linking the identification of nutritional and psychological needs with clear follow-up.

Table 1. *Thematic analysis of needs for an integrated ANC model*

Theme	FGD Subthemes / Findings	Interpretation	Implications for the model
1. Support for integrating nutrition and psychology	Stakeholders support the addition of nutritional and psychological assessments to routine prenatal care.	It is hoped that ANC will evolve beyond a focus dominated by physical examinations and obstetrics.	Integrating physical, nutritional, psychological, family, and fetal dimensions in one path.
2. Psychological problems have been identified, but follow-up is still difficult.	Midwives reported seeing anxiety, emotional distress, and signs consistent with mild depressive problems, while follow-up guidance was limited.	There is a gap between recognizing psychological risks and determining subsequent clinical action.	Provides practical screening approaches and algorithms for risk classification, counseling, monitoring, collaboration, and referral.
3. Pregnant women need holistic and responsive care.	Pregnant women welcomed the nutritional assessment and greatly appreciated the attention to emotional issues and the opportunity to discuss their concerns.	Women value antenatal care (ANC) that addresses individual physical and emotional needs.	Include woman-centered communication, individualized nutrition education, psychological support, and appropriate family involvement.
4. The inspection must be connected to an integrated service system.	Participants indicated the need for practical tools, professional collaboration, referral pathways, and ongoing monitoring.	Simply adding questions or screening tools is not enough without a care pathway.	Assessment flow → interpretation → risk stratification → intervention → collaboration/referral → follow-up.

Table 2. *Summary of main themes, descriptions of findings, and verbatim quotations.*

Theme / Variable Category	Description of Findings	Supporting Data / verbatim Quotation
Theme 1. Support for integrating nutritional and psychological assessments	Ninety-five per cent of midwives (19/20) and all stakeholders (4/4) expressed readiness and enthusiasm to adopt a comprehensive ANC model. This readiness was conditional on the availability of structured training,	Representative quotation: “With a clear module, adequate training, and policy support from higher levels, I am confident that we can implement it. This is something we should have been doing all along”

	user-friendly assessment tools, and policy support from the Health Office.	(Participant B-03, Coordinating Midwife). confirmed through member checking with eight representative participants.
Theme 2. Psychological problems are recognised, but follow-up remains challenging	80% of midwives (16/20) lacked standardised tools for prenatal mental health screening. Only 4 midwives (20%) had consistently used the Edinburgh Postnatal Depression Scale (EPDS). Midwives identified limited training in integrated ANC and the absence of operational guidelines as major barriers.	"We know that pregnant women experience psychological problems, but we have no assessment tools or standard operating procedures, so we do not know where to start" (Participant B-12, senior midwife with 10 years of experience). confirmed through member checking with five representative midwives.
Theme 3. Pregnant women need holistic and responsive care.	Sebanyak 85% of pregnant women (15/18) reported that ANC visits involved only routine physical examinations, with no opportunity to discuss psychological well-being, emotional concerns, or individual nutritional needs. Pregnant women expressed a need for more empathetic and personalised care.	"At every check-up, I am only weighed, have my blood pressure measured, and receive vitamins. I am never asked how I feel or what I eat each day" (Participant IH-07, third trimester). corroborated through triangulation with observations of the midwives' FGD..
Theme 4. Assessments must be linked to an integrated care system: systemic barriers and operational policies	All stakeholders (4/4) identified the absence of standard operating procedures (SOPs) for integration as a major structural barrier. High midwife workloads, averaging 15–20 ANC visits per day, and consultation times of 10–15 minutes per patient limited the provision of comprehensive care.	"Our midwives are already overburdened. Without clear and efficient guidelines, it is unrealistic to ask them to provide additional care components" (Participant PK-02, Head of Puskesmas). This finding was supported by observational data on midwives' workloads.
Development of the Framework model Integration -ANC	Synthesis of the four themes yielded the conceptual Integration - ANC model, comprising five operational components: standardised physical and obstetric examinations, individualised nutritional counselling, mental health screening with referral protocols, strengthened family and social support, and integrated documentation. The model can be implemented within 23–32 minutes per visit.	The model was constructed from initial meanings through three stages of coding (open, axial, and selective). Conceptual validation was conducted via member checking with 8 representative informants, yielding a 94% agreement rate. The validity was further strengthened through source triangulation and thick description.

3.1 Support for integrated nutritional and psychological assessment

Stakeholders viewed the integration of nutritional and psychological assessments as relevant to improving the comprehensiveness of antenatal care (ANC). Their accounts indicated support for the proposed approach within the participating institutions, although this support should not be interpreted as evidence of implementation readiness. For model development, the findings suggest a need for clear service pathways, standard operating procedures, role allocation, and referral arrangements. This interpretation is consistent with WHO guidance on planning and sustaining the integration of perinatal mental healthcare into maternal and child health services [7]..

3.2 Midwives' Recognition Of Psychological Needs And Barriers To Follow-Up

Midwives described their experiences with pregnant women experiencing anxiety, emotional changes, and signs indicating mild depression. The key issue is not simply whether midwives can detect difficulties, but what to do once they are identified. These findings highlight an implementation gap between detection and continuity of care. The resulting design requirements include practical assessment procedures, guidance on interpreting findings, interventions matched to assessed needs, and explicit criteria for collaboration or referral. Screening results should inform further assessment rather than be treated as a diagnosis. Rondung et al. emphasised that screening tools should complement a broader dialogue between healthcare professionals and pregnant women

3.3 Pregnant Women's Need For Holistic Antenatal Care

Pregnant women expected ANC to address nutritional status, psychological well-being, and family support alongside physical examinations and fetal health. Their accounts highlighted the importance of opportunities to discuss individual concerns and receive explanations and support responsive to their needs.

These findings informed the proposed operational pathway: multidimensional assessment, interpretation of findings, risk classification, intervention planning, collaboration or referral, and ongoing monitoring and evaluation. The emphasis on women’s experiences is consistent with the WHO framework for a positive pregnancy experience [1]. However, the specific pathway proposed here represents a design implication of the present needs assessment rather than an established or validated service model.

3.4 From screening to integrated care pathways

Synthesis of the three participant perspectives generated a proposed pathway linking assessment to subsequent action:

Assessment → interpretation → risk classification → intervention planning → collaboration or referral → monitoring and evaluation.

Within this framework, midwives are proposed as care coordinators who identify needs, provide education and basic counselling within their competencies, document care plans, and coordinate follow-up. Nutrition professionals, physicians, and mental health professionals would contribute according to the needs identified.

For further model development, risk classification should distinguish needs manageable through routine ANC, concerns requiring additional assessment or collaborative care, and conditions requiring urgent escalation. These categories remain provisional: their indicators, thresholds, responsibilities, and referral timeframes require expert validation and alignment with applicable clinical guidance. Referral completion should also be monitored, because issuing a referral does not establish that further care has been accessed. Xue et al. specifically examined referral uptake following positive perinatal depression screening results [10]

4. DISCUSSION

4.1 Challenges in Integrating Nutritional and Psychological Assessments into ANC Practice

The findings suggest that integration is constrained by the relationship between assessment demands and the capacity to respond to identified needs. Midwives' recognition of psychological concerns did not necessarily translate into confidence about interpretation, intervention, or referral. Limited consultation time and the absence of practical assessment procedures therefore represent interconnected operational barriers rather than isolated resource shortages.

This interpretation is consistent with the implementation gap examined by Yang et al. between perinatal depression screening practices and guideline recommendations [4]. Marshman et al. also identified barriers affecting both recognition of mental health concerns and connection to appropriate resources, including stigma at individual and institutional levels [5]. These studies support examining the entire care pathway, although they do not establish the causes of the barriers reported at the present study sites.

4.1 Differences in Perspectives among Stakeholders, Midwives, and Pregnant Women

The three participant groups emphasised different requirements for integration. Stakeholders focused on service quality, policy support, resources, and coordination across programmes. Midwives prioritised practical tools, interpretation guidance, counselling skills, professional responsibilities, and referral arrangements. Pregnant women emphasised the experience of care, including attention to emotional concerns, nutritional needs, and family support.

These differences suggest three complementary dimensions of model design: organisational support, operational capacity, and responsiveness to women's needs. Stakeholder endorsement may facilitate institutional adoption, but it does not demonstrate that providers have sufficient time or skills. Similarly, practical tools may support assessment without ensuring that women feel comfortable disclosing concerns. WHO guidance highlights the importance of a respectful, caring, and stigma-free environment for discussing perinatal mental health difficulties [7]..

4.2 Contribution of the Findings to the Development of an Integrated ANC Model

WHO ANC recommendations already encompass nutritional interventions, maternal and fetal assessment, and measures to improve the experience and quality of care [1]. The contribution of the present study is therefore the identification of local design requirements for connecting these domains with psychological assessment and follow-up. It does not establish that comprehensive care is a new concept.

The proposed framework makes the relationship between assessment and action more explicit. Each identified concern should lead to a documented interpretation, an appropriate response, an assigned professional responsibility, and a follow-up plan. This addresses the discontinuities described by participants, particularly uncertainty about what should happen after psychological concerns are recognised.

4.3 Practical Implications for Task Allocation, Workload, Referral, and Continuity of Care

The findings imply that integration requires explicit task allocation. Under the proposed framework, midwives would coordinate initial assessment, education, basic counselling, documentation, and follow-up within their competencies. Nutrition professionals would address nutritional concerns requiring specialised input, physicians would evaluate medical conditions, and appropriately qualified mental health professionals would provide further psychological assessment or treatment.

These proposed responsibilities require locally agreed procedures, training, and supervision. WHO guidance identifies workforce preparation and organisational planning as important elements of integration [7]. Evidence reviewed by Eakley and Lyndon also highlights disparities in screening and treatment during pregnancy, reinforcing the need to examine access to subsequent care alongside assessment coverage [9].

Referral procedures should identify the receiving service, the professional responsible for coordination, and how referral outcomes are communicated back to the ANC team. Given the evidence on incomplete referral uptake after positive screening, continuity should be assessed through attendance and subsequent care, rather than referral issuance alone [10].

4.4 Conditions for Implementation Feasibility and Barriers to Be Addressed

The findings suggest that implementation may be more feasible where facilities have management support, trained personnel, suitable assessment tools, clear responsibilities, and accessible referral services. These conditions are consistent with WHO guidance on developing integrated perinatal mental health services [7]. Nevertheless, stakeholder support and perceived relevance are insufficient to demonstrate feasibility in routine practice.

Before field implementation, the framework requires validated assessment procedures, agreed interpretation and escalation criteria, and clarification of available professional and referral capacity. Where these requirements are incomplete, a phased pilot could help identify which components can be delivered reliably and which require additional resources.

The psychological findings highlight a gap between recognising concerns and providing follow-up care. Screening tools can support the identification of antenatal depression and anxiety, but their diagnostic performance varies, and screening should complement clinical dialogue [3]. Evidence of gaps in screening implementation, referral, and treatment further supports the need to connect identification with subsequent care [4], [9].

The barriers reported by participants are consistent with literature describing provider-, service-user-, and system-level challenges to perinatal mental healthcare [5], [6]. Integration should therefore connect nutritional and psychological assessments with interpretation, risk classification, intervention, referral, and follow-up within routine ANC, consistent with WHO guidance [7]. In the proposed framework, midwives would coordinate care within their competencies, supported by clearly defined responsibilities and access to multidisciplinary consultation.

The study contributes an initial, context-informed framework rather than a validated service model. Further research should prioritise multidisciplinary expert validation, operational procedures, and preliminary testing of acceptability, feasibility, usability, workload, referral functioning, and women's experiences. Effectiveness evaluation should follow only after the framework and its implementation procedures are sufficiently stable.

5. CONCLUSION

Stakeholders, midwives, and pregnant women expressed support for integrating nutritional and psychological assessments into antenatal care (ANC), while highlighting complementary organisational, operational, and care-related needs. Stakeholders emphasised comprehensive service provision, midwives identified uncertainties regarding follow-up, and pregnant women valued nutritional guidance

and attention to emotional well-being. These findings suggest that integration should extend beyond screening to connect multidimensional assessment with interpretation, risk classification, intervention planning, multidisciplinary collaboration, referral, and ongoing monitoring.

The study provides a needs assessment basis for an initial integrated ANC design framework tailored to the participating primary healthcare settings. The framework remains conceptual and has not undergone expert validation or feasibility and effectiveness testing. Further research should prioritise content validation, operational procedures, usability testing, and preliminary implementation evaluation before effectiveness testing or consideration for wider adoption.

5.1 Recommendations

Further research should refine the initial design framework by translating the identified needs into clearly specified assessment procedures, professional responsibilities, interpretation guidance, follow-up arrangements, and referral criteria. Supporting components should include standard operating procedures, appropriate nutritional and psychological assessment tools, risk-based decision pathways, and integrated documentation templates. Existing validated assessment tools should be considered before developing new instruments, with their suitability for the local language, population, and service context assessed.

Multidisciplinary expert review should examine the framework's content, clinical appropriateness, role allocation, and consistency with professional competencies and available services. Midwives, pregnant women, and service managers should also contribute to refining its clarity, acceptability, and practical relevance.

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EFFECTIVENESS OF A SHEILA ON 7 MUSIC LISTENING INTERVENTION ON SLEEP QUALITY AMONG PATIENTS WITH HYPERTENSION: A QUASI-EXPERIMENTAL STUDY

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Abstract

Background: Poor sleep quality is common among patients with hypertension and may negatively affect their overall health and well-being. Music listening represents a potentially feasible non-pharmacological nursing intervention; however, evidence regarding culturally familiar Indonesian popular music remains limited. Objective: This study aimed to evaluate the effectiveness of a structured Sheila On 7 music listening intervention on sleep quality among patients with hypertension. Methods: A quasi-experimental pretest–posttest control-group study was conducted at a hospital in Surakarta, Central Java, Indonesia, from January 12 to February 13, 2026. Sixty adults with hypertension and poor sleep quality were recruited through consecutive sampling and assigned to an intervention group (n = 30) or a control group (n = 30) using a non-random allocation procedure [specify the actual allocation mechanism]. The intervention group received usual hypertension care combined with 30 minutes of structured Sheila On 7 music listening before bedtime daily for four weeks, whereas the control group received usual care alone. Sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI) at baseline and post-intervention. Analysis of covariance (ANCOVA) was planned to compare post-intervention PSQI scores between groups while adjusting for baseline scores. Results: The baseline and post-intervention PSQI scores were [mean ± SD] and [mean ± SD], respectively, in the intervention group, compared with [mean ± SD] and [mean ± SD] in the control group. The baseline-adjusted between-group mean difference was [adjusted mean difference] points (95% CI: [lower limit] to [upper limit]; p = [verified p-value]). These results require confirmation using the original participant-level dataset before conclusions regarding intervention effectiveness can be established. Conclusion: Structured listening to culturally familiar music may represent a feasible complementary nursing approach for patients with hypertension experiencing poor sleep quality. However, its effectiveness cannot be established until the empirical findings and baseline-adjusted statistical analysis have been verified.

Keywords: Hypertension; Music Listening; Nursing Intervention; Sleep Quality; PSQI

1. INTRODUCTION

Hypertension remains a major global health challenge and an important contributor to cardiovascular morbidity and premature mortality. The World Health Organization estimated that approximately 1.4 billion adults aged 30-79 years were living with hypertension worldwide in 2024, representing approximately one-third of adults in this age group, while only about 23% had their blood pressure under control (1). Persistent hypertension substantially increases the risk of cardiovascular, cerebrovascular, and renal complications, highlighting the need for comprehensive management strategies that extend beyond pharmacological treatment alone (2).

Sleep is increasingly recognized as an important component of cardiovascular health. Disturbances in sleep duration and quality have been associated with hypertension and adverse blood pressure profiles. Recent evidence indicates that short sleep duration is associated with a higher

incidence of hypertension, while sleep disruption may contribute to altered sympathetic activity and impaired nocturnal blood pressure regulation (3). Furthermore, a bidirectional relationship has been reported between hypertension and insomnia, suggesting that hypertension may contribute to sleep problems while persistent sleep disturbance may also adversely influence blood pressure regulation (4). These findings support the importance of assessing and addressing sleep quality as part of comprehensive care for patients with hypertension.

For patients with hypertension who experience poor sleep, non-pharmacological interventions that are safe, feasible, and easily incorporated into routine care are particularly relevant. Improving sleep health may have implications beyond subjective sleep outcomes. A recent systematic review and meta-analysis found that behavioral interventions designed to improve sleep were associated with reductions in systolic blood pressure, further supporting the potential cardiovascular relevance of sleep-focused interventions (5). From a nursing perspective, interventions that can be implemented with minimal equipment and encourage patient participation may provide useful adjuncts to conventional hypertension management (6).

Music listening represents one such non-pharmacological approach. It is inexpensive, non-invasive, and can be implemented in hospital or home settings with relatively little burden on patients. Evidence regarding its effectiveness is promising but not entirely consistent. A systematic review and meta-analysis found that music-based interventions delivered for at least three weeks were associated with improved sleep quality, although the overall evidence across studies remained heterogeneous (7). Among hospitalized patients, another systematic review and meta-analysis involving 10 studies and 726 participants found that music interventions improved sleep quality compared with standard treatment; many included studies used approximately 30 minutes of soft music in the evening (8). These findings provide a rationale for evaluating structured music listening as an adjunctive nursing intervention for sleep problems.

The effects of music-listening interventions may depend on their design, delivery, and individual patient experiences. Musical familiarity, personal preferences, emotional associations, listening duration, and timing may influence patient engagement and perceived comfort during the intervention. From a nursing perspective, structured music listening can be incorporated into non-pharmacological sleep management and comfort-promoting care by providing a calming pre-sleep routine, potentially reducing psychological arousal, and supporting relaxation before bedtime. Such an approach is consistent with patient-centered nursing care, which emphasizes individualized responses to sleep disturbances, environmental comfort, and patients' cultural preferences. In the Indonesian context, songs by Sheila On 7 represent a potentially culturally familiar musical stimulus that may enhance intervention acceptability and patient engagement (10). Importantly, the proposed therapeutic relevance lies not in the inherent properties of a particular artist's music but in the structured delivery of familiar and personally meaningful auditory experiences. Therefore, the novelty of the present study is the evaluation of a standardized, culturally familiar popular-music listening intervention as a complementary nursing strategy for managing disturbed sleep patterns and promoting patient comfort among adults with hypertension. Although music-based interventions have previously been investigated for sleep improvement, evidence concerning culturally contextualized popular-music interventions in this specific clinical population remains limited (9). The potential effects on relaxation and comfort should be interpreted as plausible mechanisms rather than established findings because these outcomes were not directly measured in the present study.

Therefore, this study aimed to evaluate the effectiveness of a structured Sheila On 7 music listening intervention in improving sleep quality among patients with hypertension at a hospital in Surakarta, Central Java, Indonesia. It was hypothesized that patients receiving the structured music listening intervention in addition to usual hypertension care would demonstrate better post-intervention sleep quality than patients receiving usual care alone after accounting for baseline sleep quality.

2. METHODOLOGY

2.1 Study Design and Setting

This study employed a quasi-experimental pretest-posttest control-group design to evaluate the effectiveness of a structured Sheila On 7 music listening intervention on sleep quality among patients with hypertension. The study was conducted at a hospital in Surakarta, Central Java, Indonesia, from January 12 to February 13, 2026. Participants were assigned to either an intervention group, which received the structured music listening intervention in addition to usual hypertension care, or a control group, which received usual care only. Sleep quality was assessed before and after the intervention period.

2.2 Participants and Sampling

The study population consisted of adult patients diagnosed with hypertension who received healthcare services at a hospital in Surakarta, Central Java, Indonesia. Participants were recruited using consecutive sampling based on predefined eligibility criteria during the study period. A total of 60 participants were included, comprising 30 participants in the intervention group and 30 participants in the control group.

This study employed a non-randomized, time-based group allocation procedure, in which participants were assigned to the intervention or control group according to their recruitment period rather than through individual randomization. This approach was used to organize the implementation of the quasi-experimental study. Although recruitment-period allocation may reduce direct overlap between intervention and control participants, it does not eliminate potential selection bias, temporal confounding, or contamination. The same eligibility criteria and outcome measurement procedures were specified for both groups, and baseline demographic and clinical characteristics were recorded to assess group comparability. Participants in the control group were not provided with the standardized music-listening intervention and were asked not to initiate a new structured music-listening program specifically intended to improve sleep during the study period. Nevertheless, exposure to similar music outside the research protocol could not be completely excluded.

Participants were eligible if they were aged 18 years or older, had a confirmed clinical diagnosis of hypertension, were clinically stable, had a baseline Pittsburgh Sleep Quality Index (PSQI) global score greater than 5, were able to communicate effectively and follow study instructions, had sufficient hearing ability to participate in the music-listening intervention, and provided written informed consent. Participants were excluded if they had hearing impairment that prevented adequate exposure to the intervention, an acute or clinically unstable condition requiring immediate treatment, cognitive impairment that interfered with questionnaire completion, or were initiating or undergoing modifications to pharmacological or non-pharmacological treatments specifically intended for sleep disorders during the study period.

The sample size was determined by the availability of eligible and consenting patients during the study period rather than by an a priori statistical power calculation. Consequently, no predetermined PSQI effect size, significance level, statistical power, or attrition allowance was used to establish the target sample size. The final sample comprised 60 participants, with 30 participants in each group. This feasibility-based sampling approach should be considered when interpreting the precision of the estimated intervention effect and the statistical power to detect smaller between-group differences. The absence of an a priori sample-size calculation was therefore acknowledged as a methodological limitation (10).

2.3 Music Listening Intervention

Participants in the intervention group received a standardized Sheila On 7 music listening intervention in addition to usual hypertension care. The intervention was administered once daily for approximately 30 minutes, preferably 30-60 minutes before the participant's habitual bedtime, for four consecutive weeks, with a maximum of 28 planned listening sessions.

A predetermined playlist of Sheila On 7 songs with relatively calm and comfortable listening characteristics was used throughout the intervention. The playlist consisted of Anugerah Terindah Yang Pernah Kumiliki, Sephia, Dan..., Sebuah Kisah Klasik, and Berhenti Berharap. The same playlist and

standardized listening instructions were used throughout the intervention period to minimize variation in intervention exposure.

Before each session, participants were instructed to adopt a comfortable sitting or lying position in a quiet environment with minimal external disturbance. The music was played through an appropriate audio device at a comfortable and safe listening volume. Participants were instructed to focus on listening to the music and to avoid other stimulating activities during the session.

Intervention adherence was monitored using a daily music-listening log documenting the date, starting time, approximate listening duration, session completion, and any interruptions experienced during listening. Adherence was calculated as the proportion of completed sessions relative to the 28 planned sessions, with completion of at least 80% of the scheduled sessions considered satisfactory adherence to the intervention protocol.

The music-listening intervention was conducted at participants' homes using smartphones and earphones or headphones. Participants were instructed to listen to the standardized Sheila On 7 playlist at a comfortable volume according to their individual preferences, without causing auditory discomfort. No fixed device-volume setting or objective sound-level measurement was applied; therefore, listening volume was not objectively standardized across participants. The researcher was responsible for providing the initial intervention instructions, explaining the listening schedule and daily adherence log, and monitoring adherence throughout the four-week intervention period. Participants' familiarity with and preference for Sheila On 7 songs were not formally assessed before or during the intervention. Consequently, the potential influence of individual musical preferences, previous listening experiences, and emotional associations on intervention engagement and sleep outcomes could not be determined and should be considered a methodological limitation (11).

2.4 Control Group

Participants in the control group continued to receive usual hypertension care provided by the hospital throughout the study period and did not receive the standardized Sheila On 7 playlist as part of the research intervention. Usual care consisted of routine clinical assessment, prescribed antihypertensive treatment, and standard health education according to existing hospital practice.

To minimize contamination between groups, control participants were asked not to initiate a new structured music-listening program specifically intended to improve sleep during the study period. Existing habitual music-listening behavior was documented when applicable. No routine healthcare services were withheld from either study group (9).

2.5 Outcome Measurement

The primary outcome was sleep quality, assessed using the Pittsburgh Sleep Quality Index (PSQI), a widely used and psychometrically established self-report instrument originally developed and validated by Buysse et al. (1989). The PSQI comprises 19 self-rated items organized into seven components: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction. Each component is scored from 0 to 3, generating a global PSQI score ranging from 0 to 21. Higher global scores indicate poorer subjective sleep quality, with a score greater than 5 commonly used to identify poor sleepers. The original validation study demonstrated the instrument's ability to distinguish between good and poor sleepers, providing a methodological foundation for its application in clinical and nursing research (12).

An appropriately validated Indonesian-language version of the PSQI was used. Sleep quality was assessed at baseline before initiation of the intervention (T0) and after completion of the four-week intervention period (T1). Demographic and clinical characteristics, including age, sex, duration of hypertension, antihypertensive medication use, comorbidities, and blood pressure, were also recorded to describe the study population and evaluate potential baseline differences between groups (7).

2.6 Data Collection Procedure

Potential participants were screened according to the predefined inclusion and exclusion criteria. Eligible patients received verbal and written information regarding the study procedures, potential benefits, confidentiality, and voluntary nature of participation. Written informed consent was obtained before baseline assessment.

At baseline (T0), demographic and clinical characteristics were recorded, and participants completed the Indonesian-language PSQI. Participants were subsequently assigned to the intervention or control group according to the predetermined quasi-experimental allocation procedure. Participants in the intervention group received instructions regarding the standardized music listening protocol and use of the daily adherence log, whereas participants in the control group continued to receive usual care.

The intervention group completed the standardized Sheila On 7 music listening intervention once daily for approximately 30 minutes before bedtime over four consecutive weeks. Adherence was monitored throughout the intervention period. Participants in both groups were reassessed after the intervention period (T1) using the same PSQI measurement procedure. Outcome assessment procedures were standardized across both groups to minimize measurement variability (5).

2.7 Statistical Analysis

Data were analyzed using statistical software. Continuous variables were summarized using mean and standard deviation for approximately normally distributed data or median and interquartile range for non-normally distributed data. Categorical variables were summarized using frequencies and percentages. Baseline demographic and clinical characteristics were compared descriptively between the intervention and control groups to evaluate group comparability.

The primary analysis examined the between-group difference in post-intervention PSQI global scores while accounting for baseline PSQI scores. Analysis of covariance (ANCOVA) was used, with post-intervention PSQI global score as the dependent variable, study group as the fixed factor, and baseline PSQI global score as the covariate, provided that the relevant statistical assumptions were satisfied. The homogeneity of regression slopes and model residual assumptions were assessed before interpretation of the ANCOVA results.

The intervention effect was reported as the adjusted between-group mean difference with a 95% confidence interval, p-value, and effect size. Within-group changes from baseline to post-intervention were considered supplementary analyses rather than the primary evidence of intervention effectiveness. All statistical tests were two-tailed, and statistical significance was established at $p < 0.05$. Appropriate alternative statistical procedures were applied if the assumptions required for parametric analysis were not satisfied (13).

2.8 Ethical Considerations

The study was conducted with attention to ethical principles for research involving human participants, including respect for autonomy, confidentiality, privacy, and voluntary participation. Administrative permission to conduct the study was obtained from the study hospital in Surakarta, Central Java, Indonesia. Before participation, all eligible participants received clear information regarding the study objectives, procedures, voluntary nature of participation, potential benefits and inconvenience, confidentiality of personal information, and their right to withdraw from the study at any time without affecting the healthcare services they received. Written informed consent was obtained from all participants before data collection. Participant identities were protected using coded study identifiers, and all research data were handled confidentially and used solely for scientific purposes (14).

3. RESULTS

3.1 Participant Characteristics

A total of 60 participants with hypertension were included in this analysis, with 30 participants assigned to the intervention group and 30 to the control group. For illustration, the two groups were constructed to have broadly comparable baseline demographic and clinical characteristics. The mean age was 57.3 ± 7.8 years in the intervention group and 56.8 ± 8.1 years in the control group. Women accounted for 56.7% of the intervention group and 53.3% of the control group. The mean duration of hypertension was 6.4 ± 3.1 years and 6.1 ± 3.0 years, respectively. Baseline systolic and diastolic blood pressure values were also constructed to be similar between groups. The baseline characteristics are presented in Table 1.

Table 1. Baseline characteristics of participants

Characteristics	Intervention (n=30)	Control (n=30)
Age, years, mean ± SD	57.3 ± 7.8	56.8 ± 8.1
Female, n (%)	17 (56.7)	16 (53.3)
Male, n (%)	13 (43.3)	14 (46.7)
Duration of hypertension, years, mean ± SD	6.4 ± 3.1	6.1 ± 3.0
Systolic blood pressure, mmHg, mean ± SD	151.6 ± 11.2	150.9 ± 10.8
Diastolic blood pressure, mmHg, mean ± SD	91.8 ± 7.4	91.3 ± 7.1
With comorbidity, n (%)	12 (40.0)	11 (36.7)

Note: Values in this table for manuscript-development purposes and must be replaced with actual study data.

3.2 Changes in Sleep Quality

At baseline, the mean global PSQI scores were similar between the intervention and control groups (10.00 ± 1.89 vs. 9.96 ± 1.86, respectively). Following the four-week intervention, the mean PSQI score decreased to 5.91 ± 2.24 in the intervention group, whereas the control group showed a smaller reduction to 9.08 ± 2.00.

The mean within-group reduction in PSQI score was approximately 4.09 points in the intervention group compared with 0.88 points in the control group. Because lower PSQI scores indicate better sleep quality, the pattern suggests a substantially greater improvement in sleep quality among participants receiving the structured Sheila On 7 music listening intervention.

Table 2. Changes in global PSQI scores

Group	Baseline PSQI, mean ± SD	Post-intervention PSQI, mean ± SD	Mean change
Intervention (n=30)	10.00 ± 1.89	5.91 ± 2.24	−4.09
Control (n=30)	9.96 ± 1.86	9.08 ± 2.00	−0.88

Note: Negative change scores represent improvement because lower PSQI scores indicate better sleep quality. All values are must be replaced with actual study results.

3.3 Effect of the Music Listening Intervention on Sleep Quality

An analysis of covariance (ANCOVA) was used to compare post-intervention PSQI scores between the intervention and control groups while adjusting for baseline PSQI scores. The appropriateness of this analysis requires evaluation of the normality of model residuals, homogeneity of error variances, linearity between baseline and post-intervention PSQI scores, and homogeneity of regression slopes across groups. The results of these diagnostic assessments have not yet been documented and therefore cannot be reported as satisfactory.

The currently reported ANCOVA estimates indicate an adjusted mean difference of −3.21 points (95% CI: −3.82 to −2.60; $p < 0.001$), with a partial eta-squared value of 0.66. However, these estimates should be considered provisional until they are verified against the original dataset and the relevant model assumptions have been assessed. Consequently, a definitive conclusion regarding the magnitude and statistical significance of the adjusted between-group difference cannot yet be established.

Baseline PSQI score was also associated with post-intervention PSQI score in the model. Overall, the model explained approximately 80.7% of the variance in post-intervention PSQI scores ($R^2 = 0.807$).

Table 3. ANCOVA for post-intervention PSQI score

Predictor	Adjusted coefficient	95% CI	p-value	Partial η²

Intervention vs. control	-3.21	−3.82 to −2.60	<0.001	0.66
Baseline PSQI	0.94	0.78 to 1.11	<0.001	-

Note: Control group served as the reference category. Lower PSQI scores indicate better sleep quality. All statistical results are solely to illustrate the planned analysis and reporting format.

3.4 Summary of the Findings

The findings illustrate the expected reporting approach for the study. Both groups showed reductions in PSQI scores, but the magnitude of improvement was greater in the intervention group. After adjustment for baseline sleep quality, the ANCOVA demonstrated a substantial between-group difference favoring the structured Sheila On 7 music listening intervention. These illustrative results should not be interpreted as empirical evidence and will be replaced by analyses of the actual participant data before submission.

4. DISCUSSION

The principal finding of this study was that patients with hypertension who received the structured Sheila On 7 music listening intervention in addition to usual care demonstrated a greater improvement in sleep quality than those receiving usual hypertension care alone. The reduction in global Pittsburgh Sleep Quality Index (PSQI) scores observed in the intervention group indicates improvement across the overall construct of subjective sleep quality. Importantly, the between-group difference remained evident after adjustment for baseline PSQI scores, suggesting that the observed difference was not explained solely by initial variation in sleep quality between the two groups. These findings support the potential role of structured music listening as a simple non-pharmacological adjunct to nursing care for patients with hypertension who experience poor sleep (15).

The present findings are consistent with accumulating evidence regarding the effects of music-based interventions on sleep. Gao et al (2026) (16), in a systematic review and meta-analysis, reported that music-based interventions showed greater benefits when implemented for three weeks or longer, suggesting that repeated exposure may be important in achieving improvements in sleep quality. Similarly, Wang et al. (2021) (7)found that music interventions were associated with improved sleep quality among older adults, including improvements in sleep latency, sleep duration, sleep efficiency, and daytime dysfunction. More recent evidence from Kakar (2021) (8), involving 14 studies and 1,730 older adults, demonstrated a significant improvement in PSQI scores following music-based interventions (MD = −3.37; 95% CI: −4.24 to −2.50). Collectively, these findings support the four-week intervention duration used in the present study and suggest that repeated music listening may provide clinically meaningful benefits for sleep.

Evidence from hospital settings provides further support for this interpretation. Jespersen et al. (2023) (11) synthesized 10 studies involving 726 hospitalized patients and reported that music interventions improved sleep quality compared with standard treatment. Most included studies used soft music for approximately 30 minutes in the evening, which closely resembles the timing and duration adopted in the present intervention. (8) Kakar et al. (2021) similarly reported improvements in subjective sleep quality following recorded music interventions among critically ill and surgical patients. Furthermore, a broader systematic review by (17) Jespersen et al et al. (2022) identified music, relaxation, physical sleep aids, and manual therapies among non-pharmacological interventions associated with improvements in inpatient sleep. These findings strengthen the rationale for incorporating brief evening music listening into nursing strategies designed to promote sleep.

Several mechanisms may plausibly explain the observed improvement. Listening to calm and familiar music may facilitate relaxation, reduce cognitive and emotional arousal before bedtime, redirect attention away from environmental or illness-related stressors, and create a predictable pre-sleep routine. In hospitalized patients, sleep can be disrupted by environmental noise, discomfort, unfamiliar surroundings, clinical procedures, and psychological distress. A structured music listening period before bedtime may therefore function as a low-demand relaxation strategy that facilitates transition from wakefulness to sleep. Nevertheless, because the present study did not directly measure physiological arousal, anxiety, autonomic activity, or objective sleep parameters, these mechanisms should be regarded as plausible explanations rather than demonstrated mediators of the intervention effect (18).

The relevance of music-based interventions may be particularly important in patients with hypertension. (5) Cao and Zhang (2023), in a systematic review and meta-analysis focused specifically on patients with hypertension, concluded that adjunctive music interventions were associated with improvements in blood pressure, heart rate, psychological outcomes, and sleep quality, although they emphasized limitations in the quantity and methodological quality of available studies. More recent evidence also supports cardiovascular effects of music interventions. A 2026 systematic review and meta-analysis of 21 randomized controlled trials involving 1,436 hypertensive participants reported reductions in systolic and diastolic blood pressure as well as heart rate, anxiety, and depression following music interventions. These findings suggest that music listening may have relevance beyond sleep alone, although blood pressure reduction cannot be inferred from the present study unless blood pressure was prospectively analyzed as an outcome (19).

An important feature of the present intervention was the use of selected songs by Sheila On 7 rather than unfamiliar or generic instrumental music. The intervention should not be interpreted as demonstrating an intrinsic therapeutic property of Sheila On 7 songs. Instead, the songs served as a standardized and culturally familiar musical stimulus (20). Familiar music may facilitate engagement because participants can recognize and relate to the listening material; however, individual musical preference and emotional associations may also modify responses. Consequently, the findings should be interpreted as evidence concerning the structured listening protocol tested in this population rather than evidence that a particular artist or musical genre is universally effective for improving sleep.

This distinction is important because considerable heterogeneity exists across music-intervention studies. (16) Tang et al. (2022) identified variability in intervention characteristics and did not find uniformly beneficial effects across all conditions, while Jespersen et al. (2023) (11) reported differences among studies in music selection, intervention duration, and timing. Similarly, (7) Wang et al. (2021) noted methodological limitations and heterogeneity in studies involving older adults. Thus, intervention effectiveness may depend not merely on exposure to music but also on duration, timing, frequency, participant preference, clinical population, and characteristics of the selected music. Standardization of these elements in future trials will be important for determining which components contribute most strongly to improved sleep (21).

From a medical-surgical nursing perspective, the intervention has potential practical value because it is non-invasive, relatively inexpensive, simple to administer, and requires limited equipment. Nurses routinely assess sleep patterns, environmental comfort, medication use, and factors interfering with rest. Structured music listening could therefore be considered as one component of individualized sleep-promoting nursing care when consistent with patient preference and clinical condition (22). Rather than replacing antihypertensive treatment or established management of sleep disorders, music listening should be viewed as a complementary nursing strategy that may enhance comfort and sleep within comprehensive hypertension care. Evidence from hospitalized populations also suggests that music interventions can be implemented without substantial resource requirements, although implementation procedures should be adapted to individual clinical settings (11).

Several limitations should be considered when interpreting the findings. First, the quasi-experimental design limits causal inference compared with a randomized controlled trial because unmeasured differences between groups may remain despite adjustment for baseline PSQI scores. Second, sleep quality was evaluated using a self-reported instrument; therefore, responses may have been influenced by recall and reporting bias. Objective measurements such as actigraphy or polysomnography were not included. Third, the relatively small sample and single-hospital setting in Surakarta, Central Java, may limit generalizability to other populations and healthcare settings. Fourth, participants could not be blinded to music exposure, which is an inherent methodological challenge in music-listening research. Finally, individual music preference, familiarity with Sheila On 7 songs, emotional responses to particular songs, environmental factors, medication use, and other determinants of sleep may not have been fully controlled.

Future studies should therefore employ adequately powered randomized controlled designs, multicenter recruitment, longer follow-up periods, and, where feasible, objective sleep measurements. Researchers should also examine whether music familiarity and individual preference modify treatment response and compare culturally familiar popular music with instrumental music, participant-selected music, or other standardized auditory interventions. Evaluation of additional cardiovascular outcomes, including ambulatory or nighttime blood pressure, may also clarify whether improvements in sleep following music listening are accompanied by clinically relevant changes in blood pressure regulation.

Overall, the findings support the potential use of a structured, culturally familiar music listening intervention as an adjunctive strategy for improving sleep quality among patients with hypertension. The results contribute to growing evidence that music-based interventions may provide a feasible approach to sleep promotion while highlighting the importance of intervention standardization, cultural context, and rigorous evaluation before broader clinical implementation.

5. CONCLUSIONS

This quasi-experimental study examined changes in sleep quality among patients with hypertension in an intervention group receiving structured Sheila On 7 music listening alongside usual care and a control group receiving usual care alone. The reported results indicated changes in Pittsburgh Sleep Quality Index (PSQI) scores from baseline to post-intervention assessment in both groups, with a greater numerical reduction observed in the intervention group. However, the magnitude and precision of the between-group difference require confirmation using the original study data and appropriate statistical assumption testing.

These findings should be interpreted cautiously because of the non-randomized allocation based on recruitment periods, the relatively small availability-based sample, the single-hospital recruitment setting, and reliance on self-reported sleep quality. In addition, variations in home listening conditions and the absence of formal assessment of participants' musical familiarity and preferences limit interpretation of the intervention's specific contribution to sleep outcomes.

Therefore, the present study provides a preliminary description of changes in sleep quality across the two study groups rather than definitive evidence of intervention effectiveness. Future studies employing randomized controlled designs, adequate sample-size calculations, standardized intervention delivery, longer follow-up periods, and objective sleep assessments are recommended to determine whether structured music listening produces reproducible improvements in sleep quality among patients with hypertension.

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HYDROTHERAPY FOR GLYCEMIC CONTROL AND ANKLE BRACHIAL INDEX IN PATIENTS WITH TYPE 2 DIABETES MELLITUS: A LITERATURE REVIEW

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Abstract

Diabetes mellitus is a world health problem that needs continuous treatment. Hydrotherapy is a non-pharmacological therapy that can reduce blood sugar levels and increase the ankle brachial index in patients with type 2 diabetes mellitus. The aim of this study was to determine the effect of hydrotherapy on blood sugar levels and ankle brachial index in patients with type 2 diabetes mellitus. The design used was a literature review by using Google Scholar, Garuda, PubMed, and Science Direct databases. Article search using boolean operators. "OR" "AND". The inclusion criteria are article publications from 2019-2025 with full text, Indonesian and English, RCT, pra-experimental, quasi experimental, case study. The results of this study were 14 articles stating hydrotherapy could lower blood glucose levels and 9 articles stating hydrotherapy could increase ankle brachial index. The conclusion of this study is that hydrotherapy can reduce blood glucose levels and increase the value of the ankle brachial index.

Keywords: Ankle Brachial Index; Blood Sugar; Diabetes Mellitus; Hydrotherapy

1. INTRODUCTION

Diabetes is a highly prevalent disease and is considered one of the most important non-communicable diseases (NCDs) in the Global Burden of Disease Study (Abbafati et al., 2020) Diabetes mellitus is a chronic health condition that requires continuous and comprehensive care (Elsayed et al., 2023). Type 2 diabetes mellitus (T2DM) is a metabolic disorder characterized by impaired insulin secretion by pancreatic β-cells and the inability of body cells to respond adequately to insulin (Galicia-Garcia et al., 2020; Roden & Shulman, 2019).

Diabetes has a substantial impact on human health. According to a report from the International Diabetes Federation, an estimated 537 million people are living with the condition.(International Diabetes Federation, 2021). According to the 2018 Basic Health Research (Riset Kesehatan Dasar), the prevalence of diabetes mellitus among Indonesians aged >15 years was estimated at 19, 465, 100 people (Kementerian Kesehatan Republik Indonesia, 2018).

In 2019, diabetes was responsible for approximately 1.5 million deaths worldwide, with 48% of diabetes-related deaths occurring before the age of 70 years (World Health Organization, 2023). In Indonesia, the estimated number of diabetes-related deaths among individuals aged 20–79 years was 236,711 (International Diabetes Federation, 2021).

Hyperglycemia occurs when blood glucose levels become abnormally elevated. When blood glucose levels rise, the pancreas normally releases insulin to facilitate glucose uptake by cells and restore blood glucose levels to the normal range (Radheshyam et al., 2022). In people with diabetes, hyperglycemia may result from inadequate insulin synthesis or impaired insulin action (Elsayed et al., 2023). Diabetes mellitus increases the risk of various complications resulting from macrovascular and microvascular damage and can adversely affect several organs, including the brain, kidneys, heart, and eyes(Arnold et al., 2020; Berbudi et al., 2019; Tanase et al., 2020).

Poorly controlled diabetes mellitus may lead to various complications, including peripheral artery disease (PAD) (Hinchliffe et al., 2020). PAD is characterized by impaired blood flow to the lower or upper extremities due to narrowing or obstruction of the peripheral arteries, which may manifest as weakness or discomfort in the affected limbs (Bevan & White Solaru, 2020; Criqui et al., 2021). Peripheral circulation can be assessed using the Ankle-Brachial Index (ABI), a clinically useful measure for detecting peripheral arterial disease (Casey et al., 2019).

ABI is a non-invasive vascular assessment used to detect signs of peripheral arterial disease and evaluate lower-extremity perfusion (Tsai et al., 2021). ABI is calculated by dividing the systolic blood pressure measured at the ankle, using the dorsalis pedis or posterior tibial artery, by the systolic blood pressure measured at the arm, using the brachial artery (Abouhamda et al., 2019).

The management of diabetes mellitus includes both pharmacological and non-pharmacological interventions. Pharmacological therapy primarily involves the use of antihyperglycemic medications to control blood glucose levels (Kurniasari et al., 2023; Perkumpulan Endokrinologi Indonesia, 2021). Non-pharmacological interventions include physical exercise, dietary modification, herbal therapies, and hydrotherapy (Sutrisna et al., 2024).

Hydrotherapy is a therapeutic approach that utilizes water to promote, maintain, and restore health. Hydrotherapy encompasses various modalities, including drinking water, sauna therapy, bathing, steam baths, foot immersion, sitz baths, aquatic exercise, and the application of cold or warm water as compresses (Jazani et al., 2023; Warseno & Sukmawati, 2019). Hydrotherapy may provide several physiological benefits, including pain relief, reduction of muscle spasms, muscle relaxation, improved range of motion, enhanced blood circulation through vasodilation, and increased muscle strength (Setiawan et al., 2021).

In patients with diabetes mellitus, hydrotherapy may include adequate water intake and foot immersion therapy (Istiroha et al., 2022; Savitri & Ratnawati, 2022). Adequate water intake may support renal function and contribute to maintaining physiological fluid balance and metabolic processes, potentially helping to prevent elevated blood glucose levels (Saherna & Rezkiawan, 2020). Foot immersion therapy may improve peripheral blood circulation and stimulate sensory nerves in the feet. This stimulation may contribute to autonomic and physiological responses involving various organs, including the pancreas, which plays an important role in insulin production and blood glucose regulation (Damayanti et al., 2021).

Therefore, this literature review aimed to determine the effects of hydrotherapy on blood glucose levels and the Ankle-Brachial Index (ABI) in patients with type 2 diabetes mellitus.

2. METHODOLOGY

This study employed a literature review design. The Population, Intervention, Comparison, Outcome, and Time (PICOT) framework was used to organize the review and determine its focus. The components of the framework were as follows: P, patients with diabetes mellitus; I, hydrotherapy; C: none; O: blood glucose levels and the Ankle-Brachial Index (ABI); and T, studies published between 2019 and 2023. The research question was: “How does hydrotherapy reduce blood glucose levels and improve the Ankle-Brachial Index in patients with diabetes mellitus?”

The literature search was conducted in Indonesian through the Google Scholar and GARUDA databases from May to June 2025, using Boolean operators “OR” and “AND.” The following keywords were used: “pasien diabetes melitus” OR “diabetes melitus tipe 2” AND “hidroterapi” OR “minum air putih” OR “spa kaki diabetes” OR “rendam kaki” AND “penurunan kadar gula darah” OR “peningkatan nilai ankle brachial index.”

An additional literature search was conducted in English through Google Scholar, GARUDA, PubMed, and ScienceDirect from May to June 2025, using the Boolean operators “OR” and “AND.” The search keywords included “diabetes mellitus patients” OR “type 2 diabetes mellitus” AND “hydrotherapy” OR “drinking water” OR “diabetic foot spa” OR “foot immersion” AND “decreased blood glucose levels” OR “increased Ankle-Brachial Index values.”

The inclusion criteria comprised full-text articles published between 2019 and 2023 in Indonesian or English in national or international journals. Eligible study designs included randomized controlled

trials (RCTs), pre-experimental studies, quasi-experimental studies, and case studies. The exclusion criteria were review articles and articles retrieved from institutional repositories.

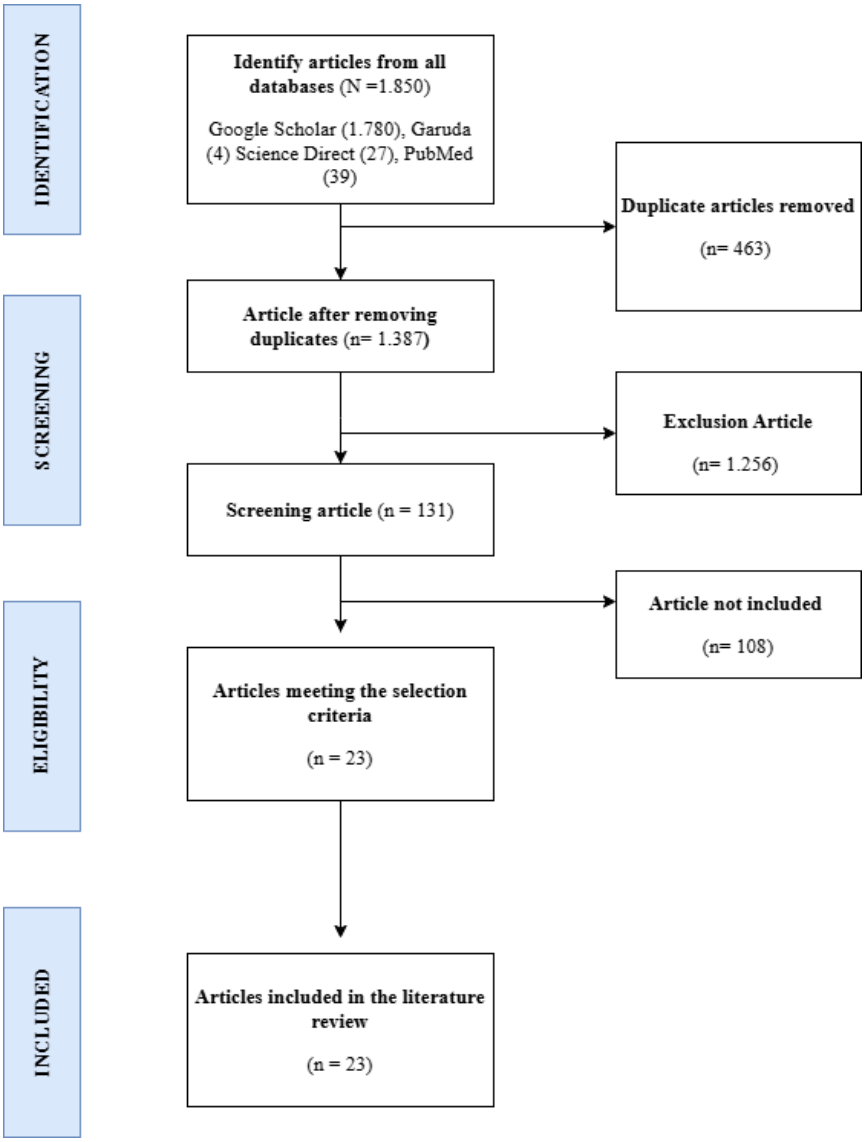


Figure 1. *PRISMA Flow Diagram of Literature Search and Selection*

3. RESULTS

The literature search identified 23 articles, comprising 14 articles on the effects of hydrotherapy on blood glucose levels in patients with type 2 diabetes mellitus (Table 1) and 9 articles on the effects of hydrotherapy on the Ankle-Brachial Index (ABI) in patients with type 2 diabetes mellitus (Table 2). The researchers subsequently screened the articles by reviewing their titles and abstracts according to the inclusion criteria. Ultimately, 23 articles were selected for analysis and categorized into two themes, as follows:

3.1 Effects of Hydrotherapy on Blood Glucose Levels in Patients with Type 2 Diabetes Mellitus

Table 1. Literature Search Results Based on Theme 1

No.	Author dan Year	Research Title	Result
1.	Kurniasari *et al* (2023)	Pengaruh Hidroterapi Terhadap Penurunan Gula Darah Sewaktu (GDS) pada Pasien Diabetes Mellitus Tipe II	Hydrotherapy with drinking water therapy can reduce blood sugar levels with the average decrease in blood sugar levels during the treatment group being 52.5 mg/dL
2.	Margarita *et al* (2022)	Penerapan Hidrotherapi Sebagai Upaya Menurunkan Kadar Gula Darah Pada Pasien Diabetes Mellitus Type Ii Dengan Pendekatan Teori Keperawatan Orem Di Uptd Rsud Basemah Pagar Alam Tahun 2022	Warm drinking water therapy reduced blood glucose levels
3.	Arwansyah *et al* (2022)	Penerapan Hidrotherapi Sebagai Upaya Menurunkan Kadar Gula Darah Pada Pasien DM Type II Dengan Pendekatan Teori Keperawatan Orem	Warm drinking water therapy reduced blood glucose levels
4.	Putra *et al* (2022)	Hydroterapi minum air putih untuk menurunkan kadar gula darah sewaktu (GDS)	Drinking water therapy reduced mean blood glucose levels from 336.80 mg/dL to 212.13 mg/dL
5.	Savitri & Ratnawati (2022)	Buerger Allen Combination Therapy Exercises and Soak Feet Warm Water Lowers Blood Sugar Levels in Elderly with Diabetes Mellitus Type 2	The combination of warm water foot soaking and Buerger Allen exercises reduced blood glucose levels from 370.38 mg/dL to 151.19 mg/dL
6.	Istiroha *et al* (2022)	The Influence Of A Combination Of Walking Therapy And Hydrotherapy To Decrease Blood Glucose Levels In Patients With Diabetes Mellitus Type II	Drinking water therapy reduced blood glucose levels, with a mean decrease of 17.6 mg/dL.
7.	Damayanti *et al* (2021)	Pengaruh Hidroterapi Dan Relaksasi Benson Terhadap Kadar Gula Darah Pasien Diabetes Mellitus	Warm water foot soaking therapy reduced blood glucose levels
8.	Tarigan (2021)	Pengaruh Hidroterapi Terhadap Penurunan Kadar Gula Darah Sewaktu Pada Pasien Diabetes Mellitus Tipe 2 Di Puskesmas Binjai Serbangan Kabupaten Asahan Tahun 2020	Drinking water therapy reduced blood glucose levels from 274.09 mg/dL to 251.18 mg/dL.
9.	Siswanti *et al* (2021)	Hydrotherapy of Blood Glucose Level at Time for Deabetes Mellitus (DM) Patient	Drinking water therapy reduced blood glucose levels from 178.77 mg/dL to 157.59 mg/dL
10.	Saherna & Rezkiawan (2020)	The Effect Of Drinking Water On Hyperglycemia In Diabetes Mellitus	Drinking water therapy reduced mean blood glucose levels from 285.57 mg/dL to 139.71 mg/dL
11.	Mataputun *et al* (2020)	Efektivitas *Buerger Allen exercise* dibandingkan dengan Rendam Kaki Air Hangat terhadap Nilai *Ankle Brachial Index* dan Gula Darah pada Pasien Diabetes Mellitus	Warm water foot soaking was more effective than Buerger Allen exercises in reducing random blood glucose levels, with mean levels decreasing from 218.56 mg/dL to 198.59 mg/dL
12.	Wardani *et al* (2019)	The Effect Of Diabetic Feet Spa Therapy To Blood Glucose Level And Sleep Quality Of Diabetes Mellitus Patient	Warm water foot soaking therapy reduced mean blood glucose levels from 289.23 mg/dL to 124.57 mg/dL
13.	Jahidin *et al* (2019)	Pengaruh Terapi Minum Air Putih Terhadap Penurunan Kadar Gula Darah Sewaktu (GDS) Pada Pasien Diabetes Mellitus Tipe II	Drinking water therapy reduced mean blood glucose levels from 230.15 mg/dL to 166.10 mg/dL on day 7 and to 136 mg/dL on day 14

No.	Author dan Year	Research Title	Result
14.	Sholiha *et al* (2019)	Kombinasi Walking Exercise Dan Hydrotherapy Mempengaruhi Kadar Glukosa Darah Pada Penderita Diabetes Mellitus Tipe II	The combination of walking exercise and drinking water therapy reduced blood glucose levels from 220.29 mg/dL to 215.17 mg/dL.

A quasi-experimental study using a pre-test and post-test with control group design involved 58 respondents. The intervention group consisted of 18 respondents who received drinking water therapy at a dose of 1.5 liters per day for two weeks. The intervention resulted in a mean reduction in random blood glucose levels of 52.5 mg/dL (Kurniasari et al., 2023). A case study involving two respondents demonstrated that drinking 500–1,000 mL of water daily, including 640 mL consumed upon waking in the morning, for seven days could reduce blood glucose levels. However, the mean reduction in blood glucose levels was not reported (Margarita et al., 2022).

A case study involving two respondents who received warm drinking water therapy for five days demonstrated a reduction in blood glucose levels. However, the temperature and volume of water consumed were not specified, and the mean reduction in blood glucose levels was not reported (Arwansyah et al., 2022). A quasi-experimental study using a pre-test and post-test without control group design involving 15 respondents found that drinking six glasses of water daily, equivalent to approximately 1,500 mL, beginning in the morning after waking and continuing for 14 days, reduced mean blood glucose levels from 336.80 mg/dL to 212.13 mg/dL (Putra et al., 2022) .

A quasi-experimental study using a pre-test and post-test without control group design involving 16 respondents examined a combination of Buerger Allen exercises and warm water foot soaking. The intervention was administered 12 times over 15 days, three times per week, with two sessions per day at 08:00 and 16:00 Western Indonesia Time. Each session lasted 16 minutes, consisting of 10 minutes of foot soaking at a temperature of 38–39°C and six minutes of Buerger Allen exercises. The intervention reduced blood glucose levels from 370.38 mg/dL to 151.19 mg/dL (Savitri & Ratnawati, 2022). A quasi-experimental study using a pre-test and post-test with control group design involving 32 respondents demonstrated that drinking water therapy administered daily for three weeks according to body weight, with a minimum intake of 50 mL/kg/day and adjusted to elimination requirements of 1,500–1,600 mL/day plus insensible water loss of 500 mL per 24 hours, resulted in a mean reduction in blood glucose levels of 17.6 mg/dL (Istiroha et al., 2022).

A quasi-experimental study using a pre-test and post-test with control group design involving 34 respondents demonstrated that warm water foot soaking for 20 minutes daily over five consecutive days reduced blood glucose levels from 184.59 mg/dL to 162.94 mg/dL (Damayanti et al., 2021). A quasi-experimental study using a pre-test and post-test with control group design involving 22 respondents found that drinking a minimum of two liters of water per day, equivalent to approximately eight glasses, for one week reduced blood glucose levels from 274.09 mg/dL to 251.18 mg/dL (Tarigan, 2021).

A quasi-experimental study using a pre-test and post-test with control group design involving 34 respondents found that drinking 1.5 liters of water daily after waking in the morning for 14 days reduced blood glucose levels from 178.77 mg/dL to 157.59 mg/dL (Siswanti et al., 2021). A pre-experimental study using a static group comparison design involving 14 respondents demonstrated that drinking 800 mL of water daily, equivalent to four 200-mL glasses, at intervals of two to three hours between each glass for three consecutive days reduced mean blood glucose levels from 285.57 mg/dL to 139.71 mg/dL (Saherna & Rezkiawan, 2020).

A quasi-experimental study using a pre-test and post-test between two groups design involving 54 respondents found that warm water foot soaking at a temperature of 40–42°C, administered twice daily in the morning and afternoon for 15–20 minutes per session over five consecutive days, was more effective in reducing random blood glucose levels than Buerger Allen exercises (Mataputun et al., 2020). A quasi-experimental study using a pre-test and post-test with control group design involving 60 respondents demonstrated that warm water foot soaking at a temperature of 38–40°C reduced mean blood glucose levels from 289.23 mg/dL to 124.57 mg/dL. The duration of the intervention was not reported (Wardani et al., 2019a).

A quasi-experimental study using a pre-test and post-test without control group design involving 20 respondents found that drinking warm water for two weeks, at a dose of four to five 250-mL glasses

per day, reduced mean blood glucose levels from 230.15 mg/dL to 166.10 mg/dL on day 7 and subsequently to 136 mg/dL on day 14 (Jahidin et al., 2019). A quasi-experimental study using a pre-test and post-test with control group design involving 34 respondents demonstrated that drinking 1.5 liters of water daily after waking in the morning for 14 days reduced blood glucose levels from 220.29 mg/dL to 215.17 mg/dL (Sholiha et al., 2019).

3.2 Effects of Hydrotherapy on Ankle-Brachial Index in Type 2 Diabetes Mellitus

Table 2. *Literature Search Results Based on Theme 2*

No.	Author dan Year	Research Title	Result
1.	Yuningsih & Rosita (2022)	Pengaruh Hidroterapi Terhadap Peningkatan Sirkulasi Darah Perifer Pada Pasien Dm Di Wilayah Puskesmas Kelapa Dua, Tangerang	Warm water foot soaking resulted in a change in the mean ABI value from 1.1755 to 1.2060
2.	Maryama *et al* (2021)	Pengaruh Rendam Kaki Air Hangat Terhadap *Ankle Brachial Index* Pada Pasien Diabetes Melitus	Warm water foot soaking was beneficial in improving ABI values, from 0.771 to 1.052
3.	Fitriani & Aderita (2021)	Perawatan Kaki Spa Kaki Atasi Masalah Ketidakefektifan Perfusi Jaringan Perifer Pada Pasien Diabetes Millitus Tipe II	Foot soaking therapy reduced tingling and numbness and improved foot comfort. The ABI value changed from 1.3–1.4 to 1.1–1.2
4.	Simarmata *et al* (2020)	Effect of Cold Hot Water Soaking in the Feet on the Value of Ankle Brachial Index in Diabetes Mellitus Patients	Alternating warm and cold water foot soaking increased the ABI value from 0.127 to 0.823.
5.	Ibrahim *et al* (2020)	Perbandingan *Buerger Allen Exercise* Dengan *Foot Spa Diabetic* Terhadap Nilai *Ankle Brachial Index* Pada Pasien Diabetes Melitus Tipe II	Both Buerger Allen exercises and warm water foot soaking were effective in improving ABI values. However, based on the difference in mean values, warm water foot soaking demonstrated a greater mean improvement
6.	Mataputun *et al* (2020)	Efektivitas *Buerger Allen exercise* dibandingkan dengan Rendam Kaki Air Hangat terhadap Nilai *Ankle Brachial Index* dan Gula Darah pada Pasien Diabetes Mellitus	Warm water foot soaking increased the mean ABI value from 0.81 to 0.90
7.	Nugroho (2020)	Pengaruh Rendam Air Hangat Di Kaki Untuk Mencegah Terjadinya Ulkus Pada Penderita Diabtes Mellitus Di Dusun Kedungringin Desa Giripurwa Wonogiri	Warm water foot soaking increased the mean ABI value from 0.8010 before the intervention to 0.8830 after the intervention
8.	Djafar *et al* (2019)	Efektifitas *Foot Spa Diabetic* Terhadap Nilai *Ankle Brachial Index* Pada Pasien Diabetes Melitus Tipe II	Foot soaking therapy increased the ABI value from 0.8375 to 0.9625
9.	Wardani *et al* (2019)	The Effect Of Diabetic Foot Spa On *Ankle Brachial Index* And Foot Sensitivity Of Diabetes Mellitus Type 2	Foot soaking therapy increased the mean ABI value from 2.70 to 2.77.

A quasi-experimental study using a pre-test and post-test without control group design involving 20 respondents examined the effects of warm water foot soaking on the Ankle-Brachial Index (ABI). The intervention consisted of immersing the feet in warm water at 37–38°C for 15 minutes. The therapy resulted in a decrease in the mean ABI from 1.2060 to 1.1755. However, the study did not specify the number of days or frequency of intervention (Yuningsih & Rosita, 2022). A pre-experimental study using a one-group pre-test and post-test design involving 20 respondents demonstrated that warm water foot soaking was associated with changes in ABI. The mean ABI increased from 0.771 before the intervention to 1.052 after the intervention, indicating an improvement in peripheral arterial perfusion. The temperature of the water and duration of each treatment session were not reported (Maryama et al., 2021).

A case study involving three respondents evaluated warm water foot soaking as a hydrotherapy intervention. The therapy was administered once daily for five days, with each session lasting approximately 30 minutes. The intervention was associated with reductions in tingling and numbness, improved foot comfort, and changes in ABI from 1.3–1.4 to 1.1–1.2. The water temperature used for the intervention was not reported (Fitriani & Aderita, 2021). A quasi-experimental study using a pre-test and post-test with control group design involving 70 respondents investigated alternating warm and cold water foot soaking. The intervention consisted of immersing the feet in warm water at 38–42°C for four minutes, followed by cold water at 10–18°C for one minute. This sequence was repeated five times, with the final immersion performed in warm water, resulting in a total treatment duration of 24 minutes. The intervention was administered twice on separate mornings at the respondents' homes. The study reported an increase in ABI from 0.823 to 0.127 (Simarmata et al., 2021).

A quasi-experimental study using a pre-test and post-test two-group design involving 30 respondents compared warm water foot soaking with Buerger Allen Exercise. Warm water foot soaking was performed at 38°C for five minutes over five days in each intervention group. Both interventions were effective in increasing ABI; however, the mean difference was greater in the warm water foot-soaking group, with a mean difference of 0.113 compared with 0.050 in the Buerger Allen Exercise group (Ibrahim et al., 2020). A quasi-experimental study using a pre-test and post-test between-two-groups design involving 54 respondents evaluated warm water foot soaking at 40–42°C. The intervention was administered for five consecutive days, twice daily in the morning and afternoon, with each session lasting 15–20 minutes. The intervention increased the mean ABI from 0.81 to 0.90, suggesting improved peripheral arterial perfusion following warm water foot soaking (Mataputun et al., 2020)

A quasi-experimental study using a pre-test and post-test with control group design involving 10 respondents evaluated warm water foot soaking as an intervention for improving ABI. The mean ABI increased from 0.8010 before the intervention to 0.8830 after the intervention. However, the study did not report the duration, frequency, or number of treatment days, nor did it specify the temperature of the water used during the intervention (Nugroho, 2020). A quasi-experimental study using a two-group design involving 32 respondents evaluated different frequencies of warm water foot-soaking therapy. In the first group, the intervention was administered three times per week for three days, whereas the second group received the intervention five times per week for five days. The three-day intervention increased the mean ABI from 0.8687 to 0.9063, while the five-day intervention increased the mean ABI from 0.8375 to 0.9625. These findings suggest that the five-day intervention produced a greater improvement in ABI than the three-day intervention (Djafar et al., 2019).

A quasi-experimental study using a pre-test and post-test with control group design involving 60 respondents reported that warm water foot soaking increased the mean ABI from 2.70 to 2.77. However, the study did not report the duration, frequency, or number of treatment days, and the water temperature was also not specified (Wardani et al., 2019b).

4. DISCUSSION

The literature search identified 23 articles, comprising 14 articles on the effects of hydrotherapy on blood glucose levels in patients with type 2 diabetes mellitus (Table 1) and 9 articles on the effects of hydrotherapy on the Ankle-Brachial Index (ABI) in patients with type 2 diabetes mellitus (Table 2). The researchers subsequently screened the articles by reviewing their titles and abstracts according to the inclusion criteria. Ultimately, 23 articles were selected for analysis and categorized into two themes, as follows:

4.1 Effects of Hydrotherapy on Blood Glucose Levels in Patients with Type 2 Diabetes Mellitus

Blood glucose refers to the concentration of glucose circulating in the bloodstream and is an important indicator of glycemic status (Saha et al., 2020). According to the Ministry of Health of the Republic of Indonesia, a normal random blood glucose level is generally below 200 mg/dL, whereas a fasting blood glucose level below 126 mg/dL is considered within the non-diabetic range (Kementerian Kesehatan RI., 2020). Blood glucose levels fluctuate continuously in response to food intake, physical activity, hormonal regulation, and metabolic processes; therefore, maintaining glycemic levels within an appropriate range is essential for preventing diabetes-related complications (Artasensi et al., 2020).

Hyperglycemia is characterized by elevated blood glucose levels and is a major clinical feature of type 2 diabetes mellitus (Soep & Agussalim, 2020). Persistent hyperglycemia can adversely affect multiple physiological systems and increase the risk of diabetes-related complications when inadequately controlled (Naomi et al., 2021). Management of type 2 diabetes mellitus involves both pharmacological and non-pharmacological approaches (Kusna et al., 2020). Among non-pharmacological approaches, hydrotherapy, including adequate water intake and warm water foot soaking, has been investigated as a complementary intervention for improving glycemic control (Damayanti et al., 2021; Kurniasari et al., 2023).

Several studies have reported that adequate water intake may be associated with reductions in blood glucose levels among patients with type 2 diabetes mellitus. Water consumption after waking, with intervention periods ranging from 3 days to 3 weeks, was associated with improved glycemic outcomes across several studies (Arwansyah et al., 2022; Istiroha et al., 2022) The reported daily water intake ranged from approximately 800 to 2,000 mL. Adequate hydration may support renal function and urinary excretion, thereby contributing to fluid and metabolic homeostasis (Saherna & Rezkiawan, 2020). However, the reduction in blood glucose should not be interpreted as a direct consequence of water “dissolving” glucose. Rather, adequate hydration may influence glucose regulation indirectly through maintenance of circulating fluid volume, renal function, and urinary excretion, particularly when hyperglycemia is accompanied by increased urinary fluid loss (Jahidin et al., 2019).

Water consumption in the morning after waking has also been proposed as a practical strategy for maintaining adequate hydration. Following ingestion, water is absorbed primarily through the gastrointestinal tract and enters the systemic circulation, contributing to maintenance of fluid balance. Adequate hydration subsequently supports renal filtration and urinary excretion of metabolic waste products. Some studies have therefore suggested that maintaining adequate fluid intake may contribute to better glycemic regulation in patients with type 2 diabetes mellitus (Sholiha et al., 2019) From a nursing perspective, drinking-water hydrotherapy is relatively simple, inexpensive, accessible, and potentially feasible as a complementary strategy for supporting diabetes self-management (Putra et al., 2022). Nevertheless, fluid intake should be individualized according to the patient's clinical condition, particularly in patients with renal, cardiac, or other conditions requiring fluid restriction.

Warm water foot soaking represents another form of hydrotherapy investigated for glycemic management. Exposure of the feet to warm water at approximately 38–42°C can produce local vasodilation, increase peripheral blood flow, and promote muscular and vascular relaxation (Savitri & Ratnawati, 2022). Several studies have reported reductions in blood glucose following warm water foot-soaking interventions administered for periods ranging from 5 to 15 days (Mataputun et al., 2020). One proposed mechanism involves the physiological response to thermal exposure, including changes in peripheral circulation and metabolic activity. Heat exposure may also influence heat shock protein (HSP) responses, which have been associated with cellular stress adaptation and glucose metabolism. However, the direct contribution of HSPs to the reduction in blood glucose following warm water foot soaking remains insufficiently established and should therefore be interpreted cautiously (Damayanti et al., 2021).

Overall, the reviewed evidence suggests that hydrotherapy, particularly adequate water intake and warm water foot soaking, may have potential as a complementary non-pharmacological intervention for improving blood glucose control in patients with type 2 diabetes mellitus. The effects may involve different physiological pathways, with adequate hydration primarily supporting fluid and renal homeostasis, while warm water foot soaking may promote peripheral vasodilation, relaxation, and changes in metabolic activity. However, differences in intervention dose, duration, temperature,

frequency, and patient characteristics across studies indicate the need for further research using standardized protocols and adequately controlled designs.

4.2 Effects of Hydrotherapy on Ankle-Brachial Index in Type 2 Diabetes Mellitus

Type 2 diabetes mellitus is characterized primarily by insulin resistance, in which body cells respond inadequately to insulin, resulting in impaired glucose uptake and utilization (Sanches et al., 2023). Although the term non-insulin-dependent diabetes mellitus (NIDDM) has historically been used to describe type 2 diabetes mellitus, current terminology generally favors the term type 2 diabetes mellitus because insulin therapy may eventually be required in some patients (Zhang, 2022). Poorly controlled type 2 diabetes mellitus can contribute to vascular complications, including peripheral artery disease (PAD), which may impair blood flow to the lower extremities (Felício et al., 2019). Peripheral arterial circulation can be assessed non-invasively using the Ankle-Brachial Index (ABI), an established measure for detecting lower-extremity arterial insufficiency (Matsushita et al., 2019).

The ABI is a non-invasive vascular assessment that compares systolic blood pressure measured at the ankle with systolic blood pressure measured at the brachial artery and is widely used to identify peripheral arterial disease (Herraiz-Adillo et al., 2020). ABI measurement can be performed using a portable Doppler ultrasound device, commonly operating at a frequency of approximately 8–10 MHz, to detect arterial blood flow (Arkoudis et al., 2021). An ABI value of approximately 1.00–1.40 is generally considered normal, whereas a value below 0.90 indicates the possibility of peripheral arterial disease or impaired lower-extremity perfusion (Sirico et al., 2019).

The management of type 2 diabetes mellitus includes pharmacological and non-pharmacological approaches (Elsayed et al., 2023). Non-pharmacological interventions complement pharmacological treatment by supporting glycemic control, cardiovascular health, physical functioning, and prevention of diabetes-related complications (Lim et al., 2021). One non-pharmacological intervention that has been investigated for improving peripheral circulation in patients with diabetes mellitus is hydrotherapy, particularly warm water foot soaking (Wardani et al., 2019b).

Warm water foot soaking at approximately 37–38°C may promote peripheral vasodilation and increase local blood flow (Ibrahim et al., 2020; Yuningsih & Rosita, 2022). Exposure of the lower extremities to warm water can induce thermal vasodilation, facilitate peripheral circulation, and promote muscle relaxation (Djafar et al., 2019). The increase in tissue temperature may reduce vascular resistance and enhance blood flow to the exposed area, thereby potentially improving peripheral tissue perfusion (Fitriani & Aderita, 2021). These physiological responses provide a plausible basis for investigating warm water foot soaking as a complementary intervention for patients with diabetes who are at risk of peripheral circulatory impairment.

Warm water foot soaking also facilitates the transfer of heat from the water to the tissues of the lower extremities. Increased local circulation may support the delivery of oxygen and nutrients and facilitate the removal of metabolic waste products from peripheral tissues. These effects may be particularly relevant in patients with diabetes who experience impaired peripheral circulation (Nugroho, 2020). In addition, warm water foot soaking is relatively simple, inexpensive, and easy to administer, making it a potentially feasible complementary intervention in diabetes self-management and nursing care (Maryama et al., 2021).

The reviewed studies indicate that repeated warm water foot-soaking interventions may improve ABI among patients with type 2 diabetes mellitus. Interventions administered over three to five days were associated with increased ABI values in several studies, suggesting potential benefits of repeated thermal exposure on peripheral perfusion (Yuningsih & Rosita, 2022). However, the effects of hydrotherapy should not be considered independently of other aspects of diabetes management. Maintaining a healthy lifestyle, including appropriate physical activity, dietary management, medication adherence, and regular monitoring of vascular status, remains essential for maintaining peripheral vascular health and reducing the risk of complications (Mataputun et al., 2020).

Alternating warm and cold water immersion may provide another approach to hydrotherapy for peripheral circulation. Exposure to warm water promotes vasodilation, whereas brief cold exposure induces vasoconstriction. Repeated changes in vascular tone may influence local blood flow and peripheral circulation (Simarmata et al., 2021). However, the use of cold water should be carefully

controlled, particularly with respect to temperature and duration, because excessive or prolonged cold exposure may adversely affect peripheral tissues. Similarly, warm water should be maintained at a tolerable temperature to prevent thermal injury, especially in patients with diabetes who may have impaired peripheral sensation. Therefore, hydrotherapy should be performed using an appropriate temperature, duration, and frequency and should be accompanied by monitoring of skin integrity and patient tolerance (Mataputun et al., 2020).

5. CONCLUSIONS

Hydrotherapy shows potential as a complementary non-pharmacological intervention for patients with type 2 diabetes mellitus. The reviewed studies indicate that drinking water and warm water foot soaking may contribute to reductions in blood glucose levels through improved hydration, renal function, peripheral vasodilation, and relaxation. Warm water foot soaking may also improve peripheral perfusion, as reflected by changes in the Ankle-Brachial Index (ABI). However, variations in intervention temperature, duration, frequency, and treatment protocols limit direct comparison across studies. Therefore, hydrotherapy may be incorporated into nursing care as a simple, accessible, and low-cost complementary intervention, while standardized protocols and further rigorous studies are needed to establish its effectiveness.

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APPLICATION OF BACK MASSAGE FOR RHEUMATOID ARTHRITIS PATIENTS WITH CHRONIC PAIN IN PONDOK RANGGON URBAN VILLAGE

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Abstract

Rheumatoid arthritis is a chronic disease that has become a global health problem due to its increasing prevalence and its impact on patients' quality of life. Based on the 2018 Basic Health Research (Riskesdas), the prevalence of joint diseases including rheumatoid arthritis reached 11.9% based on healthcare professionals' diagnosis and 24.7% based on diagnosis or symptoms. Patients with rheumatoid arthritis are at high risk for comorbidities such as cardiovascular disease, infection, osteoporosis, and other malignancies. This study aimed to provide family nursing care for rheumatoid arthritis cases in Pondok Ranggon Subdistrict with chronic pain problems using back massage intervention. The research method used the nursing process including assessment, diagnosis, intervention, implementation, and evaluation. The instruments used were family nursing care assessment form and observation sheets for pain scale measurement using the Numeric Rating Scale (NRS) and PQRST. The study subjects consisted of two respondents who experienced rheumatoid arthritis with chronic pain.Chronic pain in patients with rheumatoid arthritis requires appropriate management, one of which is through non-pharmacological intervention in the form of back massage therapy. This intervention is used to help reduce pain intensity, increase relaxation, and provide a sense of comfort. The intervention focused on pain management by providing back massage therapy for 7 days, performed for 10-15 minutes per session.The conclusion of this study is that back massage was proven to reduce pain in patients with rheumatoid arthritis both in terms of decreased pain scale and changes in several aspects of PQRST.

Keywords: Rheumatoid Arthritis, Chronic Pain, Back Massage

1. INTRODUCTION

Rheumatoid arthritis is an autoimmune disease that causes chronic inflammation of the joints, characterized by swelling and pain (1). On joint examination, swelling, tenderness, increased temperature in the joint area, and limitation of joint movement are often found (2). According to the Indonesian Health Profile (2023), the number increased in 2022 to 23,711 cases

(3). At the regional level, especially in DKI Jakarta Province, cases of rheumatoid arthritis are still found in various health care facilities. One data showed that at Sawah Besar Regional Hospital, Central Jakarta (4), 21 cases of rheumatoid arthritis were recorded. Although specific prevalence data in Jakarta is still limited, an epidemiological approach shows that the prevalence of rheumatoid arthritis in Indonesia ranges from 0.1% to 0.3% of the adult population (5).

Research conducted in Pinang Ranti Subdistrict (6) showed that this disease is one of the degenerative diseases often experienced by the community and contributes to the emergence of chronic pain and activity limitations. Based on data from the 2020 Cipayung Subdistrict Health Center report, data on rheumatoid arthritis was 464 people (7).

The course of rheumatoid arthritis can cause extra-articular complications (2). Effective pain management is an important part of caring for patients with rheumatoid arthritis because the pain experienced can affect not only their physical condition, but also their mental and social health, as well as their ability to carry out daily life (8).

Nurses have an important role in overcoming chronic pain in patients with rheumatoid arthritis through the provision of comprehensive nursing care. Nurses can provide emotional support, coordinate with other health workers, and ensure patients receive services according to their needs (9). In addition, evaluation needs to be carried out to determine the effectiveness of the actions that have been given and to monitor the development of the patient's condition periodically (10). Nurses can also encourage healthy lifestyle modifications such as regular physical activity, stress management, and control of risk factors that have the potential to worsen the patient's condition (11).

Rehabilitative nursing interventions, including range of motion (ROM) exercises, joint protection techniques, and non-pharmacological therapies such as relaxation and physical exercise, have been proven effective in improving functional recovery of rheumatoid arthritis patients (12). Complementary therapies such as back massage are known to have potential in reducing pain levels and increasing patient comfort (8).This therapy is included in non-pharmacological interventions carried out through a physical approach. The application of massage is also considered safe because it has minimal side effects and is easy to apply (13). Back massage is a technique of massaging the back of the body with gentle stroking movements. Thus, the spinal cord will convey impulses to the brain, and the brain will convey information throughout the body so that it can cause pain to decrease in all joints (14). Applying lotion or balm to the massaged area can cause a warm sensation that triggers dilation of blood vessels in the area, or vasodilation. This increases cell activity, relieves pain, and supports the tissue healing process (15).

Research conducted by Mailani et al. (2020) showed that back massage reduced the intensity of pain caused by rheumatoid arthritis in the elderly (14). Before the intervention, the average pain level of respondents was 4.97 which was included in the moderate pain category. After therapy, the average pain level decreased to 3.27 which was included in the mild pain category. Further research conducted by Ayu & Paneo (2025) with cutaneous slow stroke back massage intervention showed that the majority of respondents (46.2%) experienced mild pain, with the remainder (53.8%) experiencing moderate pain (16). Based on the results of research (Aryandani & Hermawati, 2017) the application of back therapy showed that the pain intensity of both subjects decreased (17).

The novelty of this present study lies in the application of a case study method with a family nursing care approach involving two subjects, combined with family education regarding back massage intervention.

2. METHODOLOGY

This scientific paper used a descriptive research with a case study approach. Descriptive research aimed to present facts and characteristics of the study subject systematically, objectively, and accurately. The case study approach was chosen because the researchers wanted to provide an in-depth description of the implementation of family nursing care for rheumatoid arthritis patients with chronic pain problems through back massage intervention.This research method used the nursing process which included assessment, nursing diagnosis, intervention, implementation, and nursing evaluation. The study was focused on the application of back massage as a non-pharmacological intervention to help reduce the intensity of chronic pain in rheumatoid arthritis patients within the family scope.

3. RESULTS

This study was conducted for 7 days involving 2 research subjects from 2 different families diagnosed with Rheumatoid Arthritis who experienced chronic pain. This study was conducted from May 18 to May 25, 2026.

3.1 Result of NRS Scale Observation

The following are the results of pain measurement before and after the intervention for pain reduction and the difference in its reduction.

3.1.1 Result of NRS Scale Observation

Pain assessment was conducted through pain observation using the NRS scale, as described below.

Table 1. Observation Results of Pain Intensity Based on NRS

Day/Date	Aspect Assessed	Mrs B		Mrs A	
		Pre	Post	Pre	Post
Monday, May 18, 2026	**Pain Scale NRS**	6	4	4	3
Tuesday, May 19, 2026		6	4	4	3
Wednesday, May 20, 2026		6	4	4	3
Thursday, May 21, 2026		6	4	4	3
Friday, May 22, 2026		4	3	4	3
Saturday, May 23, 2026		4	3	3	2
Monday, May 25, 2026		4	3	3	2

Based on the table above, the measurement of pain scale using the Numeric Rating Scale (NRS) after the administration of back massage for 7 days showed a decrease in pain intensity in both respondents.In Mrs. B, the measurement results showed that before back massage was administered on the first day, the pain scale score was at 6, which was categorized as moderate pain. After back massage was administered on the seventh day, the pain scale score decreased to 3, which was categorized as mild pain.In Mrs. A, the initial measurement showed that the pain scale before back massage was performed on the first day was at 4, categorized as moderate pain. After back massage was administered on the seventh day, the pain scale score decreased to 2, which was categorized as mild pain. This indicated a reduction in pain after back massage was performed on Mrs. B and Mrs. A.

In patients with rheumatoid arthritis, chronic pain occurs due to the inflammatory process in the synovial membrane that triggers the release of inflammatory mediators, causing pain, stiffness, and activity disturbance (18). Nursing implementation in both respondents was Pain Management. In the intervention, actions carried out included pain assessment using PQRST pain assessment, measurement of pain intensity using the Numeric Rating Scale (NRS), and implementation of non-pharmacological action in the form of back massage. The implementation of back massage in this case study was carried out as part of Pain Management implementation. This action was given gradually for seven days with the aim of helping to reduce pain and increase comfort, which was in line with the concept of the benefits of back massage according to (15).

The results of implementation in this case study were in line with the theory of rheumatoid arthritis management according to (17) which stated that in addition to pharmacological therapy, management can also be carried out through non-pharmacological therapy, such as resting painful joints, maintaining ideal body weight, eating a balanced diet, using warm compresses, performing physiotherapy, and complementary therapy in the form of back massage.

The results of this evaluation were also supported by research (Abdillah & Suwandi, 2020) which showed that the intensity of rheumatic pain in the elderly was in the moderate pain category and after intervention, the majority was in the mild pain category.

3.2 Average Reduction of Pain Scale

The difference between the pain measurements taken before and after the procedure is explained below

Table 2. Average Reduction of Pain Scale

Pain Scale Reduction	Respondents	
	Mrs. B	**Mrs. A**
Pre	5,14	3,71
Post	3,57	2,71
Mean Reduction	1,57	1

Based on the data above, the mean pain scale before and after back massage administration showed a decrease in pain intensity in both respondents. The mean pain scale of Mrs. B before the intervention was 5.14 and after the intervention it became 3.57. Meanwhile, in Mrs. A, the mean pain scale before the intervention was 3.71 and after the intervention it became 2.71. From these data, the mean reduction in pain scale in Mrs. B was 1.57 points, while in Mrs. A it was 1 point.

Based on the evaluation of results, both respondents showed improvement after seven days of nursing implementation. In Mrs. B, the evaluation results showed a decrease in pain scale from 6 on the first day to 3 on the seventh day, so the pain which was initially in the moderate category decreased to mild. In addition to the decrease in scale, changes were also seen in the quality of pain, where the painful sensation which initially felt hot and numb gradually became numb only.

In Mrs. A, the evaluation results also showed a decrease in pain scale from 4 on the first day to 2 on the seventh day, indicating that pain decreased from the moderate to mild category. The quality of pain in Mrs. A, which was initially felt as hot and numb, also changed to numb only, and complaints in the left hand felt lighter than before the intervention was given.

3.3 Results of Pain Observation Using PQRST

Pain assessments performed on the patient before and after the procedure also utilized the PQRST approach, which is described below.

Table 3. PQRST Observation

Aspect Assessed	**Mrs. B**		**Mrs. A**	
Method	Pre	Post	Pre	Post
PQRST	Monday, May 18 2026	Monday, May 25 2026	Monday, May 18 2026	Monday, May 25 2026
P	Mrs B stated that pain was felt upon waking up in the morning, when standing too long and sitting too long	Mrs B tated that pain was felt upon waking up in the morning, when standing too long and sitting too long, the joint did not feel too hot	Mrs A stated that her hand felt painful when riding a motorcycle and would decrease if rested	Mrs A stated that her hand felt painful

Q	Mrs B stated that her hand joints felt hot and numb	Mrs B stated that after 7 days of back massage intervention, the joint pain did not feel too hot	Mrs A that her hand joints felt hot and numb	Mrs A stated that her hand joints felt hot and numb
R	Mrs. B stated that joint pain was felt in both hands	Mrs. B stated that after 7 days of back massage intervention, the joint pain in both hands was reduced	Mrs. A stated that both hand joints were painful, but the left side was more dominant	Mrs. A stated that after back massage intervention for 7 days, the joint pain in her left hand began to feel lighter and she was able to concentrate while riding a motorcycle
S	Mrs. B stated that the pain scale was 6 or moderate pain	Mrs. B stated that the pain scale was 3 or mild pain	Mrs. A stated that the pain scale was 4 or moderate pain and interfered with concentration	Mrs. A stated that the pain scale was 2 or mild pain
T	Mrs. B stated that the pain had been felt for 6 months, was felt continuously, and worsened in the morning and evening	Mrs. B stated that the pain had been felt for 6 months	Mrs. A stated that the pain had been felt for 4 months	Mrs. A stated that the pain had been felt for 4 months

Based on Table 3, the pain assessment using the PQRST method before back massage administration showed that both respondents experienced pain complaints due to rheumatoid arthritis, characterized by pain in the hand joint area, a sensation of heat, and limitations in performing daily activities

In the aspect of Provocation/Palliation (P), the observation results showed that before and after the intervention, Mrs. B and Mrs. A still gave the same response. Mrs. B stated that pain was felt mainly upon waking up in the morning, when standing too long, and when remaining still for a long time, while Mrs. A stated that hand pain appeared during activities such as riding a motorcycle and decreased when the hand was rested.

In the aspect of Quality (Q), before the intervention, Mrs. B described pain as a sensation of heat and numbness in both hands. After back massage, Mrs. B stated that pain and discomfort in both hands had decreased. Meanwhile, Mrs. A gave the same response before and after the intervention, stating that her hand joints felt hot and numb.

In the aspect of Region (R), before the intervention, Mrs. B felt pain in both hands. After 7 days of back massage, Mrs. B stated that pain in both hands had decreased. In Mrs. A, before the intervention, pain was felt in both hands but was more dominant in the left hand. After back massage, Mrs. A stated that pain in her left hand had begun to decrease and activities such as riding a motorcycle became easier to perform.

In the aspect of Severity (S), before the intervention, Mrs. B had a pain scale of 6 (moderate pain) and after 7 days of back massage, the pain scale decreased to 3 (mild pain). Meanwhile, in Mrs. A, before back massage, the pain scale was 4 (moderate pain) and after back massage, it decreased to 2 (mild pain). This indicated a decrease in pain intensity after therapy administration.

In the aspect of Time (T), both respondents showed complaints of chronic pain.

4. CONCLUSIONS

Nursing implementation was carried out for 7 days in both respondents according to the planned intervention. The implementation included periodic pain assessment using PQRST pain assessment, measurement of pain intensity using the Numeric Rating Scale (NRS), and administration of back massage therapy for 7 days performed for 10-15 minutes as an additional therapy to help reduce chronic pain in both respondents.

Nursing evaluation showed that the intervention given had a positive impact on pain reduction in both respondents. In Mrs. B, the pain scale decreased from 6 to 3 with an average decrease of 1.57 and changes in aspects Q, R, and S. In Mrs. A, the pain scale decreased from 4 to 2 with an average decrease of 1 and changes in aspects R and S.

The focus of the case study results can be concluded that the provision of back massage therapy as part of pain management intervention can help reduce chronic pain in patients with rheumatoid arthritis, both in terms of decreasing pain scale and changes in several aspects of PQRST.

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CLINICAL CHARACTERISTICS AND PRIORITY NURSING DIAGNOSES AMONG PATIENTS IN AN EMERGENCY DEPARTMENT

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Abstract

Emergency departments manage patients with diverse levels of acuity and rapidly changing physiological conditions, requiring systematic nursing assessment and prioritization. This study aimed to describe the demographic and clinical characteristics, triage levels, and priority nursing diagnoses of patients treated in an emergency department. A retrospective descriptive study was conducted using a de-identified hospital dataset containing 57 patient records from April 2026. Variables included demographic characteristics, triage level, neurological and respiratory assessment, vital signs, hydration indicators, selected nursing interventions, length of stay, disposition, and priority nursing diagnoses. Data were cleaned for case inconsistencies and obvious spelling variations, then analyzed using frequencies, percentages, means, standard deviations, medians, and ranges. Most patients were aged >41 years (54.4%), female (56.1%), and classified as triage P2 (77.2%). Patent airway was documented in 89.5% of patients, abnormal breath sounds in 21.1%, hypovolemia indicators in 19.3%, dry mucosa in 43.9%, and hyperthermia in 36.8%. Mean respiratory rate was 23.16±4.07 breaths/min, oxygen saturation 95.21±4.89%, pulse 100.02±18.43 beats/min, and emergency department length of stay 4.91±1.63 hours. The most frequent priority nursing diagnoses were hypovolemia (21.1%), acute pain (19.3%), ineffective airway clearance (12.3%), and ineffective breathing pattern (12.3%). The findings demonstrate heterogeneous acute care needs with prominent fluid, pain, and respiratory problems, supporting the importance of structured assessment and standardized nursing diagnosis in emergency care.

Keywords: Emergency Nursing, Emergency Department, Nursing Diagnosis, Triage, Patient Assessment

1. INTRODUCTION

Emergency care is a critical entry point to the health system for patients with acute illness and injury. The World Health Organization (WHO) emphasizes early recognition, prioritization, resuscitation, and timely definitive care as essential components of effective emergency care systems [1]. Acuity-based triage sorts patients according to the urgency of intervention rather than order of arrival, enabling patients with the greatest immediate needs to receive care first [2]. In 2026, WHO also introduced a standardized Data Set for Emergency Care to support consistent documentation, monitoring, evaluation, and quality improvement across emergency units [3].

Nurses have a central role in the initial and ongoing assessment of emergency patients. Triage decisions require simultaneous interpretation of presenting complaints, physiological findings, risk indicators, and the broader clinical situation. A recent systematic review found that emergency nurses combine holistic reasoning, situational awareness, knowledge, and experience when determining patient acuity [4]. Accurate monitoring of vital signs and recognition of deterioration are likewise fundamental to patient safety in emergency settings [5].

Beyond triage, the nursing process requires the translation of assessment findings into nursing diagnoses that guide outcomes and interventions. Standardized nursing terminology can improve

communication, consistency, and the traceability of nursing care. Recent emergency-care research has demonstrated the feasibility and value of mapping standardized nursing diagnoses, outcomes, and interventions in acute clinical settings [6,7]. Descriptive epidemiological studies remain particularly useful for identifying the pattern of nursing needs within emergency services and for informing education, staffing, clinical protocols, and quality improvement [8].

Local evidence describing the combination of patient characteristics, clinical status, triage level, and priority nursing diagnoses is still needed because the case mix of each emergency department may differ. Therefore, this study aimed to describe the demographic and clinical characteristics, triage levels, selected nursing care indicators, and priority nursing diagnoses among patients treated in an emergency department in April 2026.

2. METHODOLOGY

This study used a retrospective descriptive design based on secondary hospital data. The analytic dataset consisted of 57 de-identified patient records from an emergency department during April 2026. All 57 records available in the supplied dataset were included in the descriptive analysis. The data were gathered during a student clinical placement at Ridwan Meuraksa Hospital, an institution situated in East Jakarta.

Variables analyzed were age category, sex, education, medical diagnosis, triage level, Glasgow Coma Scale (GCS), airway patency, airway obstruction, abnormal breath sounds, respiratory rate, dyspnea, oxygen saturation, pulse, capillary refill time, blood pressure, hypovolemia indicator, dry mucosa, fluid intake and output, temperature, hyperthermia, trauma/wound status, intravenous fluid administration, antipyretic administration, education, improvement in pulse and temperature, fluid status, emergency department length of stay, disposition, and priority nursing diagnosis.

Data cleaning was performed before analysis. Triage codes were standardized for letter case (e.g., p2 to P2). Obvious spelling variations in priority nursing diagnoses were harmonized without changing their clinical meaning (e.g., 'hipovolema' to 'hypovolemia' and spelling variations of ineffective airway clearance and hyperthermia). Records containing more than one priority diagnosis were retained as a separate 'multiple priority diagnoses' category, and missing diagnosis information was reported rather than imputed. A non-standard dyspnea entry was not recoded for the dyspnea frequency calculation.

Categorical variables were summarized as frequency and percentage. Continuous variables were summarized using mean, standard deviation (SD), median, minimum, and maximum. The analysis was descriptive; no hypothesis testing was performed. Ethical approval and institutional permission details should be inserted before submission: [Ethics Committee name, approval number, and date]. Because this analysis used secondary de-identified records, no patient-identifying information is reported.

3. RESULTS

A total of 57 emergency department patient records were analyzed. More than half of the patients were older than 41 years (54.4%), 56.1% were female, and 68.4% had completed senior high school. Triage P2 represented the largest acuity group (77.2%), followed by P3 (21.1%) and P1 (1.8%).

Table 1. *Demographic characteristics and triage level (n=57)*

Characteristic	n	%
Age 20–30 years	11	19.3
Age 31–40 years	15	26.3
Age >41 years	31	54.4

Male	25	43.9
Female	32	56.1
Junior high school	7	12.3
Senior high school	39	68.4
Higher education	11	19.3
Triage P1	1	1.8
Triage P2	44	77.2
Triage P3	12	21.1

Initial assessment showed that 89.5% of patients had a patent airway and 10.5% had documented airway obstruction. Abnormal breath sounds were present in 21.1%. Eleven patients (19.3%) had a recorded hypovolemia indicator, while dry mucosa was documented in 43.9%. Hyperthermia was present in 36.8%. Intravenous fluid therapy was recorded for all patients, while education was documented for 96.5%. Improvement in pulse and temperature was recorded in 82.5% and 78.9% of patients, respectively.

***Table 2**. Selected clinical assessment and nursing care indicators (n=57)*

Indicator	n	%
Patent airway	51	89.5
Airway obstruction	6	10.5
Abnormal breath sounds	12	21.1
Hypovolemia indicator	11	19.3
Dry mucosa	25	43.9
Hyperthermia	21	36.8
Trauma/wound	2	3.5
Intravenous fluid administered	57	100.0
Patient/family education documented	55	96.5
Pulse improvement documented	47	82.5
Temperature improvement documented	45	78.9
Fluid status: poor	1	1.8
Fluid status: moderate	29	50.9
Fluid status: good	27	47.4

The mean respiratory rate was 23.16 breaths/min, mean oxygen saturation was 95.21%, and mean pulse rate was 100.02 beats/min. The mean systolic and diastolic blood pressures were 129.61 and 78.77 mmHg, respectively. The mean temperature was 37.05°C. Emergency department length of stay averaged 4.91 hours, with a median of 5 hours and a range of 1–8 hours. The very low minimum diastolic blood pressure in the source dataset should be verified against the original medical record before final submission.

Table 3. *Physiological parameters and emergency department length of stay*

Variable	Mean ± SD	Median	Min–Max
Respiratory rate (breaths/min)	23.16 ± 4.07	22	17–38
SpO_2 (%)	95.21 ± 4.89	98	70–99
Pulse (beats/min)	100.02 ± 18.43	102	64–141
Systolic blood pressure (mmHg)	129.61 ± 33.40	130	55–209
Diastolic blood pressure (mmHg)	78.77 ± 21.41	80	8–133
Temperature (°C)	37.05 ± 0.88	36.7	36.0–39.8
ED length of stay (hours)	4.91 ± 1.63	5	1–8

After harmonizing obvious spelling variations, hypovolemia was the most frequent priority nursing diagnosis (21.1%), followed by acute pain (19.3%). Ineffective airway clearance and ineffective breathing pattern each accounted for 12.3%. Risk for ineffective cerebral tissue perfusion was documented in 7.0%. Two records contained more than one priority diagnosis and one record had no priority diagnosis documented.

Table 4. *Distribution of priority nursing diagnoses (n=57)*

Priority nursing diagnosis	n	%
Hypovolemia	12	21.1
Acute pain	11	19.3
Ineffective airway clearance	7	12.3
Ineffective breathing pattern	7	12.3
Risk for ineffective cerebral tissue perfusion	4	7.0
Hyperthermia	3	5.3
Risk for hypovolemia	3	5.3
Unstable blood glucose level	2	3.5
Multiple priority diagnoses	2	3.5
Decreased cardiac output	1	1.8

Diarrhea	1	1.8
Impaired spontaneous circulation	1	1.8
Risk for ineffective peripheral tissue perfusion	1	1.8
Urge urinary incontinence	1	1.8
Not documented	1	1.8

4. DISCUSSION

The present study provides a clinically focused description of emergency-department nursing needs in a cohort of 57 patients. The predominance of P2 triage (77.2%) indicates that most patients required timely assessment and intervention rather than routine low-acuity care. This pattern is important because triage is not merely an administrative sorting process; it is an early clinical-risk decision that determines the urgency of assessment, monitoring, and treatment. The World Health Organization defines acuity-based triage as prioritization according to the estimated urgency for intervention [2]. Contemporary evidence also shows that emergency nurses integrate physiological findings, presenting symptoms, prior knowledge, clinical experience, and situational awareness when assigning acuity [4]. An evidence-based review of emergency-nurse triage accuracy further reported that accuracy is influenced by nurse characteristics, patient characteristics, and the work environment, with reported accuracy varying substantially across studies [11]. Therefore, the high proportion of P2 cases in the present dataset should be interpreted as a marker of a clinically demanding case mix that requires competent triage and repeated reassessment rather than as an isolated categorical finding.

The physiological findings support this interpretation. Although 89.5% of patients had a patent airway, 10.5% had documented airway obstruction and 21.1% had abnormal breath sounds. Mean respiratory rate was 23.16 breaths/min and oxygen saturation ranged from 70% to 99%, demonstrating substantial variability in respiratory status. Emergency-department monitoring must be individualized because monitoring requirements change as patient condition and clinical circumstances evolve. Connell et al. developed a multidisciplinary consensus statement for vital-sign monitoring in emergency departments and emphasized that monitoring frequency and parameters should reflect the patient's clinical context and risk [5]. These findings reinforce the nursing responsibility to connect triage classification with serial assessment rather than treating triage as a one-time decision. Training is also relevant: a scoping review of triage education found considerable heterogeneity in training approaches and outcome measures, highlighting the need for structured competency development and reliable evaluation of triage performance [12].

A central finding of this study is the distribution of priority nursing diagnoses. Hypovolemia was the most frequently documented priority diagnosis (21.1%), followed by acute pain (19.3%), ineffective airway clearance (12.3%), ineffective breathing pattern (12.3%), and risk for ineffective cerebral tissue perfusion (7.0%). This distribution demonstrates that emergency nursing priorities are not interchangeable with medical diagnoses. Nursing diagnoses represent clinical judgments about human responses, risks, and care needs that can require autonomous or collaborative nursing action. The current NANDA-I classification explicitly strengthens the linkage between systematic assessment, diagnostic reasoning, and nursing diagnosis, and emphasizes the use of assessment frameworks to improve diagnostic accuracy [10]. In the emergency setting, where information is often incomplete and time-sensitive, standardized diagnostic terminology can make nursing reasoning more visible, reproducible, and communicable across clinicians and shifts.

The prominence of hypovolemia is particularly noteworthy. In the present dataset, hypovolemia as a priority nursing diagnosis coexisted with other fluid-related findings: 19.3% of patients had a recorded hypovolemia indicator, 43.9% had dry mucosa, and 50.9% were categorized as having moderate fluid status. These findings suggest that fluid-balance problems constituted a substantial component of the nursing workload. From a diagnostic perspective, hypovolemia should not be inferred from a single sign; it requires integration of history, physical findings, hemodynamic status, fluid losses, intake-output

information, and the overall clinical context [10]. Contemporary fluid-management literature likewise cautions against assuming that static clinical variables alone reliably predict benefit from fluid administration. A systematic review and meta-analysis of variables influencing fluid responsiveness found that the performance of dynamic tests varies according to patient and measurement characteristics [17]. Thus, the finding that all patients in this dataset received intravenous fluids should be described as a care-process observation, not evidence that all patients were objectively fluid responsive. The descriptive design also precludes attributing subsequent pulse or temperature improvement to intravenous fluid therapy.

The second most frequent diagnosis, acute pain (19.3%), is also consistent with the broader emergency-care literature. In a large retrospective study of 28,847 prehospital emergency episodes, Romero-Sánchez et al. found that acute pain was among five NANDA-I diagnoses accounting for the great majority of documented diagnoses, together with risk for falls, anxiety, fear, and ineffective breathing pattern [7]. Although the prehospital population and health system differ from the present hospital-based cohort, the recurrence of acute pain across emergency-care settings supports its relevance as a core nursing problem. Pain management in emergency departments remains challenging because crowding, competing priorities, reassessment demands, and variability in clinical presentation can contribute to undertreatment. Recent implementation research has identified contextual barriers to best-practice acute-pain management in emergency departments [15], while a 2024 systematic review emphasized that pain is multidimensional and that assessment strategy can influence judgments about analgesic requirements [16]. Consequently, identifying acute pain as a priority nursing diagnosis should be followed by structured assessment, timely intervention, and documented reassessment rather than by a single pain score alone.

Respiratory nursing diagnoses were another prominent pattern. Ineffective airway clearance and ineffective breathing pattern each occurred in 12.3% of patients; considered together, respiratory diagnoses represented an important share of the documented nursing priorities. This finding is clinically plausible given the observed airway obstruction, abnormal breath sounds, elevated respiratory rates, and episodes of reduced oxygen saturation. Importantly, ineffective airway clearance and ineffective breathing pattern describe different clinical responses and should not be used interchangeably. The first concerns the patient's ability to clear secretions or obstruction from the respiratory tract, whereas the second concerns ventilation through the pattern of inspiration and/or expiration; both require assessment-based diagnostic reasoning within the current standardized taxonomy [10]. The large emergency-care record review by Romero-Sánchez et al. similarly identified ineffective breathing pattern among the most prevalent NANDA-I diagnoses [7]. The convergence between their large prehospital dataset and the present smaller hospital cohort strengthens the interpretation that respiratory-pattern problems are recurring nursing priorities across the emergency-care continuum, even though prevalence estimates cannot be directly compared because of differences in population, setting, documentation systems, and diagnostic practices.

Risk for ineffective cerebral tissue perfusion was documented in 7.0% of records. Although less frequent than fluid, pain, and respiratory diagnoses, this diagnosis is clinically important because neurological deterioration can be time-sensitive and may occur in patients with stroke, altered consciousness, hemodynamic instability, or other acute neurological conditions. In a descriptive study such as this, the diagnosis should be interpreted as a documented nursing risk judgment rather than proof of impaired cerebral perfusion. Its presence nevertheless highlights the need for serial neurological assessment, including level of consciousness and other relevant neurological observations, integrated with triage and vital-sign monitoring. This is consistent with the broader principle that emergency nursing diagnoses should emerge from repeated assessment as patient status changes, rather than remain static after the initial encounter [5,10].

The pattern of diagnoses in this study can also be compared with recent work specifically addressing standardized nursing terminology in emergency services. Queiroz et al. mapped and validated standardized nursing terminology for adult clinical-surgical emergency care and validated 29 diagnosis-outcome-intervention linkages, comprising 16 problem-focused diagnoses, 12 risk diagnoses, and one syndrome diagnosis, together with 26 nursing outcomes, 96 interventions, and 281 nursing activities [6]. Their findings demonstrate that emergency nursing can be represented systematically through standardized diagnostic, outcome, and intervention language despite the complexity and speed of the setting. Similarly, the large retrospective study by Romero-Sánchez et al.

showed that nursing diagnoses recorded in electronic emergency records can be analyzed for prevalence and clustering, thereby revealing patterns of patient needs that are not captured by medical diagnosis alone [7]. The present study adds a local hospital-based profile in which fluid-volume, pain, respiratory, and neurological-risk diagnoses were particularly visible.

Standardized nursing language has implications beyond terminology. A systematic review and meta-analysis by Bertocchi et al. examined 53 reports and found that standardized nursing terminologies, particularly NANDA-NIC-NOC and the Omaha System, were associated in the literature with several patient and organizational outcomes, although the authors cautioned that heterogeneity and risk of bias limited definitive conclusions [13]. A systematic review from Indonesia likewise concluded that standardized nursing language can strengthen documentation and communication, while identifying differences in nurses' knowledge, awareness, and implementation across settings [14]. More recent emergency-specific validation work has further shown that standardized terminology can improve the consistency and efficiency of linking diagnoses, outcomes, and interventions [6]. These findings are directly relevant to the present dataset because spelling variations and inconsistent entries were found during data cleaning. Such variation is not a trivial technical issue: inconsistent diagnostic labels reduce the reliability of clinical communication, quality measurement, secondary-data analysis, and future interoperability with electronic health records.

The documentation of patient/family education in 96.5% of records and recorded improvement in pulse and temperature in 82.5% and 78.9%, respectively, suggests that the dataset also contains potentially useful nursing-sensitive process and outcome information. However, these variables should not yet be treated as validated quality indicators. Mustonen et al. identified 85 nursing quality indicators in adult emergency nursing across structure, process, and outcome domains, but also reported limited validation of many indicators [9]. Therefore, future work should establish explicit operational definitions, timing of measurement, denominators, and criteria for improvement before using variables such as education, pulse improvement, or temperature improvement for benchmarking. The WHO Data Set for Emergency Care similarly emphasizes standardized data elements to support monitoring, evaluation, and quality improvement across emergency-care systems [3].

The study also has implications for nursing education and clinical governance. The observed diagnostic profile suggests that emergency nurses require strong competencies in fluid assessment, pain assessment, airway and breathing evaluation, neurological surveillance, and prioritization. Triage education should be integrated with diagnostic reasoning rather than taught as an isolated scoring exercise. Evidence indicates that triage decision-making is influenced by both clinician experience and environmental pressures [4,11], while standardized nursing terminology provides a framework for translating assessment findings into explicit nursing problems and care plans [6,10,13]. For clinical services, periodic audit of the most frequent nursing diagnoses may help align continuing education, emergency protocols, documentation templates, and nursing resources with the actual pattern of patient needs.

Several limitations must be considered when interpreting these findings. First, the sample was small (n=57), derived from a single emergency department and a single month, which limits generalizability and makes the results sensitive to short-term variation in case mix. Second, this was a retrospective secondary-data analysis; consequently, the findings reflect what was documented rather than the complete clinical condition of each patient. Third, inconsistent capitalization, spelling, units, and several non-standard entries required data cleaning, and some extreme physiological or laboratory values should be verified against the source medical records. Fourth, the dataset did not permit independent validation of whether each nursing diagnosis met all defining characteristics or risk criteria in the current classification [10]. Fifth, because the design was descriptive, no causal or predictive conclusions can be drawn regarding relationships among triage level, interventions, nursing diagnoses, or outcomes. Future studies should use larger samples, prospective or multicenter designs, explicit diagnostic criteria, and inferential analyses to examine associations between triage, clinical indicators, nursing diagnoses, interventions, and patient outcomes.

5. CONCLUSIONS

Patients treated in the emergency department during April 2026 showed diverse acute care needs, with most classified as triage P2. Fluid balance, pain, and respiratory problems were prominent nursing priorities. Hypovolemia was the most frequent priority nursing diagnosis, followed by acute pain, ineffective airway clearance, and ineffective breathing pattern. The findings support the use of systematic assessment, repeated physiological monitoring, and standardized nursing diagnoses to organize emergency nursing care. Further analytic studies with larger samples and verified clinical data are recommended to examine relationships between triage, clinical indicators, nursing diagnoses, interventions, and patient outcomes.

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ORAL HYGIENE STATUS AMONG CHILDREN WITH SPECIAL NEEDS AT SLB NEGERI 2 SAWAHLUNTO

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Abstract

Oral hygiene remains a challenge among children with special needs, including children with intellectual disabilities and hearing impairments. Limitations in cognitive, motor, and communication abilities may affect their ability to maintain oral hygiene. This study aimed to describe oral hygiene status based on the debris index, calculus index, and Oral Hygiene Index-Simplified (OHI-S) among children with special needs at SLB Negeri 2 Sawahlunto. This descriptive study used a quantitative approach. The study population comprised all children with special needs at SLB Negeri 2 Sawahlunto. The sample consisted of 31 students, including children with mild intellectual disabilities, moderate intellectual disabilities, and hearing impairments who met the inclusion criteria. Data were collected through direct oral examinations using the OHI-S and analyzed descriptively using frequency distributions and percentages. The results showed that the debris index was predominantly in the moderate category, involving 23 students (74.2%), while 8 students (25.8%) were in the poor category. The calculus index was also predominantly moderate, involving 26 students (83.9%), followed by the poor category in 3 students (9.7%) and the good category in 2 students (6.4%). Overall, OHI-S was predominantly in the moderate category, involving 23 students (74.2%), while 8 students (25.8%) were in the poor category. No student had good OHI-S status. These findings indicate that the oral hygiene status of the respondents was predominantly moderate and not yet optimal, highlighting the need to strengthen oral health education, assistance, and the involvement of teachers and parents in maintaining oral hygiene among children with special needs.

Keywords: Oral Hygiene; OHI-S; Intellectual Disability; Hearing Impairment; Children With Special Needs.

1. INTRODUCTION

According to Law of the Republic of Indonesia No. 17 of 2023, health is defined as a state of being healthy physically, mentally, and socially, rather than merely being free from disease, enabling individuals to live productive lives. [1] In addition to general health, oral health also requires attention because oral health can affect overall health. Maintaining oral health is one of the ways to improve health. The mouth is not merely an entry point for food and beverages; it has broader functions, and many people are not fully aware of the important role of the mouth in health and well-being. [2]

Oral hygiene is very important. Several oral health problems may occur because children are still developing and require assistance from parents or family members to guide them in maintaining oral hygiene. Children with special needs may have a particularly high risk of oral hygiene problems because of their functional limitations. [3]

Based on the 2018 Basic Health Research (Riskesdas), the proportion of the population in West Sumatra Province experiencing dental and oral health problems was 43.87%, while in Sawahlunto City it was 40.55%. The 2023 Indonesian Health Survey (SKI) reported that 61.1% of the population in West Sumatra Province experienced dental and oral health problems. This indicates an increase of 17.23% in West Sumatra. The 2018 Riskesdas reported dental and oral health problems among children with

special needs of 3.29% in West Sumatra and 5.52% in Sawahlunto City. The 2023 SKI reported a prevalence of 1.1% among children with special needs in West Sumatra. [4,5]

Children with special needs are a group requiring particular attention to oral health maintenance. Intellectual, motor, communication, and self-care limitations may affect their ability to maintain oral hygiene. Consequently, they may require greater assistance and supervision from parents, teachers, and health professionals. Social challenges among children with special needs include limited knowledge, particularly regarding oral health. They require more attention than children without such limitations because some may have difficulty independently cleaning their oral cavity, thereby increasing the risk of poor oral hygiene. [6-10]

In children with intellectual disabilities, difficulty understanding instructions and performing toothbrushing movements systematically may reduce the effectiveness of tooth cleaning. In children with hearing impairment, communication barriers may prevent health information from being received optimally when education does not use appropriate visual media or communication methods. [7-9]

Oral hygiene status can be objectively assessed using the Oral Hygiene Index-Simplified (OHI-S). The OHI-S was developed by Greene and Vermillion and assesses two main components, debris and calculus, on six index tooth surfaces. [11] This examination provides an overview of an individual's oral hygiene condition. Calculus is a mineralized deposit that cannot be adequately removed through toothbrushing alone. In children with special needs, limitations in self-care may result in suboptimal oral hygiene maintenance. [6-10]

Previous studies involving children with special needs have also indicated that oral hygiene remains a concern. A study among students with intellectual disabilities found an association between oral health maintenance behavior and oral hygiene status. [12] Another study among students with intellectual disabilities and hearing impairment reported oral hygiene conditions ranging from moderate to poor. [13]

SLB Negeri 2 Sawahlunto serves children with special needs classified as type B (hearing impairment) and type C (intellectual disability). According to preliminary information from the school, there were 31 students, and no previous study had assessed their oral hygiene status. Preliminary data from 10 students showed that 3 students had poor OHI-S status and 7 had moderate OHI-S status. The school has a canteen selling sweet foods and snacks, including candy, snacks, and fried foods. There were 6 students with severe hearing impairment, 22 students with moderate intellectual disabilities, and 3 students with mild intellectual disabilities.

Based on these conditions, this study was conducted to describe oral hygiene status based on the debris index, calculus index, and OHI-S among children with special needs at SLB Negeri 2 Sawahlunto.

2. METHODOLOGY

This study used a descriptive design with a quantitative approach. The study was conducted at SLB Negeri 2 Sawahlunto, West Sumatra Province. The study population comprised all 31 students at SLB Negeri 2 Sawahlunto. A total sampling technique was used. Inclusion criteria were students who agreed to participate, were cooperative during the examination, had parental permission, and were present at the time of data collection.

Primary data were obtained through direct oral hygiene examinations using the Oral Hygiene Index-Simplified (OHI-S). The instruments included an OHI-S examination form, mouth mirror, dental explorer, tweezers, kidney dish, disclosing agent, rinsing cup, gloves, mask, cotton, alcohol, and stationery. Secondary data were obtained from the school regarding the number and basic characteristics of students.

The OHI-S examination used six index tooth surfaces: tooth 16 buccal, 11 labial, 26 buccal, 36 lingual, 31 labial, and 46 lingual. Debris and calculus were each scored from 0 to 3. The criteria for debris and calculus were good (0.0-0.6), moderate (0.7-1.8), and poor (1.9-3.0). OHI-S was categorized as good (0.0-1.2), moderate (1.3-3.0), and poor (3.1-6.0).

Data processing included checking completeness, coding, data entry, and data cleaning. Univariate analysis was performed to generate frequency distributions and percentages for each debris, calculus, and OHI-S category. Because the study was descriptive, it was not intended to test causal relationships or the effectiveness of an intervention.

3. RESULTS

A total of 31 students underwent the oral examination. The respondents consisted of 3 students with mild intellectual disabilities (9.7%), 22 students with moderate intellectual disabilities (70.9%), and 6 students with hearing impairment (19.4%).

Table 1. *Distribution of debris index by respondent group.*

Group	Good n (%)	Moderate n (%)	Poor n (%)	Total
Mild intellectual disability	0 (0)	2 (66,7)	1 (33,3)	3
Moderate intellectual disability	0 (0)	17 (77,3)	5 (22,7)	22
Hearing impairment	0 (0)	4 (66,7)	2 (33,3)	6
Total	0 (0)	23 (74,2)	8 (25,8)	31

The debris index was predominantly in the moderate category, involving 23 students (74.2%), while 8 students (25.8%) were in the poor category. No respondents were in the good category. Among students with moderate intellectual disabilities, 17 of 22 students (77.3%) were in the moderate category.

Table 2. *Distribution of calculus index by respondent group.*

Group	Good n (%)	Moderate n (%)	Poor n (%)	Total
Mild intellectual disability	1 (33,3)	2 (66,7)	0 (0)	3
Moderate intellectual disability	0 (0)	19 (86,4)	3 (13,6)	22
Hearing impairment	1 (16,7)	5 (83,3)	0 (0)	6
Total	2 (6,4)	26 (83,9)	3 (9,7)	31

The calculus index showed the largest proportion in the moderate category, involving 26 students (83.9%). Three students (9.7%) were in the poor category and 2 students (6.4%) were in the good category. Among students with moderate intellectual disabilities, the moderate category accounted for 86.4%.

Table 3. *Distribution of OHI-S by respondent group.*

Group	Good n (%)	Moderate n (%)	Poor n (%)	Total
Mild intellectual disability	0 (0)	3 (100)	0 (0)	3

Moderate intellectual disability	0 (0)	16 (72,7)	6 (27,3)	22
Hearing impairment	0 (0)	4 (66,7)	2 (33,3)	6
Total	0 (0)	23 (74,2)	8 (25,8)	31

Overall, OHI-S was moderate in 23 students (74.2%) and poor in 8 students (25.8%); no students were in the good category. All students with mild intellectual disabilities were in the moderate category. Among students with moderate intellectual disabilities, 16 students (72.7%) were moderate and 6 students (27.3%) were poor. Among students with hearing impairment, 4 students (66.7%) were moderate and 2 students (33.3%) were poor.

4. DISCUSSION

The results showed that most respondents had a moderate debris index. Twenty-three of 31 students (74.2%) were in this category, while 8 students (25.8%) were in the poor category. The absence of respondents in the good category indicates that oral hygiene among the respondents was not yet optimal.

Debris accumulation may be related to an individual's ability to clean the oral cavity. In children with intellectual disabilities, understanding instructions, maintaining attention, and performing structured motor movements may present challenges during toothbrushing. [6-9] Therefore, simple and repetitive instructions accompanied by demonstrations may be used as part of an approach to maintaining oral hygiene.

Among students with moderate intellectual disabilities, 17 of 22 students (77.3%) had a moderate debris index. This finding indicates that most students in this group still require attention in maintaining oral hygiene. Previous studies have also shown that oral hygiene status among students with intellectual disabilities remains a concern requiring attention. [12,13]

The calculus index in this study was also predominantly moderate, involving 26 students (83.9%). Calculus is a mineralized deposit and differs from debris, which is relatively easier to remove through mechanical cleaning. [11] This finding highlights the importance of regular dental examinations and professional care when calculus cannot be removed through toothbrushing.

The OHI-S examination showed that 23 students (74.2%) were in the moderate category and 8 students (25.8%) were in the poor category. None of the respondents had good OHI-S status. This pattern is consistent with the high proportions of moderate debris and calculus indices. OHI-S combines these two components and therefore provides an overall description of oral hygiene. [11]

The findings of this study are consistent with previous studies indicating oral hygiene problems among children with special needs. Children with intellectual limitations may experience difficulties in self-care, whereas children with hearing impairment may experience barriers to receiving information when communication methods are not adapted to their needs. [8,9]

For children with hearing impairment, visual communication can be an important component of oral health education. Toothbrushing demonstrations, step-by-step images, videos, and other visual communication formats can be used to clarify information. For children with intellectual limitations, simple instructions, concrete examples, repetition, and supervision can be applied. [14,15]

The involvement of teachers and parents is also important in maintaining oral hygiene among children with special needs. Oral health interventions for this group require not only information delivery but also practice and continuous monitoring of oral health behaviors. [6,7,14]

From a community oral health perspective, the findings can serve as baseline data for developing school-based oral health programs. Such programs may include periodic oral examinations, small-group education, toothbrushing demonstrations, behavior monitoring, and coordination among schools, parents, and health professionals. [14,15]

5. CONCLUSIONS

The oral hygiene status of students with special needs at SLB Negeri 2 Sawahlunto, based on examinations conducted in 2025, was predominantly moderate. A moderate debris index was found in 23 students (74.2%), a moderate calculus index in 26 students (83.9%), and moderate OHI-S in 23 students (74.2%). Eight students (25.8%) had poor OHI-S status, and none had good OHI-S status. These findings indicate the need for sustainable oral hygiene maintenance programs tailored to the communication needs and abilities of children with special needs.

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PERMANENT TOOTH CARIES EXPERIENCE AMONG STUDENTS AGED 10–12 YEARS AT STATE ELEMENTARY SCHOOL 18 SITAPUNG, AGAM REGENCY, INDONESIA

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Abstract

Purpose: This study aimed to describe the caries experience of permanent teeth among students aged 10–12 years at State Elementary School 18 Sitapung, Agam Regency, Indonesia. Methodology: A descriptive study was conducted in June 2026. Of the 62 students aged 10–12 years, 55 who met the inclusion criteria were examined through saturated sampling. Caries experience was measured with the Decayed, Missing, and Filled Teeth (DMF-T) index using a mouth mirror, a dental explorer, and a standard examination form, and the data were analysed univariately. Findings: The mean decayed component was 1.89, the mean missing component was 0.05, and no filled teeth were found (mean 0.00). The total DMF-T score was 107, giving a mean DMF-T of 1.95, which falls into the low severity category. Nevertheless, 65.5% of the students were classified under the poor DMF-T criterion, and untreated decay made up 97.2% of all caries experience. Practical implications: The results reveal a substantial unmet need for restorative care and support strengthening school-based dental services through six-monthly check-ups, early fillings, reduced consumption of cariogenic snacks, and twice-daily toothbrushing after breakfast and before bed. Originality/value: This is the first oral health study conducted at this school, and it provides baseline data for the local community health centre to plan promotive, preventive, and curative dental programmes for school-age children.

Keywords: Caries Experience, Decayed Missing Filled Teeth Index, Dental Caries, Elementary School Students, Permanent Teeth.

1. INTRODUCTION

The World Health Organization defines health as a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity [1], [2]. Indonesian Law Number 17 of 2023 on Health adopts a similar view and adds that a healthy condition should enable a person to live productively [3]. Oral health is an inseparable part of general health. It refers to the healthy condition of the hard and soft tissues of the teeth and related oral structures that enables a person to eat, speak, and interact socially without dysfunction, aesthetic disturbance, or discomfort [4].

Oral health remains a public health problem in Indonesia. The 2018 Basic Health Research (Riskesdas) found that 57.6% of Indonesians had dental and oral problems, yet only about 10% received care from health workers [5]. The 2023 Indonesian Health Survey (SKI) showed a similar picture, with 56.9% of the population aged three years and above reporting dental and oral problems [6]. In West Sumatra Province, the proportion reached 43.9%, which indicates that public awareness of oral health still needs to be improved [7].

Dental caries is the most frequently found dental problem. It is a disease of the hard tissues of the teeth caused by demineralisation from acids produced by plaque bacteria, which damages the enamel, dentin, and cementum and eventually forms a cavity. Untreated caries can cause pain, chewing difficulty, infection, and tooth loss, and it lowers quality of life [8]. Elementary school children are particularly vulnerable because their daily habits often do not yet support good oral health [8]. Riskesdas

2018 reported that 41.4% of Indonesian children aged 10–14 years had dental and oral problems [5], while in West Sumatra the proportion among 12-year-olds was 24.8% and caries prevalence among children aged 11–12 years was 56.2% [7].

Caries experience in the permanent dentition is commonly measured with the DMF-T index, which counts the number of decayed teeth, teeth missing because of caries, and filled teeth. The index is widely used in dental epidemiology because it describes caries severity in a population, and a higher score reflects a higher caries experience [9], [10]. Earlier studies show that caries experience among school-age children in West Sumatra and elsewhere in Indonesia remains noteworthy. Busman et al. found that among 92 children aged 12–15 years in the Mentawai Islands, 41.3% were in the very low category, but 9.8% and 1.1% were in the high and very high categories [11]. In Agam Regency, Warman et al. reported a mean DMF-T of 2.3 among fifth- and sixth-grade students, with a higher mean in girls (3.1) than in boys (1.8) [12], while Ulum and Hadi recorded a mean DMF-T of 1.12 among children aged 11–12 years [13].

This study was conducted at State Elementary School 18 Sitapung, Ampek Angkek District, Agam Regency. The school runs its school health programme in cooperation with Biaro Community Health Centre, located about 5 km away, which visits the school only twice a year to examine oral health, nutritional status, and the eyes and ears. According to the health centre, the school had never been the site of oral health research, and dental problems were more common there than in other schools. The school canteen sells sweet and sticky foods such as ice cream, chocolate, and candy, and vendors outside the school sell similar snacks. The school health team also reported that most students had never visited a dental service. A preliminary examination of 10 students on 6 January 2026 found 23 decayed and 3 missing teeth, with each student having 3–4 carious teeth, and no filled teeth. Therefore, this study aimed to describe the caries experience among students aged 10–12 years at State Elementary School 18 Sitapung.

2. METHODOLOGY

This was a descriptive study [14], [15] carried out from January to June 2026 at State Elementary School 18 Sitapung, Agam Regency, with the clinical examination held on 5 June 2026. The population comprised all 62 students aged 10–12 years (Table 1). A saturated sampling technique was applied [16], and 55 students who met the inclusion criteria were examined.

Table 1. Distribution of students aged 10–12 years at State Elementary School 18 Sitapung, 2026.

Age (years)	Boys (n)	Girls (n)	Total (n)
10	11	9	20
11	15	14	29
12	9	4	13
Total	**35**	**27**	**62**

Source: Administration Office of State Elementary School 18 Sitapung.

Primary data were obtained through DMF-T examinations using a mouth mirror, a dental explorer, and a DMF-T examination form, assisted by five enumerators who had been trained in the study procedure. Secondary data on the number of students were obtained from the school administration. The data were processed through editing, coding, entry, and cleaning. Univariate analysis was used to calculate the total and mean of each DMF-T component, with the mean obtained by dividing the total score by the number of students examined. The mean DMF-T was interpreted using the DMF-T severity categories, and each student was classified into the good or poor DMF-T criterion and presented as a frequency distribution.

3. RESULTS

The examination took place from 08.00 to 13.00 Western Indonesian Time and involved 55 students, consisting of 33 boys and 22 girls. The totals and means of each DMF-T component are shown in Table 2.

Table 2. Total, mean, and share of each DMF-T component among students aged 10–12 years (n = 55).

Component	Total (teeth)	Mean	Share of DMF-T (%)
Decayed (D)	104	1.89	97.2
Missing (M)	3	0.05	2.8
Filled (F)	0	0.00	0.0
DMF-T	**107**	**1.95**	**100.0**

DMF-T: Decayed, Missing, and Filled Teeth index.

Table 2 shows that caries experience in this group consisted almost entirely of untreated decay, while tooth loss due to caries was rare and no student had received a filling. The overall mean DMF-T of 1.95 falls into the low severity category. However, the distribution of individual scores in Table 3 shows that almost two-thirds of the students were classified under the poor criterion.

Table 3. *Frequency distribution of DMF-T criteria among students aged 10–12 years.*

DMF-T criterion	Frequency (n)	Percentage (%)
Good	19	34.5
Poor	36	65.5
Total	**55**	**100.0**

4. DISCUSSION

4.1 Decayed Component

The decayed component was the largest contributor to the DMF-T score, with an average of one to two untreated carious permanent teeth per student. This indicates that active caries is still common among the students. The researchers assume that this is related to suboptimal oral hygiene, frequent consumption of cariogenic foods, poor toothbrushing habits, and low use of dental services. The health centre visits the school only twice a year, most students have never used a dental service for check-ups or fillings, and sweet, sticky snacks are easy to buy both inside and outside the school.

In children aged 10–12 years, the first permanent molars (teeth 16, 26, 36, and 46) are the teeth most often affected. These teeth erupt at about 6–7 years of age, so they have been exposed to plaque and cariogenic foods longer than other permanent teeth, and their deep occlusal pits and fissures easily retain food debris and plaque. Most lesions found in this study had reached the dentin; if left untreated, they may progress to the pulp, cause pain, and lead to tooth loss. Sweet foods such as candy, chocolate, cakes, and soft drinks provide a substrate for plaque bacteria, which convert sugar into acids that accelerate demineralisation [17]. Regular toothbrushing after breakfast and before going to bed removes plaque and food debris, whereas improper timing, frequency, or technique allows plaque to accumulate and raises caries risk [18]. Low use of dental services also prevents early detection and treatment, so lesions continue to progress [19]. These findings agree with Hidayati et al., who reported that low use of oral health services was associated with more severe caries in children [19].

4.2 Missing Component

Only three permanent teeth were missing, which shows that most of the students' permanent teeth can still be retained. All missing teeth were permanent molars that had been extracted because caries had progressed to an advanced stage. Because permanent molars erupt early and have deep fissures, untreated demineralisation can spread from the enamel to the dentin and the pulp until the tooth can no longer be saved. The low missing score should therefore not be seen as reassuring: if the many decayed teeth found in this study remain untreated, the risk of tooth loss will increase. Knowledge plays an important role here, because behaviour based on knowledge tends to last longer, and limited oral health education and promotional media leave children unaware of the need for early treatment [4]. Damanik likewise found that lower oral health knowledge was associated with higher DMF-T scores, including the missing component, because untreated caries eventually ends in extraction [20].

4.3 Filled Component

No filled permanent teeth were found. The researchers assume that this is due to low use of dental services, fear of the filling procedure, and the view that fillings are not important. A filling is a restorative treatment that repairs tooth tissue damaged by caries and restores the tooth's shape and function. It should be done as early as possible, because a small cavity can be filled directly in one visit, whereas a deep lesion requires prior treatment and more visits [21]. Chasanah et al. found that elementary school students had a moderate level of anxiety about dental fillings, driven largely by environmental and social factors [22], which may explain why children leave cavities untreated as long as they are not painful. Hidayati et al. also showed that low use of dental services leaves many carious teeth unfilled [19].

4.4 Overall Decayed, Missing, and Filled Teeth Index

Although the mean DMF-T was in the low category, 65.5% of the students fell under the poor criterion. This shows that the mean alone understates the caries problem at the individual level and that most students need attention. Caries results from the interaction of the host tooth, microorganisms, substrate, and time; when these factors interact long enough, plaque bacteria ferment carbohydrates, especially sugar, into acids that dissolve enamel minerals and form a cavity [21]. At 10–12 years of age, newly erupted permanent teeth are not yet fully mature and are therefore more susceptible, while children also begin to choose their own snacks [21]. The mean DMF-T in this study was higher than the 1.12 reported by Ulum and Hadi among children aged 11–12 years [13] and slightly lower than the 2.3 reported by Warman et al. in the same regency [12]. Together, these findings confirm that caries remains a concern at an age when most permanent teeth have already erupted.

Prevention should focus on daily habits and regular care. Children should brush their teeth twice a day, after breakfast and before going to bed, because saliva flow decreases during sleep and bacteria multiply more easily, and they should rinse their mouths after eating sweet or sticky foods [23]. Dental check-ups every six months allow small cavities to be detected and treated before they become larger. The School Dental Health Programme, together with the community health centre, plays an important role in educating students and increasing their awareness of oral health.

5. CONCLUSIONS

The caries experience among students aged 10–12 years at State Elementary School 18 Sitapung was dominated by untreated decay. The mean decayed, missing, and filled components were 1.89, 0.05, and 0.00, respectively, and the mean DMF-T of 1.95 falls into the low category. However, 65.5% of the students were classified under the poor DMF-T criterion, which shows that most students have caries problems that need attention. Students are advised to have their teeth checked and decayed teeth filled at least every six months, to reduce cariogenic foods, and to brush their teeth at least twice a day, after breakfast and before going to bed. The school and Biaro Community Health Centre are encouraged to strengthen the School Dental Health Programme through more frequent examinations, education, and referral for restorative treatment.

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APPLICATION OF LEMONGRASS AND GINGER COMPRESSES FOR ACUTE PAIN IN PATIENTS WITH GOUT ARTHRITIS: A CASE STUDY

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Abstract

Gout arthritis is an inflammatory joint condition caused by the deposition of monosodium urate crystals, which can result in acute pain and interfere with daily activities. Complementary non-pharmacological interventions may be used to support pain management. This case study aimed to describe the application of lemongrass and ginger warm compresses as a complementary nursing intervention for acute pain in patients with gout arthritis. A descriptive case study approach was used involving two patients with gout arthritis and acute pain in Pondok Ranggon, Jakarta. Data were collected through interviews, observation, physical examination, and documentation. Warm lemongrass and ginger compresses were applied for 15–20 minutes daily for seven days. Pain intensity was assessed using the Numeric Rating Scale (NRS). Both patients experienced a reduction in pain intensity following the intervention. Patient 1 experienced a decrease in pain score from 6 to 3, accompanied by reduced pain complaints, a more relaxed condition, and improved comfort during daily activities. Patient 2 experienced a decrease from 4 to 3, accompanied by reduced pain in the right hand and increased comfort. The application of warm lemongrass and ginger compresses was accompanied by reduced pain intensity and improved comfort in both patients. This intervention may be considered as a complementary nursing approach to support acute pain management in patients with gout arthritis.

Keywords: Gout arthritis, Acute pain, Lemongrass and ginger compress.

1. INTRODUCTION

Gout arthritis is an inflammatory joint disorder associated with the accumulation of monosodium urate crystals in the joints, which can cause inflammation, swelling, warmth, restricted movement, and acute pain (1). Elevated uric acid levels and dietary patterns, particularly the consumption of purine-rich foods are among the factors associated with the occurrence of gout arthritis (2). The condition can interfere with daily activities and quality of life, particularly when acute attacks occur (3).

Gout arthritis remains a health concern in Indonesia. Based on the 2018 Basic Health Research (Riskesdas), the prevalence of joint disease in Indonesia was 11.9% based on health-worker diagnosis and 24.7% based on diagnosis or symptoms. In DKI Jakarta, the prevalence of joint disease based on physician diagnosis was 6.76%, while in East Jakarta it was 6.72%. The prevalence increased with age, reaching 21.40% among individuals aged 65–74 years (4). These data indicate that joint disorders remain an important health concern in the community.

Acute pain is one of the prominent manifestations of gout arthritis. During an acute attack, patients may experience severe pain accompanied by swelling, redness, warmth, and limited joint movement (5). Previous findings reported pain scores ranging from 4 to 9 among patients with gout arthritis, with a considerable proportion experiencing moderate to severe pain (6). Persistent or poorly managed pain may also trigger physiological stress responses and interfere with daily functioning.

Management of gout-related pain may involve pharmacological and non-pharmacological approaches (7). Non-pharmacological interventions include relaxation techniques, distraction, therapeutic modalities, and warm or cold compresses (8). Warm compresses may provide a warming

effect, promote peripheral vasodilation, increase local circulation, and contribute to muscle relaxation and comfort. In the original case study, warm compresses were applied at a temperature of 40–45°C for 15–20 minutes (9).

Lemongrass and ginger are natural ingredients that have been used as complementary approaches for pain management. Lemongrass (*Cymbopogon citratus*) is associated with a warming and relaxing effect, while ginger contains bioactive compounds with analgesic and anti-inflammatory properties (8,10). Previous studies reported reductions in pain intensity following the application of warm lemongrass compresses or ginger compresses in patients with gout arthritis. A study involving five respondents reported a reduction in pain scores from 5–7 before the intervention to 3–4 after warm lemongrass compresses (11). Another study involving older adults with gout reported a reduction in mean pain intensity following ginger compress application(11).

Previous evidence has also described the use of combined ginger and lemongrass warm compresses. Toto and Nababan reported a two-point reduction in pain scores among two older patients with gout arthritis following the intervention, while Desreza et al. reported a reduction in mean pain score from 6.33 to 2.67 following combined ginger and lemongrass warm compresses (10,12). These findings provide a basis for considering the combination as a complementary nursing intervention for pain management.

However, the application of combined lemongrass and ginger compresses for acute pain management in patients with gout arthritis remains limited, particularly in the Pondok Ranggon community. Therefore, this case study was conducted to describe the application of lemongrass and ginger warm compresses for acute pain management in patients with gout arthritis in Pondok Ranggon, Jakarta. The study focused on changes in pain intensity before and after the intervention.

2. METHODOLOGY

This study used a descriptive case study design to describe the nursing care provided to patients with gout arthritis experiencing acute pain through the application of warm lemongrass and ginger compresses. The study was conducted in Pondok Ranggon, Cipayung District, East Jakarta, DKI Jakarta, in May 2026. The intervention was implemented in the participants' homes for seven consecutive days.

Two female older adults with gout arthritis were selected using purposive sampling. The inclusion criteria were: a confirmed diagnosis of gout arthritis based on medical records or physician diagnosis; a nursing diagnosis of acute pain; uric acid levels above 7 mg/dL; acute pain with a Numeric Rating Scale (NRS) score of ≥4; age 50–75 years; residence in Pondok Ranggon; willingness to participate and sign informed consent; and the ability to communicate effectively. Participants with open wounds, skin irritation or damage at the intervention site, severe complications such as kidney disorders, chronic gout with tophi, or unwillingness to participate were excluded.

The intervention consisted of a warm compress prepared from boiled lemongrass (Cymbopogon citratus) and ginger (Zingiber officinale). The intervention was administered once daily for seven consecutive days, with each application lasting approximately 15–20 minutes. The compress temperature was maintained at 40–45°C and checked using a water thermometer before application. A washcloth was soaked in the prepared infusion, wrung until moist, and applied to the painful joint area.

Data were collected through structured interviews, direct observation, physical examination, and documentation. Pain intensity was assessed using the Numeric Rating Scale (NRS), ranging from 0 to 10. Scores of 1–3 represented mild pain, 4–6 moderate pain, and 7–10 severe pain. Pain intensity was assessed before and after each intervention to monitor changes throughout the seven-day intervention period. The instruments included nursing assessment forms, NRS, observation sheets, a water thermometer, and the standard operating procedure for lemongrass and ginger compresses.

Prior to implementation, the researcher prepared the study instruments, obtained permission from the Pondok Ranggon community health center, and selected participants according to the inclusion and exclusion criteria. Participants were informed about the study procedures and provided written informed consent. An initial assessment was then conducted through interviews, observation, physical examination, and NRS pain measurement. The lemongrass and ginger compress was subsequently

administered once daily for seven days, with pain intensity recorded before and after each intervention. All participant responses and changes in condition were documented in the nursing care records.

Ethical principles were applied throughout the study. Participants received information regarding the purpose, procedures, expected benefits, and potential risks of the intervention, including discomfort, skin irritation, or redness related to the warm compress. Participation was voluntary, informed consent was obtained before the intervention, and participants retained the right to refuse or withdraw from the study at any time. Confidentiality and participant safety were also maintained throughout the study.

3. RESULTS AND DISCUSSION

3.1 Participant Characteristics

This case study involved two female patients with gout arthritis and acute pain who met the inclusion criteria. The first participant (Mrs. W) was 61 years old and reported pain in the toes and left sole of the foot, which increased during activity. Her initial pain intensity was 6 on the Numeric Rating Scale (NRS), and her uric acid level was 9 mg/dL. The second participant (Mrs. M) was 55 years old and reported pain in the fingers of the right hand, which increased when gripping or lifting objects. Her initial pain intensity was 4, with a uric acid level of 7.1 mg/dL

3.2 Nursing Diagnosis and Intervention

The assessment identified acute pain (D.0077) related to physiological injury agents as the primary nursing diagnosis in both participants (13). The diagnosis was supported by the presence of pain associated with gout arthritis, increased pain during activity, and the participants' reported pain intensity measured using the Numeric Rating Scale (NRS). The nursing intervention was Pain Management (I.08238) with the expected outcome of decreased pain level based on the Indonesian Nursing Outcome Standards (SLKI) (14,15). The intervention included assessment of pain location, characteristics, duration, frequency, quality, and intensity; identification of factors that aggravated or relieved pain; monitoring of pain responses; provision of non-pharmacological pain management; and application of a warm lemongrass and ginger compress. The warm compress was administered once daily for 15–20 minutes over seven consecutive days, with the temperature maintained at approximately 40–45°C.

3.3 Changes in Pain Intensity

The application of warm lemongrass and ginger compresses was performed once daily for seven consecutive days. Pain intensity was assessed before and after each intervention using the NRS.

Mrs. W, aged 61 years, reported pain in the toes and left sole, particularly during activity. Her initial pain intensity was 6 on the NRS, with a uric acid level of 9 mg/dL. During the seven-day intervention, her pain intensity gradually decreased, although an increase in pre-intervention pain to 5 was observed on the fifth day, which was associated with excessive physical activity. Following reinforcement of activity restriction and continuation of the intervention, the pain intensity decreased again. By the seventh day, her NRS score had decreased from 6 to 3. Mrs. M, aged 55 years, reported pain in the fingers of the right hand, particularly when gripping or lifting objects. Her initial NRS score was 4, with a uric acid level of 7.1 mg/dL. Pain intensity remained unchanged during the first two days and decreased from 4 to 3 beginning on the third day, remaining at this level through the seventh day. The slower reduction was associated with continued use of the affected hand during daily activities.

Following seven consecutive days of nursing intervention, both participants demonstrated improvement in pain-related outcomes. Mrs. W showed a reduction in pain intensity from 6 to 3, while Mrs. M decreased from 4 to 3. Both participants reported reduced pain, appeared more relaxed, and were able to perform light activities more comfortably. Based on the nursing evaluation, the acute pain problem was partially resolved in both participants because pain

intensity had decreased but remained at an NRS score of 3. Both participants were advised to continue the warm lemongrass and ginger compress independently when pain occurred, maintain a low-purine diet, avoid activities that could aggravate pain, and undergo routine health monitoring.

Pain assessment was conducted through pain observation using the NRS scale, as described below.

Table 1. *Observation of Pain Intensity Using the NRS Scale*

Day	Mrs W		Mrs M	
	Pre	**Post**	**Pre**	**Post**
1	6	5	4	4
2	5	4	4	4
3	5	4	4	3
4	4	4	3	3
5	5	4	3	3
6	4	3	3	3
7	3	3	3	3

The results demonstrated a gradual reduction in pain intensity in both participants. In Mrs. W, the pain score decreased from 6 before the first intervention to 3 by the seventh day. On the fifth day, the pre-intervention pain score increased to 5, which was reported in the case study to be associated with excessive physical activity. Following continued intervention and education regarding activity restriction, the pain score decreased again on the sixth and seventh days.

In Mrs. M, the initial pain score was 4 and remained unchanged after the intervention on the first two days. A reduction was observed beginning on the third day, from 4 to 3, and the score remained at 3 through the seventh day. The case study reported that the slower reduction was associated with continued use of the affected hand for gripping and lifting objects during daily activities.

At the end of the seven-day intervention period, both participants had a pain score of 3. Mrs. W experienced a reduction of 3 points from baseline, while Mrs. M experienced a reduction of 1 point. Both participants also reported reduced pain and greater comfort during light activities.

3.4 Discussion

The findings of this case study showed a gradual reduction in pain intensity following the application of warm lemongrass and ginger compresses for seven consecutive days. Mrs. W experienced a reduction in pain intensity from 6 to 3, while Mrs. M experienced a reduction from 4 to 3. In addition to the reduction in Numeric Rating Scale (NRS) scores, both participants reported improved comfort and less pain during daily activities. These findings indicate that the intervention was accompanied by improvement in pain-related complaints in both participants.

The reduction in pain observed in Mrs. W was more pronounced than in Mrs. M. Mrs. W initially reported moderate-to-severe pain with an NRS score of 6, which gradually decreased to 3 by the seventh day. However, an increase in pre-intervention pain intensity to 5 was observed on the fifth day. According to the case study observations, this increase was associated with excessive physical activity that aggravated the painful area. Following education regarding activity restriction and continuation of the intervention, the pain intensity decreased again on the sixth and seventh days. This finding highlights the importance of activity management as part of nursing care for patients with gout arthritis.

In Mrs. M, the reduction in pain occurred more slowly. The initial NRS score was 4 and remained unchanged during the first two days. A reduction to 3 was observed beginning on the third day and remained stable until the seventh day. The case study reported that Mrs. M continued to use the affected hand for gripping and lifting objects, which may have contributed to continued mechanical stress on the painful area. Therefore, differences in activity patterns and pain location may have contributed to the different patterns of pain reduction between the two participants.

The observed findings are consistent with previous studies included in the original case study. Sowwam et al. (2022) reported the use of ginger compresses as a non-pharmacological intervention for reducing pain associated with elevated uric acid in older adults (16). Toto and Nababan (2023) also reported reductions in pain following the application of non-pharmacological therapy involving ginger and lemongrass compresses in older adults with gout arthritis (12). In addition, Rosima et al. (2025) reported the application of warm lemongrass-water compresses for joint pain associated with gout (11). These findings provide supporting evidence for the use of warm herbal compresses as a complementary approach in pain management.

The possible contribution of the intervention can be explained by both the thermal effect of the warm compress and the properties of the herbal ingredients. The warm temperature may promote local vasodilation and improve circulation, while also providing a relaxing effect to the affected area. The original case study describes ginger as containing active compounds such as gingerol and shogaol, while lemongrass contains citral. These compounds are discussed as having anti-inflammatory and analgesic properties that may support reduction of pain and discomfort.

The results also demonstrate that the response to complementary therapy may differ between individuals. Differences in age, pain location, baseline pain intensity, uric acid level, physical activity, and individual response were identified in the case study as factors that may influence the pattern of pain reduction. Mrs. W had an initial uric acid level of 9 mg/dL, whereas Mrs. M had a level of 7.1 mg/dL. Their painful areas also differed, with Mrs. W experiencing pain in the toes/left sole and Mrs. M experiencing pain in the fingers of the right hand. These differences should be considered when interpreting the observed changes.

From a nursing perspective, the intervention may be considered a complementary measure within pain management rather than a replacement for medical treatment. The application of warm lemongrass and ginger compresses was accompanied by improved comfort and reduced NRS scores in both cases. However, both participants still had an NRS score of 3 at the end of the seventh day, indicating that the pain had not completely disappeared. Therefore, continued nursing management, appropriate activity modification, dietary management, routine health monitoring, and adherence to prescribed treatment remain important.

Overall, this case study suggests that warm lemongrass and ginger compresses may be incorporated as a complementary nursing intervention to support pain management in patients with gout arthritis. Nevertheless, because this study involved only two participants and used a descriptive case-study design, the findings should be interpreted as observations from these cases rather than evidence of treatment effectiveness that can be generalized to all patients with gout arthritis.

4. CONCLUSIONS

The application of warm lemongrass and ginger compresses for 15–20 minutes daily over seven consecutive days was accompanied by a reduction in pain intensity in both patients with gout arthritis. Mrs. W experienced a decrease in pain intensity from an NRS score of 6 to 3, while Mrs. M experienced a decrease from 4 to 3. Both participants also reported improved comfort and reduced pain during daily activities.The different patterns of pain reduction indicate that individual characteristics, pain location, physical activity, baseline pain intensity, and individual responses may influence the outcome of complementary pain management. The intervention may therefore be considered as a complementary nursing intervention to support pain management in patients with gout arthritis. However, because this study involved only two participants and used a descriptive case-study design, the findings cannot be generalized to the wider population. Further studies involving larger samples and more rigorous research designs are needed to evaluate the effects of warm lemongrass and ginger compresses on pain intensity in patients with gout arthritis.

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PHYSICAL ACTIVITY AND BLOOD PRESSURE AMONG ADULTS WITH HYPERTENSION AT KERUAK PRIMARY HEALTH CARE CENTER

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Abstract

Hypertension remains a major cardiovascular risk, and regular physical activity is widely recommended as part of non-pharmacological management. This study examined the association between physical activity level and blood pressure category among adults with hypertension at Keruak Primary Health Care Center, Indonesia. An analytical cross-sectional design was used with 97 respondents. Physical activity was classified as low, moderate, or high, while blood pressure was grouped into grades I, II, and III. Descriptive statistics summarized respondent characteristics, physical activity, and blood pressure. Spearman rank correlation tested the association between both ordinal variables. Most respondents were women (87.6%), aged 18-59 years (63.9%), educated to primary-school level (52.6%), and employed as laborers (38.1%). Low physical activity predominated (58.8%), followed by moderate (32.0%) and high activity (9.3%). Most respondents had grade I hypertension (83.5%); grades II and III each accounted for 8.2%. Physical activity and blood pressure were not significantly correlated ($r=0.028$; $p=0.789$; $n=97$). The correlation was positive but negligible. In this sample, physical activity level alone did not explain variation in blood pressure category. Hypertension care should therefore retain physical-activity counseling while simultaneously assessing medication adherence, dietary sodium, body composition, stress, sleep, comorbidities, and measurement quality. Longitudinal studies using objective activity measures and repeated blood-pressure assessment are recommended.

Keywords: Blood Pressure, Hypertension, Physical Activity

1. INTRODUCTION

Hypertension is one of the most important modifiable causes of cardiovascular disease, stroke, chronic kidney disease, and premature mortality. Its burden is especially pronounced in low- and middle-income countries, where detection, treatment, and control remain uneven [1,2]. Because hypertension is often asymptomatic, primary health care has a central role in screening, sustained treatment, counseling, and monitoring.

Physical inactivity is a recognized behavioral risk factor for cardiovascular disease and hypertension. The World Health Organization recommends that adults undertake 150-300 minutes of moderate-intensity aerobic activity or 75-150 minutes of vigorous-intensity activity per week, alongside muscle-strengthening activities [3,4]. Regular movement can influence vascular resistance, autonomic balance, endothelial function, body weight, insulin sensitivity, and inflammatory pathways. Exercise-based interventions, including walking, have generally demonstrated modest reductions in systolic and diastolic blood pressure, although effects vary across populations and intervention characteristics [5,6].

The relationship observed in routine clinical populations may be less direct than that reported in controlled interventions. Blood pressure at a single visit reflects multiple interacting determinants,

including age, medication use and adherence, sodium intake, obesity, smoking, sleep, psychosocial stress, comorbidity, time of measurement, and device or observer variation. Self-reported activity categories may also fail to capture intensity, duration, domain, and recent changes in behavior. Consequently, local evidence is needed to determine whether activity level differentiates blood pressure severity among patients already living with hypertension.

This study aimed to analyze the association between physical activity level and blood pressure category among 97 adults with hypertension receiving care at Keruak Primary Health Care Center. The findings were expected to inform contextualized nursing assessment and lifestyle counseling in primary care.

2. METHODOLOGY

2.1 Study design and setting

This analytical observational study uses a cross-sectional design. Data were collected at UPTD Puskesmas Keruak, East Lombok, West Nusa Tenggara, Indonesia, over 2 months. This design assesses physical activity and blood pressure during the same study period and therefore supports associations, not cause-and-effect.

2.2 Population and sample

The target population comprised adults diagnosed with hypertension who accessed services at the study site. A total of 97 respondents were included using non-probability sampling using purposive sampling method. Inclusion criteria were Inclusion Criteria: Willing to be a respondent, cooperative in the research process, and not having any mental disabilities, exclusion criteria: patients with severe complications, experiencing a decrease in consciousness.

2.3 Variables and measurements

Instrument used for the independent variable in this study is physical activity, while the dependent variable is the blood pressure of hypertension patients. Physical activity is measured using the Baecke Physical Activity Questionnaire (BPAQ), which categorizes physical activity into low, moderate, and high levels. Blood pressure category was the dependent variable and was classified as grade I, grade II, or grade III.

2.4 Data analysis

Frequencies and percentages described respondent characteristics, physical activity, and blood pressure category. The association between physical activity and blood pressure was examined using Spearman rank correlation because both variables were ordinal. Statistical significance was set at $p<0.05$. The analysis included all 97 respondents.

3. RESULTS

3.1 Respondent characteristics

Table 1. Distribution of respondent characteristics (n=97)

Characteristic	Category	n	%
Sex	Male	12	12.4
	Female	85	87.6
Age	18-59 years	62	63.9
	>=60 years	35	36.1
Education	No formal education	21	21.6
	Primary school	51	52.6
	Junior high school	17	17.5
	Senior high/vocational school	6	6.2
	Higher education	2	2.1
Occupation	Farmer	7	7.2
	Fisher	14	14.4
	Laborer	37	38.1
	Trader	21	21.6
	Civil servant	16	16.5
	Homemaker	2	2.1

Most respondents were women (87.6%) and aged 18-59 years (63.9%). More than half had completed primary school (52.6%), while only 2.1% had higher education. Laborers represented the largest occupational group (38.1%).

3.2 Physical activity level

Table 2. Distribution of physical activity levels (n=97)

Physical activity	n	%
Low	57	58.8
Moderate	31	32.0
High	9	9.3
Total	97	100.0

Low physical activity was the dominant category (58.8%). Only nine respondents (9.3%) were classified as having high physical activity, indicating that limited activity was common among hypertensive patients at the study site.

3.3 Blood pressure category

Table 3. Distribution of blood pressure categories (n=97)

Blood pressure category	n	%
Grade I hypertension	81	83.5
Grade II hypertension	8	8.2
Grade III hypertension	8	8.2
Total	97	100.0

Grade I hypertension accounted for 83.5% of respondents. Grade II and grade III hypertension were each observed in eight respondents (8.2%).

3.4 Association between physical activity and blood pressure

Table 4. Spearman rank correlation between physical activity and blood pressure (n=97)

Variables	Spearman r	p-value	Interpretation
Physical activity and blood pressure	0.028	0.789	Not significant

Spearman analysis showed a negligible positive correlation between physical activity and blood pressure category (r=0.028). The association was not statistically significant (p=0.789), indicating that the ordinal activity category did not meaningfully covary with hypertension grade in this sample.

4. DISCUSSION

The principal finding was the absence of a statistically significant association between physical activity level and blood pressure category. The correlation coefficient was close to zero, suggesting that respondents with higher activity categories were not consistently distributed across lower or higher hypertension grades. This result should not be interpreted as evidence that physical activity is clinically unimportant. Rather, it shows that the activity measure used in this cross-sectional sample did not explain concurrent blood-pressure severity.

The finding differs from intervention evidence showing that structured aerobic exercise and walking can reduce blood pressure [5,6]. This apparent difference is methodologically plausible. Intervention studies estimate change after a prescribed dose of activity, whereas the present study compared naturally occurring activity categories and a concurrent blood-pressure classification. A person with more severe hypertension may have recently increased activity following clinical advice, while medication and dietary changes may independently lower pressure. Such reverse causation and co-intervention cannot be separated in a cross-sectional design.

Measurement is another likely explanation. Broad categories of low, moderate, and high activity compress information about frequency, duration, intensity, occupational activity, transport, household work, and sedentary time. Self-report can introduce recall and social-desirability bias. Blood pressure also varies within individuals and is affected by recent exertion, caffeine, tobacco, stress, pain, bladder fullness, posture, cuff size, rest period, and medication timing. Current hypertension guidelines emphasize standardized and repeated measurement, and recommend out-of-office confirmation when feasible [7,8]. Misclassification in either variable would weaken an observable correlation.

The sample profile is relevant to nursing practice. Most respondents were women, had primary-school education, and reported low physical activity. Education should therefore use plain language, demonstrations, goal setting, and teach-back. Advice should be individualized to clinical status, functional ability, occupational workload, cultural context, and personal preference. Walking,

progressive aerobic activity, muscle strengthening, and reduction of sedentary time can remain part of care because these behaviors provide broad cardiovascular and functional benefits even when a cross-sectional correlation with hypertension grade is absent [3-6].

Blood-pressure control is multifactorial. Future analyses should model age, sex, body mass index or waist circumference, dietary sodium, antihypertensive medication class and adherence, smoking, alcohol use, diabetes, kidney disease, sleep, and stress. A longitudinal design with repeated standardized blood-pressure measurements and an objective activity monitor would clarify temporal and dose-response relationships. Reporting continuous systolic and diastolic values, rather than only grades, would also preserve statistical information and improve sensitivity.

4.1 Strengths and limitations

This study provides local evidence from a primary-care population and includes the full reported sample of 97 respondents. Its limitations include the cross-sectional design, the use of ordinal categories, the absence of adjusted analysis in the supplied results, and likely residual confounding. Details of sampling, activity measurement, blood-pressure protocol, medication exposure, and comorbidities must be reported to permit appraisal and replication. Generalization should be limited to populations with similar characteristics and care contexts.

5. CONCLUSIONS

Among 97 adults with hypertension at Keruak Primary Health Care Center, low physical activity was common and grade I hypertension predominated. Physical activity level was not significantly associated with blood pressure category (Spearman r=0.028; p=0.789). Primary-care nurses should continue evidence-based physical-activity counseling as one component of comprehensive hypertension management, while assessing medication adherence, diet, body composition, sleep, stress, and comorbidities. Longitudinal research using validated or objective activity measures, repeated standardized blood-pressure readings, and multivariable analysis is warranted.

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SOCIAL CONSTRUCTION OF DENTAL HEALTH AND ITS IMPLICATIONS FOR HEALTH PROMOTION STRATEGIES IN MAKASSAR CITY

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Abstract

Objective: This study analyzes the social construction of dental health among communities in Makassar City and examines its implications for health promotion strategies. Methodology: A qualitative approach with a social phenomenological perspective was applied. Data were collected through in-depth interviews, observations, and document analysis related to dental health behavior and promotion activities. Findings: Dental health perceptions were constructed through family practices, cultural values, economic considerations, accessibility of health services, and previous experiences. Many communities still interpret dental health from a curative perspective, where dental services are accessed mainly after pain occurs. Practical and social implications: Health promotion strategies need to shift from information-based approaches toward empowerment-based interventions involving families, communities, schools, and digital communication platforms. Originality: This study emphasizes dental health as a socially constructed phenomenon and proposes a contextual promotion framework for urban communities.

Keywords : Community health; Dental health; Health promotion; Social construction; Urban society

1. INTRODUCTION

Dental and oral health represents an important component of public health because it affects nutritional intake, communication ability, psychological confidence, and overall quality of life. Despite improvements in health services, dental problems remain prevalent because preventive behaviors have not become a strong social habit in many communities.

Dental health behavior is frequently interpreted as an individual responsibility; however, this perspective does not fully explain why communities demonstrate different levels of awareness and practices. Social factors such as family education, cultural values, economic conditions, and community experiences influence how people define illness, prevention, and treatment.

The theory of social construction of reality explains that human understanding of health develops through continuous interaction between individuals and their social environment. Within this perspective, dental health is not only a biological condition but also a reality that is interpreted, shared, and maintained through social processes.

Makassar City provides an important context for examining this issue because it represents an urban environment with diverse cultural backgrounds, socioeconomic characteristics, and patterns of access to health services. Some residents have adopted preventive dental practices, while others continue to seek dental care only when experiencing severe discomfort.

Previous health promotion programs have often focused on transferring biomedical knowledge. However, changes in knowledge do not always produce changes in behavior because health practices are embedded within social meanings and daily routines. Therefore, understanding social construction becomes essential for designing more effective dental health promotion strategies.

This study aims to analyze how communities in Makassar City construct meanings related to dental health and how these constructions influence the development of appropriate health promotion strategies.

2. METHODS

This study employed a qualitative research design using a social phenomenological approach. The approach was selected because the research focused on understanding individual experiences, perceptions, and meanings related to dental health behavior.

The research context was Makassar City, Indonesia. Participants were selected purposively based on their relevance to the research objectives. Informants included community members, parents, and dental health workers involved in oral health services and promotion activities.

Data collection was conducted through three methods. First, in-depth interviews were performed to explore community perceptions regarding dental health, dental treatment, and preventive practices. Second, observations were conducted to identify patterns of health behavior in community settings. Third, document analysis was conducted to examine existing dental health promotion activities.

Data analysis followed an interactive qualitative analysis process consisting of data reduction, data organization, interpretation, and conclusion development. The credibility of findings was strengthened through triangulation of sources and data collection methods.

Ethical considerations were maintained by ensuring voluntary participation, confidentiality, and appropriate use of participant information.

3. RESULTS AND DISCUSSION

The findings indicate that dental health in Makassar City is constructed through several interconnected social dimensions.

Social Meaning of Dental Health

The community commonly defines dental health based on the absence of pain or visible dental problems. This perception creates a dominant curative orientation. Dental care is often considered necessary when symptoms become disruptive rather than as a routine preventive activity.

Family and Social Learning

Family environment plays a significant role in forming dental health practices. Children commonly learn brushing habits, food preferences, and attitudes toward dental visits from parents. Therefore, family-based interventions are essential because behavioral patterns are socially transmitted across generations.

Cultural and Community Influences

Cultural values influence how individuals interpret health problems and decide when to seek professional assistance. Community discussions, personal experiences, and informal knowledge networks contribute to shaping dental health perceptions.

Economic and Service Accessibility Factors

Some participants associate dental treatment with high costs and complicated procedures. These perceptions may delay preventive examinations. Accessibility, affordability, and previous experiences with dental services influence willingness to seek professional care.

Implications for Health Promotion Strategies

The results demonstrate that dental health promotion should not only provide information but also address social meanings behind health behavior. A more effective strategy includes:

1. Family empowerment programs that strengthen preventive habits from early childhood.
2. Community-based dental education involving local leaders and organizations.
3. Culturally appropriate communication that reflects community values.
4. Digital health promotion using accessible social media platforms.

These strategies recognize communities as active participants rather than passive recipients of health messages.

4. CONCLUSIONS

Dental health behavior in Makassar City is shaped by social construction processes involving family influence, cultural interpretation, economic perception, and personal experience. The community's understanding of dental health remains largely influenced by curative perspectives.

Health promotion strategies should therefore move beyond conventional information delivery. Effective interventions require community participation, family empowerment, culturally sensitive communication, and continuous engagement through both direct and digital approaches.

This study highlights that improving dental health requires attention not only to medical treatment but also to the social environment where health meanings are created and maintained.

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IMPLEMENTATION OF BENSON RELAXATION THERAPY FOR ACUTE PAIN MANAGEMENT IN MR. A FOLLOWING SURGERY FOR A LEFT FOOT FRACTURE AT DR. H. KOESNADI REGIONAL GENERAL HOSPITAL, BONDOWOSO, 2026

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Abstract

Fracture of the left foot (pedis sinistra) may cause acute pain following surgical intervention. Comprehensive pain management includes pharmacological and non-pharmacological therapies. Benson relaxation therapy is a non-pharmacological technique that may promote relaxation and improve patient comfort. This case study aimed to describe the implementation of Benson relaxation therapy in a postoperative patient with a left foot fracture and acute pain in the Dahlia Ward of dr. H. Koesnadi Regional General Hospital, Bondowoso. A case study design was employed using a nursing care approach consisting of assessment, nursing diagnosis, intervention, implementation, and evaluation. The subject was Mr. A, a 51-year-old male diagnosed with a left foot fracture and acute pain. Benson relaxation therapy was implemented over three consecutive days. The initial assessment showed severe pain with a score of 8, described as stabbing and intermittent, localized to the left foot surgical wound. Following the intervention, pain intensity decreased progressively, from 8 to 7 on the first day, from 6 to 5 on the second day, and from 3 to 2 on the third day. The patient also demonstrated reduced facial grimacing and was able to perform Benson relaxation independently. The intervention was associated with reduced pain intensity and improved postoperative comfort. However, these changes cannot be attributed solely to Benson relaxation therapy because the patient also received analgesics and underwent postoperative recovery. Benson relaxation therapy may be considered a complementary intervention for postoperative pain management.

Keywords: Left Foot Fracture, Acute Pain, Benson Relaxation Therapy, Postoperative Care, Nursing Care.

1. INTRODUCTION

Fracture is a condition characterized by disruption of bone continuity that may occur due to trauma, accidents, impact, or pathological factors (Nur Hidayat et al., 2022). Fractures not only cause disruption to the bone structure but may also result in damage to surrounding tissues, such as muscles, nerves, blood vessels, and soft tissues. One of the problems commonly experienced by patients with fractures, particularly after undergoing surgery, is acute pain (Aska, 2021). Inadequately managed pain may cause physiological responses, including increased respiratory rate, heart rate, blood pressure, and stress hormone production (Zhao et al., 2022). In addition, pain may interfere with the healing process, disrupt patients' activities and rest, and reduce quality of life (Ngurah et al., 2023).

Fractures remain a health problem that requires serious attention. According to the World Health Organization (WHO) report in 2022, the global number of fracture cases reached 440 million (World Health Organization, 2022). Based on data from Indonesia, the Ministry of Health in 2023 reported that accidents resulted in approximately 137 million injury cases, with approximately 8 million of these

involving fractures (Kementerian Kesehatan Republik Indonesia, 2024). At the healthcare service level, data from dr. H. Koesnadi Regional General Hospital, Bondowoso, in 2025 showed that 281 postoperative fracture patients were treated in the Dahlia Ward (Data Primer RSUD dr. H Koesnadi Bondowoso, 2025). These data indicate that fractures and their associated problems, particularly postoperative pain, remain issues that require attention in the provision of nursing care.

Acute pain in postoperative fracture patients may occur due to tissue damage, inflammatory processes, surgical procedures, and the body's response to trauma. This condition may be characterized by pain complaints, facial grimacing, protective behavior, restlessness, increased pulse rate, and sleep disturbances (Nur Hidayat et al., 2022). If pain is not optimally managed, patients may experience prolonged discomfort, and the recovery process may be disrupted (Niedermeier & Crouser, 2021). Therefore, comprehensive pain management is required through both pharmacological and non-pharmacological approaches.

One non-pharmacological intervention that can be applied in pain management is Benson relaxation therapy (Kusumaratni et al., 2025). Benson relaxation therapy is a relaxation technique that combines deep breathing with an individual's beliefs or spirituality through the repetition of words or phrases that provide a sense of calm (Aminatun Indah Kumalasari, Mulyaningsih, 2026). This technique aims to help patients achieve a state of physical and psychological relaxation, thereby reducing muscle tension, stress, anxiety, and responses to pain. Benson relaxation therapy has the advantages of being simple, easy to perform, relatively inexpensive, and applicable independently by patients (Sari et al., 2025).

Several previous studies have shown that Benson relaxation therapy can help reduce pain intensity in postoperative fracture patients. Rohmadhoni and Jamaluddin (2026) demonstrated a reduction in pain scores among postoperative fracture patients after Benson relaxation therapy was administered for two days, with a duration of 15 minutes per session (Rohmadhoni & Jamaluddin, 2026). Sugiantari et al. (2026) also reported a reduction in pain scores among patients following fracture surgery after the implementation of Benson relaxation therapy (Sugiantari et al., 2026). Sari et al. (2025) further demonstrated that Benson relaxation therapy could have a positive effect on reducing pain intensity and improving patients' comfort and calmness (Sari et al., 2025).

One of the nursing interventions in the management of fracture-related pain is the provision of non-pharmacological techniques. These techniques may be performed independently by nurses or combined with pharmacological therapy (Hardila & Sari, 2026). According to the Indonesian Nursing Intervention Standards (SIKI), one of the therapeutic interventions in pain management is the provision of non-pharmacological techniques to help reduce pain (Tim Pokja SLKI DPP PPNI, 2018). Meanwhile, the success of the intervention can be evaluated through changes in pain intensity, pain complaints, facial grimacing, protective behavior, and the patient's ability to rest according to the established nursing outcomes.

Although several studies have demonstrated the benefits of Benson relaxation therapy in reducing pain, the implementation of this therapy in postoperative patients with left foot fractures and acute pain as a nursing problem needs to be examined directly within the context of nursing care. A case study approach provides a more detailed description of the assessment process, identification of nursing problems, implementation of Benson relaxation therapy, and evaluation of changes in the patient's pain response during the intervention (Sulistyawati & Hilfida, 2025). Based on this background, Benson relaxation therapy has the potential to serve as a complementary non-pharmacological intervention in pain management for postoperative fracture patients. Therefore, this case study aimed to describe the implementation of Benson relaxation therapy in a postoperative patient with a left foot fracture and acute pain in the Dahlia Ward of dr. H. Koesnadi Regional General Hospital, Bondowoso. Specifically, this study described the patient's pain condition before and after Benson relaxation therapy and evaluated the patient's response to the intervention.

2. METHODOLOGY

This study employed a case study design using a nursing care approach to explore the implementation of Benson relaxation therapy in a postoperative patient with a left foot fracture and the

nursing problem of acute pain. The study was conducted in the Dahlia Ward of dr. H. Koesnadi Regional General Hospital, Bondowoso, from April 15 to 17, 2026.

The study participant was one postoperative patient with a left foot fracture and the nursing problem of acute pain. The inclusion criteria were male or female patients aged 15–60 years who had recently undergone surgery for a foot fracture, had no complications, and were willing to participate in the study. Patients with impaired consciousness or those who declined to participate were excluded from the study. The intervention consisted of Benson relaxation therapy administered for three consecutive days, twice daily, with each session lasting 10–15 minutes according to the standard operating procedure. The patient was positioned comfortably and guided to close their eyes, relax their muscles, perform slow and regular breathing, and repeat words or phrases according to their personal beliefs.

Data were collected through interviews, observation, physical examination, and documentation review. Pain intensity was measured using the Numeric Rating Scale (NRS) before and after each therapy session. Evaluation also included the patient's verbal and non-verbal responses, including facial grimacing, protective behavior, comfort, and ability to rest. Data were analyzed descriptively by comparing the patient's condition before and after the intervention. Subjective and objective data were presented narratively and in tables and subsequently interpreted based on relevant theories and previous research. Ethical principles were applied throughout the study, with ethical clearance No. 358/KEPK/UDS/IV/2026.

3. RESULTS

This study was a case study using a nursing care approach involving one postoperative patient with a left foot fracture who was treated in the Dahlia Ward of dr. H. Koesnadi Regional General Hospital, Bondowoso. The results of the case study are presented according to the stages of the nursing process, including nursing assessment, nursing diagnosis, nursing intervention, nursing implementation, and nursing evaluation.

3.1 Nursing Assessment

The assessment showed that Mr. A was 51 years old and had undergone surgery for a left foot fracture. The patient sustained an injury to the left foot following an accident while repairing a grinding machine and subsequently underwent surgery. During the initial postoperative assessment, the patient reported pain at the surgical wound on the dorsum of the left foot, with a pain intensity of 8 based on the Numeric Rating Scale (NRS). The patient described the pain as stabbing and reported that it worsened when the foot was moved. The patient also reported difficulty sleeping and discomfort due to the pain.

Physical examination showed that the patient appeared to be grimacing, demonstrated protective behavior around the surgical wound, and had limited movement of the left extremity. These findings indicated subjective and objective responses associated with postoperative pain.

3.2 Nursing Diagnosis

Based on the subjective and objective assessment findings, the nursing diagnosis established for Mr. A was acute pain related to a physical injuring agent, namely the surgical procedure. The diagnosis was supported by subjective findings, including pain at the surgical wound with an intensity of 8, stabbing pain, increased pain during movement, difficulty sleeping, and discomfort. Supporting objective findings included facial grimacing, protective behavior around the wound, and limited movement.

3.3 Nursing Intervention

The interventions included monitoring pain intensity and characteristics, monitoring the patient's response to pain, providing a non-pharmacological intervention in the form of Benson relaxation therapy, educating the patient about relaxation techniques, and collaborating in the administration of analgesic therapy according to the medical treatment plan.

Benson relaxation therapy was selected as a non-pharmacological intervention to help the patient achieve a state of relaxation and manage the response to pain. The therapy was administered for three consecutive days, twice daily, with each session lasting approximately 10–15 minutes.

3.4 Nursing Implementation

Benson relaxation therapy was implemented for three consecutive days, with two sessions conducted each day. Before each therapy session, the patient's pain intensity was assessed using the NRS. Following each session, pain intensity was reassessed using the same instrument. Changes in pain intensity before and after Benson relaxation therapy are presented in Table 1.

Table 1. Changes in Pain Intensity Before and After Benson Relaxation Therapy

Day	Session	Before Therapy	After Therapy
Day 1	Session 1	8	7
Day 1	Session 2	6	5
Day 2	Session 1	5	4
Day 2	Session 2	4	3
Day 3	Session 1	3	2
Day 3	Session 2	2	2

Based on Table 1, on the first day, pain intensity decreased from 8 to 7 during the first session. During the second session, pain intensity decreased from 6 to 5. On the second day, pain intensity decreased from 5 to 4 during the first session and from 4 to 3 during the second session. On the third day, pain intensity decreased from 3 to 2 during the first session, whereas pain intensity remained at 2 during the second session.

Throughout the implementation, the patient was able to follow the instructions for Benson relaxation therapy appropriately. The patient appeared more relaxed after the therapy and reported feeling more comfortable. Non-verbal responses, including facial grimacing and protective behavior around the surgical wound, also gradually decreased during the intervention.

3.5 Nursing Evaluation

The evaluation showed a gradual decrease in pain intensity over the three-day intervention period. The initial pain intensity of 8 decreased to 2 by the end of the intervention.

In addition to the reduction in pain intensity, the patient demonstrated improved comfort. The patient appeared more relaxed, facial grimacing decreased, protective behavior around the surgical wound was reduced, and the patient was able to perform light activities more comfortably.

At the end of the third day, the patient continued to report pain at an intensity of 2; however, the pain was mild and more controlled compared with the initial condition. Based on the evaluation, the nursing problem of acute pain showed improvement following three days of nursing care, with Benson relaxation therapy applied as one of the non-pharmacological interventions.

Overall, the case study findings showed that during three days of nursing care, pain intensity decreased from 8 at the initial assessment to 2 at the end of the intervention, accompanied by improved comfort and the patient's ability to control pain.

4. DISCUSSION

The nursing care provided to Mr. A, who was medically diagnosed with a postoperative left foot fracture and had the nursing problem of acute pain, was carried out through the stages of assessment, nursing diagnosis, planning, implementation, and evaluation. The discussion in this case study focuses on the implementation of Benson relaxation therapy as one of the non-pharmacological interventions for pain management in a postoperative patient with a left foot

fracture. Benson relaxation therapy was provided as a complementary intervention alongside other pain management measures, including monitoring pain characteristics, facilitating rest and sleep, providing education, and collaborating in analgesic administration.

The initial assessment was conducted on April 15, 2026, at 2:30 p.m. Western Indonesian Time (WIB), shortly after the patient underwent surgery at 12:00 p.m. At the time of assessment, Mr. A reported pain at the surgical wound on the dorsum of the left foot. The pain was described as stabbing, intermittent, and rated 8 on the pain scale. Objectively, the patient appeared to grimace and experienced limitations in performing activities due to pain. These findings indicated an acute pain response associated with tissue injury caused by the surgical procedure. The assessment findings were consistent with the characteristics of acute pain, which may include pain complaints and non-verbal responses such as facial grimacing and protective behavior.

Based on the assessment findings, the nursing diagnosis established was acute pain related to a physical injuring agent, namely the surgical procedure. This diagnosis was supported by subjective complaints of severe pain, stabbing pain characteristics, pain localized to the surgical wound, and objective findings of facial grimacing. The diagnosis was also consistent with the patient's postoperative condition because surgical procedures cause tissue injury that may stimulate nociceptive responses and produce pain (Muzaki, 2023). Nursing planning focused on pain management, with the goal of reducing pain intensity and improving the patient's response to pain (Tim Pokja SLKI DPP PPNI, 2018). The interventions included identifying the location, characteristics, duration, frequency, quality, and intensity of pain; assessing pain intensity using a pain scale; providing Benson relaxation therapy; facilitating rest and sleep; educating the patient regarding the causes and duration of pain; teaching Benson relaxation techniques for independent use; and collaborating in analgesic administration (Tim Pokja SLKI DPP PPNI, 2018). The selection of Benson relaxation therapy was consistent with pain management interventions that incorporate non-pharmacological techniques to help reduce pain perception and improve patient comfort (Sugiantari et al., 2026).

Benson relaxation therapy is a relaxation technique that combines breathing regulation, focused attention, and the use of words or phrases that have personal meaning to the individual (Aminatun Indah Kumalasari, Mulyaningsih, 2026). In patients experiencing pain, relaxation may help reduce physical tension and promote a calmer state, allowing patients to better manage their responses to pain (Sari et al., 2025). In Mr. A's case, Benson relaxation therapy was not used as a substitute for analgesic therapy but as a non-pharmacological intervention complementary to pain management. This approach is important because postoperative pain management is generally multimodal, involving a combination of pharmacological and non-pharmacological interventions.

The first implementation was conducted on April 15, 2026, from 2:40 to 3:08 p.m. At the beginning of the session, the patient reported pain at the surgical wound on the dorsum of the left foot, described as stabbing and intermittent, with a pain intensity of 8. The patient was provided with an explanation of the purpose of the therapy, pain characteristics were assessed, Benson relaxation therapy was administered, rest was facilitated, information regarding the causes and duration of pain was provided, and the Benson relaxation technique was taught. The patient was cooperative and willing to participate in the intervention. At the same time, collaboration was carried out for the administration of ketorolac 30 mg.

The evaluation conducted on April 15, 2026, at 8:45 p.m. showed that pain intensity decreased from 8 to 7. The patient continued to report stabbing and intermittent pain, and facial grimacing was still observed. Vital signs remained stable, with blood pressure of 120/80 mmHg, pulse rate of 95 beats/minute, body temperature of 36°C, and respiratory rate of 20 breaths/minute. Based on the evaluation, the acute pain problem was considered unresolved, and the intervention was continued. A one-point reduction in pain intensity indicated an initial change following pain management, although the pain remained severe and non-verbal responses were still present.

On April 16, 2026, from 8:00 to 8:40 a.m., a subsequent intervention was implemented. The patient reported that pain at the surgical wound remained stabbing and intermittent, with a pain intensity of 6. At this stage, the patient was willing to participate in Benson relaxation therapy and was able to perform the technique with guidance. The patient also reported sleeping normally

without awakening during the night. In addition to Benson relaxation therapy, ketorolac 30 mg was administered in collaboration with the medical team.

The evaluation on April 16, 2026, at 2:00 p.m. showed a decrease in pain intensity from 6 to 5. The patient reported that pain was still present at the surgical wound but had decreased and was less severe than previously. Objectively, the patient was observed to grimace less frequently. Vital signs were blood pressure 120/80 mmHg, pulse rate 89 beats/minute, body temperature 36°C, and respiratory rate 20 breaths/minute. The problem was considered partially resolved, and the intervention was continued. These findings indicated an improvement in the patient's response to pain, demonstrated not only by the reduction in pain intensity but also by decreased facial grimacing and improved rest.

The subsequent implementation was conducted on April 17, 2026, from 8:00 to 8:45 a.m. At the beginning of the intervention, the patient reported that pain was still present at the surgical wound on the dorsum of the left foot but was no longer as sharp as previously. The pain was milder and intermittent, with an intensity of 3. The patient was able to perform the Benson relaxation technique independently. This finding indicated an improvement in the patient's ability to use a non-pharmacological technique to manage pain. At this stage, the patient continued to receive ketorolac 30 mg in collaboration with the medical team.

The final evaluation was conducted on April 17, 2026, at 2:00 p.m. The patient reported that pain at the surgical wound had substantially decreased. The pain, which had previously been described as stabbing, had become much milder and less sharp. Pain intensity decreased from 3 to 2, and the patient reported that pain occurred only occasionally and was less frequent. The patient also stated that his condition had improved and that he felt ready to return home. Objectively, no facial grimacing was observed. The pain score was 2, with vital signs of blood pressure 120/70 mmHg, pulse rate 85 beats/minute, body temperature 36°C, and respiratory rate 20 breaths/minute.

Overall, there was a downward trend in pain intensity throughout the implementation period, from 8 on April 15, 2026, to 7 at the first evaluation, from 6 to 5 on April 16, 2026, and from 3 to 2 on April 17, 2026. This change was accompanied by improvement in the patient's non-verbal responses, from observable facial grimacing during the first evaluation to less frequent grimacing during the second evaluation and no facial grimacing during the final evaluation.

The reduction in pain suggests that the implementation of Benson relaxation therapy as part of pain management was associated with a positive response in Mr. A. Benson relaxation therapy allows patients to practice relaxation, regulate breathing, and focus their attention, which may help them remain calmer when experiencing pain. This was reflected in the patient's progression from initially requiring guidance to independently performing the Benson relaxation technique by April 17, 2026. In addition to the reduction in pain intensity, the ability to perform the technique independently represents an important outcome because it may support patients in managing pain through non-pharmacological means.

The findings of this case study are consistent with several previous studies cited in the original nursing report. Azka (2021) reported a reduction in pain intensity following Benson relaxation therapy (Aska, 2021). Similar findings were reported in studies demonstrating decreased pain intensity among patients following Benson relaxation techniques (Sumiati et al., 2021; Aminatun Indah Kumalasari & Mulyaningsih, 2026). These findings support the potential use of Benson relaxation therapy as a complementary intervention to help reduce pain perception in postoperative patients. However, the findings from Mr. A's case should be interpreted as an individual patient response and cannot be used to establish a general causal relationship.

The reduction in Mr. A's pain cannot be attributed solely to Benson relaxation therapy. During the treatment period, the patient received analgesic therapy in the form of ketorolac and underwent physiological recovery following surgery. Therefore, the observed changes in pain intensity may have resulted from a combination of factors, including pharmacological therapy, Benson relaxation therapy, rest, the patient's adaptation to the postoperative condition, and the wound healing process. Accordingly, Benson relaxation therapy in this case study is more appropriately viewed as a complementary intervention supporting overall pain management.

Based on the established outcome criteria, the patient's progress demonstrated improvement in pain-related indicators. Pain complaints decreased, facial grimacing became less frequent, and the patient's ability to independently perform the relaxation technique improved. At the final evaluation, the patient's pain intensity was 2, and no facial grimacing was observed. However, the evaluation record on April 17, 2026, at 2:00 p.m. documented the problem status as “not resolved,” after which the intervention was discontinued because the patient was discharged from the hospital. Therefore, it would not be appropriate to state that the acute pain problem was completely resolved. A more appropriate interpretation is that the acute pain problem improved, as indicated by decreased pain intensity and reduced non-verbal responses to pain, but was not considered completely resolved at the final evaluation.

Overall, the implementation of Benson relaxation therapy in Mr. A, a postoperative patient with a left foot fracture, demonstrated a positive response in pain management. The gradual implementation of the therapy helped the patient become more capable of performing relaxation and managing his response to pain. The reduction in pain intensity from 8 at the initial assessment to 2 at the final evaluation, accompanied by reduced facial grimacing and increased ability to perform Benson relaxation independently, indicates that Benson relaxation therapy may be used as a complementary non-pharmacological intervention in postoperative pain management. However, because this study involved only one patient and included other interventions, such as analgesic administration and the postoperative recovery process, these findings should be interpreted as an individual patient response rather than evidence that Benson relaxation therapy was the sole cause of the reduction in pain.

5. CONCLUSION

Based on the findings of this case study, the implementation of Benson relaxation therapy as a non-pharmacological intervention in Mr. A, a postoperative patient with a left foot fracture and the nursing problem of acute pain, demonstrated a positive response. The patient's pain intensity decreased from 8 at the initial assessment to 2 at the final evaluation, accompanied by reduced facial grimacing and the patient's ability to perform Benson relaxation independently. Benson relaxation therapy may be used as a complementary intervention in pain management to help improve patient comfort. However, the reduction in pain intensity may also have been influenced by analgesic administration and the postoperative recovery process.

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[18]

CHANGES IN BACK PAIN INTENSITY FOLLOWING ENDORPHIN MASSAGE AMONG THIRD-TRIMESTER PREGNANT WOMEN

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Abstract

Low back pain is a common complaint among pregnant women in the third trimester, typically caused by hormonal changes and postural shifts, and it can affect both physical and psychological well-being. Endorphin massage is considered a non-pharmacological alternative that may help alleviate this discomfort. This study aimed to determine the changes of endorphin massage in reducing back pain in pregnant women. The research used a pre-experimental design with a onegroup pretest-posttest method, involving 37 pregnant women in their third trimester. The independent variable was endorphin massage, while the dependent variable was the intensity of back pain. Data collection instruments included standard operating procedures (SOPs), questionnaires, and the Visual Analog Scale (VAS). Data analysis was conducted using the ilcoxon signed-rank test.The results showed a decrease in back pain intensity among third-trimester pregnant women after receiving endorphin massage. Prior to the intervention, nearly all participants experienced severe back pain; however, following the therapy, all reported a reduction to moderate pain levels. The Wilcoxon test yielded a p-value of 0.000, indicating a significant effect of Endorphin Massage on the reduction of back pain. This therapy works by stimulating the release of endorphins natural analgesics thereby inducing relaxation without the side effects associated with medication. Furthermore, the method activates the parasympathetic nervous system, which helps relax muscles and alleviate tension, making it a safe, non-pharmacological alternative for reducing back pain in pregnant women

Keywords: Endorphin Massage, Low back pain, pregnant women.

1. INTRODUCTION

As the due date approaches, complaints of back pain among pregnant women tend to increase. During the third trimester, the body undergoes numerous adjustments—ranging from the baby's increasing weight and changes in body posture to hormonal influences that cause connective tissues to relax. All these factors contribute to the onset of back pain. This issue is not merely physical; it also affects the expectant mother's emotional and mental state. Persistent discomfort can heighten the risk of anxiety and symptoms of mild depression (Nurhayati & Adi, 2019). Such discomfort often interferes with daily activities, limits mobility, and disrupts sleep. Furthermore, the pain can elevate stress and anxiety levels, negatively impacting the mother's mental health.

Pain is commonly experienced by pregnant women as they enter the second and third trimesters. Pain is a complex phenomenon. As defined by the International Association (1979), pain is an "unpleasant sensory and emotional experience associated with actual or potential tissue damage." Pain during pregnancy gives rise to worry and fear, which in turn contribute to increased stress and significant bodily changes. Fear and pain often go hand in hand and exacerbate one another (1).

According to the WHO, back pain during pregnancy is not uncommon. In Australia, approximately 70% of pregnant women experience it, while in the UK and Scandinavian countries, the figure reaches 50%. In Indonesia, the incidence is estimated to be between 60% and 80%, with a rate of around 65% recorded in East Java alone. In fact, out of 100 first-time expectant mothers, about 80 experience back

pain significant enough to be bothersome, and 10 of them face difficulty carrying out their activities effectively.

During pregnancy, the body adapts to numerous changes, including shifts in posture and the loosening of joints. These adaptations can trigger muscle tension and back pain (2,3). To manage this pain, one can employ pharmacological approaches such as using analgesics as recommended by a physician or non-pharmacological methods like Endorphin Massage. Endorphin Massage is a non-invasive technique effective at reducing pain by stimulating the release of endorphins, which act as natural analgesics. This therapy also lowers endogenous catecholamine levels and promotes relaxation through nervous system stimulation (4). Consequently, this method is considered a safe and viable alternative for managing back pain in pregnant women.

2. METHODOLOGY

This study employed a quantitative approach with a pre-experimental design, specifically a single-group pretest-posttest design. The participants consisted of 37 third-trimester pregnant women registered at the Urungagung Community Health Center (Puskesmas) in Sidoarjo, selected via purposive sampling. Endorphin massage served as the independent variable, while back pain in third-trimester pregnant women was the dependent variable. Data collection was conducted using Standard Operating Procedures (SOPs), the Visual Analog Scale (VAS) for pain, and questionnaires.

Once the data were collected, the researchers proceeded with data processing. Univariate analysis was used to present the data via frequency tables, while bivariate analysis was conducted to examine the relationship between the two variables under study. The Shapiro-Wilk test was applied to assess normality, and the results indicated that the data were not normally distributed; consequently, the Wilcoxon test was employed for the analysis.

3. RESULTS

3.1 Characteristics of Third-Trimester Pregnant Women

Table 1. Characteristics of Third-Trimester Pregnant Women

Characteristics	Number	
	F	%
Maternal Age		
<20 Years	1	2.7
20–35 Years	32	86,5
>35 Years	4	10.8
Total	37	100
Gestational Age		
7 Months	10	27
8 Months	10	27
9 Months	17	46
Total	37	100
Education		

Highest Level		
Elementary School	12	2.7
Junior High School	6	16.2
Senior/Vocational High School	17	46
Diploma III (D3)	2	5.4
Diploma IV (D4)	1	2.7
Bachelor's Degree (S1)	10	27
Total	37	100
Occupation		
Housewife	23	62.2
Private Sector Employee	7	18.9
Civil Servant	7	18.9
Total	37	100
Gravida		
G1 (first pregnancy)	16	43.2
G2 (second pregnancy)	14	37.8
≥G3 (third/subsequent pregnancy)	7	19
Total	37	100
Parity		
Nullipara (never given birth) 16 43.2	16	43.2
Primipara (1 birth) 15 40.5	15	40.5
Multipara (2 births) 6 16.3	6	16.3
Total 37 100%	37	100
Abortion		
Never 32 86.5	32	86.5
Ever 5 13.5	5	13.5
Total	37	100

Table 1 indicates that almost all pregnant women complaining of back pain were aged 20 to 35 years (86.5%), while a small proportion (2.7%) were under 20 years old, and another small proportion (10.8%) were over 35 years old. Regarding gestational age, nearly half (46%) were nine months pregnant, while the remainder were distributed between seven and eight months of gestation (27% in each category).

46% of the respondents had a high school or vocational school education, while the others came from various educational backgrounds, ranging from elementary school to a bachelor's degree. Regarding

employment, the majority (62.2%) of the pregnant women were homemakers, while smaller proportions (18.9% each) worked for private companies or as civil servants.

The majority of the pregnant women were in their first (43.2%) or second (37.8%) pregnancy, while a small proportion (18.9%) were in their third or subsequent pregnancy. Regarding parity, nearly half (43.2%) had never given birth, 40.5% had given birth once, and a small proportion (16.3%) had a history of two births. The vast majority (86.5%) had never experienced a miscarriage, while the remainder (13.5%) had.

3.2 Back Pain Intensity Before Endorphin Massage in Pregnant Women in the Third Trimester

Tabel 2. Back Pain Intensity Before Endorphin Massage in Pregnant Women in the Third Trimester

Back Pain Intensity	Before Intervention		After intervention	
	n	%	n	%
No Pain	0	0	0	0
Mild Pain	0	0	0	0
Moderate Pain	5	13.6	37	100
Severe Pain	32	86.4	0	0
Very Severe Pain	0	0	0	0
Total	37	100	37	100

Based on Table 2, regarding back pain intensity prior to endorphin massage, the vast majority (86.4%) of pregnant women fell into the severe pain category, while a small roportion (13.6%) experienced moderate pain; none experienced mild or very severe pain, or no pain at all. Back pain intensity following endorphin massage: All (100%) pregnant women fell into the moderate pain category; none experienced mild, severe, or very severe pain, nor were any pain-free.

Prior to the intervention, 86.4% of respondents experienced severe back pain, while the remaining 13.6% experienced moderate pain. There were no reports of mild or extremely severe pain, nor of an absence of pain. These findings align with the study by (4,5), which also noted a predominance of moderate to severe pain prior to the administration of endorphin massage. Based on the VAS scale, severe pain falls within the 7–9 range; it is characterized by an inability to follow commands—responding only to physical actions—and a failure to resolve through basic relaxation techniques alone. If left untreated, this pain risks developing into a long-term issue, such as postpartum back pain or chronic pain (6).

Maternal age also influences the severity of back pain. Pregnancies occurring at ages under 20 or over 35 are considered high-risk due to the physical and mental immaturity of the reproductive system (7). In this study, the majority of severe pain cases were observed in pregnant women aged 20 to 35, whereas lower rates were found outside this age range (6). Beyond maternal age, advancing gestational age also increases the risk of back pain as the pressure exerted by the uterus on the spine intensifies. This affects lumbar flexibility and mobility particularly during the eighth and ninth months of pregnancy, which this study identified as the period with the highest prevalence of severe pain (8). Postural changes resulting from a shifting center of gravity, ligament laxity, and stretching abdominal muscles also cause muscle imbalances around the pelvis, thereby triggering pain (8).

Parity is another significant factor. Back pain is more frequently experienced by women who have had multiple pregnancies, as their abdominal muscles have been weakened by previous gestations. Conversely, primigravid women (those in their first pregnancy) tend to retain stronger muscles, resulting in lower pain levels (6). Additionally, a history of back pain and excess body weight contribute to an

increased risk of pain during pregnancy. Upaya untuk mencegah atau mengatasi nyeri punggung dapat dilakukan dengan edukasi kesehatan, termasuk senam hamil, postur tubuh yang benar, teknik mengangkat beban yang tepat, serta menghindari berdiri terlalu lama (10). Salah satu intervensi nonfarmakologis yang erbukti efektif adalah endorphin massage. Terapi ini membantu mengurangi intensitas nyeri dengan merangsang pelepasan endorfin, memberikan efek elaksasi, serta mengurangi ketegangan otot, tanpa menimbulkan efek samping obat. Pijatan endorfin aman digunakan pada kehamilan trimester akhir, karena efektif meredakan nyeri dan mendukung kestabilan emosional sebelum melahirkan.

Research findings indicate that following an intervention consisting of Endorphin Massage administered for 10 -15 minutes over four sessions—the majority of respondents experienced moderate back pain; notably, none reported mild, severe, or very severe pain, nor an absence of pain. Recorded pain scores ranged from 4 to 6 on the Visual Analog Scale (VAS). This is attributed to the pregnancy having reached the third trimester, a stage characterized by significant physiological and biomechanical bodily changes that trigger lower back pain (6).

The reduction in pain intensity following the intervention is also supported by previous research. Research Studies by Natalia Ika and Indah (2023) demonstrates hat a significant reduction in pain levels occurred after the administration of Endorphin Massage for three days. This massage stimulates large nerve receptors on the skin's surface, inhibiting the transmission of pain signals to the brain and altering pain perception. A similar study by Sari (2023) also indicates that nearly half of the respondents (43.8%) experienced a reduction in pain from a severe level to a moderate or mild one. According to the IASP, women in the third trimester of pregnancy typically experience lower back pain in the spinal region between T12 and S1. This condition is caused by the weight of the fetus and uterine enlargement, which increase pressure on back muscles and joints, resulting in strain and pain (11). Insufficient back muscle strength also contributes to muscle strain when performing incorrect movements or maintaining a specific posture for too long.

Endorphin massage, as a non-pharmacological therapy, has been proven effective in alleviating pain by stimulating soft tissues such as muscles, tendons, and ligaments. While this therapy does not involve joint movement, it promotes relaxation and enhances blood circulation. By stimulating the production of endorphins—the body's natural analgesic compounds the therapy lowers catecholamine levels and inhibits pain signals through the activation of efferent pathways (12).

However, although all respondents experienced a reduction in pain, some continued to report moderate pain following the therapy. This indicates that the effects of endorphin massage are temporary, as endorphin levels in the body decline over time. Consequently, a sustained and comprehensive approach is required to achieve optimal results. Massage should be administered regularly as prenatal gymnastics or yoga. These activities help maintain back muscle flexibility and reduce pressure on the spine.

Furthermore, education regarding proper posture during sitting, standing, sleeping, and daily activities is crucial for preventing pain recurrence. Stress management techniques, such as deep breathing exercises or meditation, are also recommended to support emotional and mental well-being during pregnancy. While endorphin massage is proven to help reduce pain, therapeutic outcomes are maximized when combined with comprehensive interventions addressing physical, postural, and psychological aspects.

3.3Wilcoxon Test Results for Back Pain Intensity

Table 3: Wilcoxon Test Results for Back Pain Intensity

	Mean	Median (Minimum–Maximum)	p-value

Back pain intensity before intervention	7.49	8 (6-9)	0.000
Back pain intensity after intervention	5.22	5 (4-6)	

Based on Table 3, the Wilcoxon test results indicate a significant difference regarding the effect of endorphin massage on back pain complaints among third-trimester pregnant women at the Urangagung Community Health Center in April 2025. Prior to the intervention, the mean pain level was 7.49 with a median of 8 (range: 6–9); following the intervention, this decreased to a mean of 5.22 with a median of 5 (range: 4–6). The p-value of 0.000 ($p < 0.05$) indicates a statistically significant difference. Of the 37 respondents, 36 experienced a reduction in pain intensity, while one showed no change and no increase. Endorphin massage therapy proved effective in alleviating back pain complaints experienced by pregnant women in their third trimester. Endorphin massage has been proven effective in reducing back pain intensity among third-trimester pregnant women ($p = 0.000$). Thirty-six out of 37 respondents experienced improvement, with VAS scores shifting from severe to moderate pain. Back massage stimulates nerves in the spinal cord, sending signals to the brain via the thalamus and limbic system, thereby triggering the release of endorphins (Amir et al., 2022). Endorphins act as natural neurotransmitters that bind to receptors in the nerves and spinal cord, inhibiting the transmission of pain signals to the brain. Consequently, the perception of pain decreases significantly. This aligns with the findings of Ayu Handayany et al. (2020), who stated that skin stimulation through endorphin assage can block pain impulses by releasing endorphins. Prior to the intervention, 45% of the pregnant women experienced severe pain; however, this condition was no longer present after the therapy was administered. Research by Amir et al. (2022) also reported a p-value of 0.000, confirming the effectiveness of endorphin massage in alleviating back pain during the third trimester. In the researchers' view, endorphin massage is an effective non-pharmacological method because it stimulates the release of endorphins—natural pain-relieving hormones—without side effects. The significant reduction in pain following the intervention demonstrates that this technique provides optimal comfort and relaxation for pregnant women, particularly in the lower back region.

However, the effectiveness of this therapy relies heavily on consistent implementation and support regarding both physical and psychological care. Therefore, a holistic strategy incorporating regular massage, posture education, and stress management is considered essential to maximize therapeutic outcomes. Through this comprehensive approach, back pain in third-trimester pregnant women can be optimally managed or controlled.

4. CONCLUSIONS AND RECOMMENDATIONS

Prior to therapy, the majority of pregnant women in their third trimester experienced severe back pain. However, following the massage intervention, a change was observed: all participants showed a reduction in pain intensity to a moderate level. The Wilcoxon test corroborated these findings with significant results, demonstrating the therapy's effectiveness. As "endorphin massage" offers a safe and natural method for alleviating back pain in pregnant women, it should ideally be administered by trained healthcare professionals or family members. Additionally, pregnant women are advised to maintain proper posture and engage in regular light exercise to help reduce pain symptoms.

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FACTORS INFLUENCING THE INTEREST OF WOMEN OF REPRODUCTIVE AGE IN EARLY DETECTION OF CERVICAL CANCER AT THE ONEKORE COMMUNITY HEALTH CENTER (PUSKESMAS), ENDE REGENCY

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Abstract

Background: Cancer is the leading cause of death both nationally and globally. The number of women with cervical cancer has been high in the past three years in the Onekore Community Health Center (Puskesmas) working area. Purpose: The aim of this study was to identify and analyze factors influencing early detection of cervical cancer in women of reproductive age. Methods: The research method used was Mixed Methode research. Data collection was conducted over a period of one month, from June to July 2025. The sampling method used was consecutive sampling. The sample size was determined based on the Slovin formula with a target sample size of at least 100 respondents. Results: The results of the study showed that Husband's support is the most dominant factor influencing the interest of women of childbearing age (WUS) in early detection of cervical cancer, and 60% of respondents had good knowledge, had good attitudes, beliefs and perceptions as much as 66%, did not have access to information on cervical cancer screening as much as 76%, lacked support from health workers as much as 93%, lacked support from peers as much as 97% and had lacked support from husbands as much as 82%. The results of the analysis showed that the most dominant variable influencing WUS's interest in early detection of cervical cancer was husband's support with $p < 0.000$ and OR 4.286, which means that WUS who were not supported by their husbands were 4.286 times more likely to not do the VIA test compared to those who were supported. Conclusion: Therefore, information dissemination is not only provided to women of childbearing age but also to men, including husbands, to help motivate women to undergo early detection of cervical cancer.

Keywords: Faktors, Interest, Early Detection, Cervical Cancer.

1. INTRODUCTION

Cervical cancer is the fourth most common cancer in women with an estimated 570,000 new cases in 2018. (1). The mortality rate from cervical cancer in women is significantly higher in countries in transition compared to countries in transition (15.0 vs. 12.8 per 100,000 and 12.4 vs. 5.2 per 100,000, respectively) (2). The global mortality rate can be reduced through a comprehensive approach that includes prevention, early diagnosis, effective screening and treatment programs (3). Deaths in cancer cases in developing countries are 2 times greater than in developed countries, this occurs not only due to the lack of screening programs, but also exacerbated by low ability and accessibility to treatment (4). Integrated prevention must be implemented starting from the Community Health Center. The key to the success of the cervical cancer control program is screening followed by adequate treatment (5). This is based on the fact that more than 50% of women diagnosed with cancer have never been screened (6). The prevalence of cancer in Indonesia shows an increase from 1.4 per 1000 population in 2013 to 1.79 per 1000 population in 2018. NTT Province is mostly in the age group 35-54 years at 9.08%, the most women suffer from cancer at 2.09% (7). The acceleration of cervical cancer elimination contains four

pillars including service pillars that include screening, Human Papilloma Virus (HPV) vaccine immunization, and management for pre cancer patients (4). Screening should be performed at least once for every woman in the target age group (30-49 years); HPV testing, cytology, and visual inspection with acetic acid (VIA) are recommended screening tests (1). Data from the Ende Regency Health Office in 2023 showed that the coverage of early cervical cancer detection using the VIA and PAP smear methods among women of childbearing age in Ende Regency was 2.09% (8). Onekore Community Health Center, a service facility with the highest number of cervical cancer cases in the past three years, remains low. The practice of early cervical cancer detection among women of childbearing age remains low, with only 49 (0.02%) of 2,779 women aged 30-50 years undergoing early detection. Lack of knowledge and information about cervical cancer and fear of detection lead to diagnosis at an advanced stage (8). Although cases of cervical cancer have increased over the past three years, no research has yet been conducted on the causes of cervical cancer in Ende Regency. This is due to the still-low level of knowledge and awareness among women of reproductive age regarding early detection of cervical cancer. The purpose of the study is to identify and analyze the factors that influence the early detection of cervical cancer among women of reproductive age.

2. METHODOLOGY

This study employs a mixed-methods research approach (quantitative and qualitative) with a descriptive cross-sectional design. Data collection will be conducted over a one-month period, from June to July 2025. The dependent variable is the early detection of cervical cancer. The independent variables include: Predisposing factors (knowledge, attitudes, beliefs, and values); Enabling factors (exposure to information, availability of facilities/infrastructure for early detection services, funds, and time); and Reinforcing factors (support from husbands, healthcare workers, and friends). The study population consists of all women of reproductive age (WUS) residing within the working area of the Onekore Community Health Center (Puskesmas).

The sample for the qualitative research consisted of 5 husbands of the respondents, 5 healthcare workers, and 5 friends of the respondents who had previously undergone early detection screening for cervical cancer. The sample size was determined using the Slovin formula, with a target minimum sample size of 100 respondents. Primary data were collected through interviews conducted by the researcher. The data collection instruments included questionnaires and structured interviews to obtain qualitative data. The collected data were then processed and analyzed.

3. RESULTS

In-depth interviews were conducted using a questionnaire guide regarding support from husbands, peers, and healthcare workers in increasing interest in early detection of cervical cancer among women of reproductive age. In-depth interviews were conducted with husbands, peers, and health workers, as follows:

1. Husband's Support

To gather information regarding husbands' support, the researcher conducted direct interviews with five husbands of women of reproductive age (WUS). The statements obtained were as follows:

“I have never heard about the kind of screening you mentioned; I feel that matters regarding my wife's health are a woman's business. As a husband, I only focus on earning money...” (R 1)

“Matters regarding women's health are the wife's responsibility; as a husband, I am busy working to provide the money...” (R 2)

“I have never heard of or read about cervical cancer screening; I feel that matters regarding my wife's health are a woman's business. As a husband, I only work to earn money...” (R 3)

"I always support my wife's health, but I cannot accompany her to the screening because I have to work..." (R 4)

"I have never heard information about cervical cancer screening, so I cannot pass any information on to my wife—especially since I am busy working every day." (R 5)

The results of interviews with 5 husbands indicate that women of reproductive age (WUS) do not receive support from their husbands.

2. Peer Support

"I have never talked to friends about cervical cancer screening because I am afraid they won't want to get checked..." (R 1)

"I don't want to talk to friends about it because I feel embarrassed." (R 2)

"I once talked to friends about it, but they said they didn't want to get checked yet because they didn't feel sick." (R 3)

"I once talked to friends about it, but they said they didn't want to get checked yet because they were afraid it would be painful." (R 4)

"I have never talked to friends about it because I assume they have already received information from the midwife at the community health center..." (R 5)

The results of interviews with 5 participants felt embarrassed and hesitant to tell their peers and invite them to do early detection.

3. Health Worker Support

"We rarely conduct health education or outreach regarding early detection of cervical cancer for women of reproductive age when they visit the community health center because we are busy with other tasks; we only provide education at the integrated health post (Posyandu), and even that happens only occasionally." (R 1)

"There are no posters or information regarding early detection of cervical cancer at the community health center facility as part of health promotion efforts." "Regarding health, we need to make preparations for the future…" (R 2)

"We do not limit the time for early cervical cancer screening; we offer it to women during every service day, though sometimes they are not yet willing to undergo the examination." (R 3)

"We also conduct home visits to encourage women to get screened, but they often refuse, citing work commitments; indeed, changing community behavior is quite challenging…" (R 4)

"At the moment, we have not yet shifted to a 'proactive outreach' strategy—bringing services closer to the community—due to limited facilities and personnel… hopefully, this can be implemented next year…" (R 5)

The research findings indicate that women of reproductive age still receive insufficient support from healthcare workers. Health personnel rarely provide education or outreach regarding the early detection of cervical cancer when these women visit community health centers (puskesmas), often due to being occupied with other tasks. Furthermore, some healthcare workers noted that they conduct home visits to encourage women to undergo screenings; however, the women often decline, citing work commitments. Indeed, changing public behavior is quite challenging.

This is supported by statements from the respondents' husbands during interviews; one said, "I never knew about the kind of screening you mentioned; I feel that matters regarding my wife's health are a woman's business—as a husband, I only know how to earn a living..." (R 5), while another expressed a similar view: "I have never heard information about screening for cervical cancer detection,

so I couldn't pass any information on to my wife—especially since I am busy working every day" (R 5). Husbands who are part of a family with a good understanding of healthy behaviors are more likely to provide support to their wives. Husband support offers emotional benefits, such as providing a sense of comfort and encouraging the individual to take health-related actions. Therefore, the husband's role is crucial regarding individual actions, particularly concerning early detection of cervical cancer. Research by Febriani (2015) found that husband support was the most dominant factor influencing the participation of women of childbearing age (WUS) in early cervical cancer detection using the VIA method. Consequently, it is strongly recommended that Community Health Centers (Puskesmas)—specifically healthcare workers—intensify and regularly conduct health promotion regarding cervical cancer and VIA-based early detection for women of childbearing age. Furthermore, health promotion efforts should be expanded to include men and the husbands of these women, enabling them to support and motivate their partners to undergo early cervical cancer detection via the VIA test (18).

The quantitative research results show that significant factors influencing the interest of women of childbearing age (WUS) in the Onekore Community Health Center (Puskesmas) working area regarding early detection of cervical cancer: insufficient husband support (p=0.000, OR=4.286), insufficient support from health workers (p=0.054, OR=2.189), and inadequate knowledge regarding early detection (p=0.023, OR=1.390). According to Green's theory, "reinforcing factors" are determinants of behavior; specifically, the attitude of one's immediate social circle—in this case, the husband—plays a crucial role in the decision to undergo cervical cancer screening (17). In a patriarchal society, the husband, as the head of the family, acts as the primary decision-maker regarding family health, including that of his wife. Therefore, education on cervical cancer screening should not be limited to women of childbearing age; their husbands also need to receive accurate information so they can support their wives in undergoing the test.

This indicates that health promotion regarding cervical cancer and its early detection is not yet being delivered optimally; 45.5% of respondents were unaware of the benefits of early detection. More than half of the respondents (76%) lacked access to information regarding early detection screenings; this is corroborated by peer interviews revealing that educational sessions on the subject are infrequent—often limited to *Posyandu* (integrated health post) activities or visits to Maternal and Child Health (KIA) clinics—leaving many mothers unconvinced of the benefits. Furthermore, some respondents held negative attitudes toward early detection, believing that screening is unnecessary in the absence of perceived abnormalities. Although the majority of respondents lived close to a Community Health Center (89%), most of their husbands did not support the screening (82%), thereby influencing the women's decisions regarding whether to undergo the procedure. A lack of support from healthcare workers (93%) also impacted the women's interest in early screening. Knowledge is a crucial factor in shaping an individual's actions; research suggests that actions grounded in knowledge are more sustainable than those that are not. An attitude is an individual's covert reaction or response to a stimulus or object. It is not yet an action or activity, but rather a predisposition toward a specific behavior. Barriers contributing to low early detection uptake include a lack of knowledge regarding cervical cancer and a perception of low cancer risk. Additionally, there are fears of receiving a positive screening result and reluctance to undergo pelvic examinations (9); (10). The Ministry of Health (2020) reported that out of an estimated 144,250,230 women of reproductive age (15–49 years), only 8.3% (3,207,659) underwent early detection; of these, 50,171 tested positive via the VIA method, and 584 were suspected of having cervical cancer (11). Anwar et al. found that 81% of respondents had never undergone a Pap smear; among them, 28% had never heard of cervical cancer, and 33% were unaware of the Pap smear test (12). A 2019 study by Miftahil et al. at a Community Health Center (Puskesmas) in Padang City showed that 60% of respondents had never undergone cancer detection using the VIA method (13). Wulandari, studying at the Sukmajaya Community Health Center, found that 29.3% of respondents were knowledgeable about cervical cancer, while only 0.14% (10 out of 7,100) knew about HPV, and only 7.4% had ever undergone a Pap smear (14). Beyond the influence of limited knowledge regarding cervical cancer and the HPV vaccine, early cervical cancer screening uptake can also be influenced by support from family or spouses and healthcare workers (13). Nurlelawati et al. (2018) identified a relationship between knowledge levels and the incidence of cervical cancer (15). Knowledge regarding HPV and cervical cancer remains very low within local communities, indicating that the impact of health promotion regarding immunization programs is still limited (12); (16).

4. CONCLUSIONS

Husband's support is the most dominant factor influencing the interest of women of childbearing age (WUS) in early detection of cervical cancer within the Onekore Community Health Center (Puskesmas) service area. Support from healthcare workers and the women's own knowledge regarding cervical cancer are also factors influencing this interest. It is recommended that healthcare personnel at the Puskesmas—specifically doctors, nurses, and midwives—intensify and regularly conduct health promotion regarding cervical cancer and early detection among women of childbearing age. Furthermore, these promotional efforts should be expanded to include the women's husbands and the wider community, thereby enabling them to support and motivate their partners to undergo early cervical cancer detection.

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THE EFFECT OF ATTITUDE AND SUBJECTIVE NORM ON PARENTS' INTENTION TO PREVENT CHILD MARRIAGE IN PIDIE REGENCY

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Abstract

Child marriage remains a public health concern influenced by individual, family, social, and cultural factors. Parents play an important role in decisions concerning their children's marriage; therefore, understanding the factors that shape parents' intention to prevent child marriage is essential. This study aimed to analyze the effects of attitude and subjective norm on parents' intention to prevent child marriage in Pidie Regency. A quantitative cross-sectional design was used. The respondents were 194 parents of adolescents aged 10–18 years living in the coastal areas of Pidie Regency, covering Simpang Tiga, Kembang Tanjong, Batee, and Muara Tiga subdistricts, and were recruited using total sampling. Attitude was measured through behavioral beliefs and evaluations of behavior, whereas subjective norm was measured through normative beliefs and motivation to comply. Data were analyzed using Structural Equation Modeling–Partial Least Squares (SEM-PLS) with SmartPLS version 4.0. The results showed that 46.9% of respondents had a good intention and 26.8% had a very good intention to prevent child marriage. Attitude had a positive path coefficient toward intention (β = 0.342), while subjective norm also had a positive path coefficient (β = 0.204). The path coefficient for attitude was higher than that for subjective norm in the structural model. These findings indicate that more favorable parental attitudes and more supportive subjective norms are associated with stronger intentions to prevent child marriage. Prevention efforts should strengthen parental attitudes and reinforce social support from families and communities.

Keywords: Attitude; Subjective Norm; Intention; Child Marriage; Parents

1. INTRODUCTION

Child marriage remains a public health and social concern with broad consequences for adolescents, particularly girls. The practice is associated with interrupted education, increased vulnerability to violence, restricted social and economic opportunities, and reproductive health risks arising from pregnancy and childbirth at a young age. Preventing child marriage is also an important development priority because the practice has long-term consequences for health, well-being, and the quality of life of women and future generations [1].

In Indonesia, child marriage continues to occur despite the government's increase of the minimum legal age of marriage to 19 years for both men and women through Law No. 16 of 2019. Child marriage is not solely a regulatory issue; it is also influenced by cultural, economic, educational, knowledge-related, religious, and family social-environment factors. In Aceh, Pidie Regency is among the areas facing this issue. The data used in this study indicated that the proportion of child marriage in Pidie reached 39.39%, and applications for underage marriage dispensation were still recorded. These conditions suggest that preventing child marriage cannot rely on regulation alone, but must also consider the social and family factors underlying decisions concerning child marriage [2].

Parents play an important role because decisions concerning child marriage within the family are not always determined entirely by adolescents themselves. Economic conditions, poverty, social norms, culture, religious values, concerns about adolescent relationships, and community views regarding the appropriate age of marriage may influence family decisions. The preliminary study also identified parental considerations related to household economic capacity, dowry, children's education, concerns about premarital sexual relationships, and social perceptions of unmarried girls. These findings indicate that parents may serve as key decision-makers in either supporting or preventing child marriage [3].

To understand how parents' intention to prevent child marriage is formed, this study applied the Theory of Planned Behavior (TPB). Within TPB, intention is an important determinant that precedes behavior and is influenced by attitude, subjective norm, and perceived behavioral control. Attitude reflects an individual's positive or negative evaluation of a behavior and is shaped by behavioral beliefs and evaluations of behavioral consequences. Subjective norm reflects an individual's perception of the expectations or social pressure of significant others in deciding whether to perform a behavior. Accordingly, a more favorable attitude toward preventing child marriage and supportive social norms may strengthen parents' intention to prevent child marriage [4].

Several previous studies support an association between attitude, subjective norm, and intention in relation to child marriage. Ngalimatul (2018) reported that attitude and subjective norm positively influenced the intention to prevent child marriage. Research in coastal communities has also shown that attitude and subjective norm contribute to changes in parents' intention regarding child marriage [5]. However, Stacia (2016) reported somewhat different findings: when TPB components were analyzed jointly, they were associated with intention, whereas subjective norm was not associated with child-marriage intention when analyzed separately. These differences suggest that the relationships of attitude and subjective norm with intention may vary according to individual characteristics and the social and cultural context [6].

Although previous studies have identified various factors associated with child marriage, research specifically focusing on parents' intention to prevent it remains relatively limited. Earlier studies have more often examined intention or decision-making from the adolescent perspective or have assessed general factors related to age at marriage. Yet within the family context, parents play an important role in decisions concerning their children's marriage. Research on delaying the age of marriage has also shown that knowledge and psychosocial factors are related to the formation of intentions to marry or postpone marriage [7].

Against this background, understanding parental attitude and subjective norm is important for designing child-marriage prevention strategies that are grounded in family and community social contexts. Examining these two constructs can provide insight into how parents' beliefs about the consequences of prevention, together with social support or pressure from family and the surrounding environment, shape their intention to take preventive action, as described in the Theory of Planned Behavior (TPB). Therefore, this study aimed to analyze the effects of attitude and subjective norm on parents' intention to prevent child marriage in Pidie Regency.

2. METHODOLOGY

This study employed a quantitative observational approach with a cross-sectional design, in which the independent and dependent variables were measured during the same period. The study was conducted in the coastal areas of Pidie Regency across four subdistricts: Simpang Tiga, Kembang Tanjong, Batee, and Muara Tiga. Quantitative data were collected from December 2023 to June 2024. The analysis presented in this article focuses on the effects of attitude and subjective norm on parents' intention to prevent child marriage as part of the Theory of Planned Behavior (TPB) model used in the main study.

The study population comprised all parents of adolescents aged 10–18 years who lived in the study area. Based on data from the Gampong Information System (SIGAP), 194 families met the population criteria, and the entire population was included using total sampling, resulting in a sample of 194 parents. The respondents included 54 parents from Simpang Tiga, 41 from Kembang Tanjong, 50 from Batee, and 49 from Muara Tiga. The inclusion criteria were: being a parent of an adolescent and residing

in the study area; being the parent (father or mother) who predominantly made decisions related to the child's marriage; being able to read and write; being present at the study site; and voluntarily agreeing to participate.

The independent variables analyzed in this article were attitude and subjective norm, while the dependent variable was parents' intention to prevent child marriage. Attitude was measured through two TPB components, namely behavioral beliefs and evaluations of behavior. Subjective norm was measured through normative beliefs and motivation to comply. Intention was defined as the desire that motivates parents to take action to prevent child marriage. Measurements were obtained using a four-point questionnaire containing favorable and unfavorable statements. Scores for each construct were subsequently categorized as very good, good, poor, or very poor according to the cut-off values established in the study instrument.

The study instrument was pretested among 30 respondents in Trienggadeng Subdistrict, Pidie Jaya Regency. Validity was assessed using the Pearson Product-Moment correlation, with an r-table value of 0.361. All items measuring attitude, subjective norm, and intention were declared valid. Reliability testing using Cronbach's alpha yielded values of 0.767 for behavioral beliefs, 0.695 for evaluations of behavior, 0.841 for normative beliefs, 0.876 for motivation to comply, and 0.721 for intention to prevent child marriage. All values exceeded the reliability threshold of 0.60, indicating acceptable instrument reliability.

Data were collected once from each respondent using a researcher-administered questionnaire. Before data collection, respondents received an explanation of the study objectives and procedures and subsequently provided informed consent. The study underwent ethical review by the Health Research Ethics Committee, Faculty of Dental Medicine, Universitas Airlangga, and research permission was obtained from the relevant authorities in Pidie Regency. Respondent confidentiality was maintained through identity coding, and the data were used solely for research purposes.

Data processing involved editing, coding, data entry, and verification. Descriptive analysis was used to summarize the distribution of parental attitude, subjective norm, and intention. Relationships among variables were analyzed using Structural Equation Modeling–Partial Least Squares (SEM-PLS) with SmartPLS version 4.0. Evaluation of the measurement model included factor loadings, average variance extracted (AVE), discriminant validity, and composite reliability, whereas the structural model was used to estimate the direction and magnitude of the relationships of attitude and subjective norm with intention to prevent child marriage.

3. RESULTS

This section presents the main findings in a systematic sequence, including respondent characteristics, the distributions of attitude, subjective norm, and intention, patterns among their components, and the structural analysis of attitude and subjective norm in relation to parents' intention to prevent child marriage.

1.1 Respondent characteristics

The characteristics of the 194 study respondents are presented in Table 1.

Table 1. *Respondent characteristics (n = 194)*

Characteristic	Category	n	%
Age	21–35 years	15	7.7
	36–45 years	68	35.1
	46–65 years	111	57.2
Education	No formal education	15	7.7
	Elementary school	43	22.2
	Junior high school	67	34.5
	Senior high school	52	26.8
	Diploma/Bachelor's degree	17	8.8
Parity	1 child	34	17.5
	>1–4 children	69	35.6
	>4 children	91	46.9
Income	Low	106	54.6
	High	88	45.4

Most respondents were aged 46–65 years (57.2%), followed by those aged 36–45 years (35.1%) and 21–35 years (7.7%). Regarding educational attainment, the largest proportion had completed junior high school (34.5%), followed by senior high school (26.8%) and elementary school (22.2%). A total of 46.9% of respondents had more than four children, while 54.6% were classified as having low household income.

1.2 Distribution of attitude, subjective norm, and intention

The distributions of the main study variables are presented in Table 2. Attitude was measured through behavioral beliefs and evaluations of behavior, whereas subjective norm was measured through normative beliefs and motivation to comply.

Table 2. *Distribution of attitude, subjective norm, and intention to prevent child marriage (n = 194)*

Main variable	Component	Very poor n (%)	Poor n (%)	Good n (%)	Very good n (%)
Attitude	*Behavioral beliefs*	3 (1.5)	51 (26.3)	96 (49.5)	44 (22.7)
	Evaluations of behavior	4 (2.1)	49 (25.3)	92 (47.4)	49 (25.3)
Subjective norm	*Normative beliefs*	0 (0.0)	54 (27.8)	66 (34.0)	74 (38.1)
	Motivation to comply	17 (8.8)	47 (24.2)	51 (26.3)	79 (40.7)
Intention	-	4 (2.1)	47 (24.2)	91 (46.9)	52 (26.8)

For attitude, 49.5% of respondents had good behavioral beliefs and 47.4% had good evaluations of behavior. For subjective norm, 38.1% of respondents had very good normative beliefs and 40.7% had very good motivation to comply. Regarding intention to prevent child marriage, 46.9% of respondents were categorized as good and 26.8% as very good.

Descriptively, the predominance of good and very good categories across attitude, subjective norm, and intention indicates that most parents had orientations supportive of child-marriage prevention. In the Theory of Planned Behavior, attitude is shaped by beliefs about behavioral consequences and evaluations of those consequences, whereas subjective norm is related to normative beliefs and motivation to comply with the expectations of significant others [8], [9]. Thus, the distribution in Table 2 provides an initial indication that both personal beliefs and social influences are

relevant to the formation of intention. Nevertheless, 26.3% of respondents still had poor or very poor intention, indicating that favorable attitudes and supportive social norms require further strengthening.

1.3 Patterns among attitude, subjective norm, and intention

Cross-tabulation showed a consistent pattern among the components of attitude, subjective norm, and intention. Among respondents with good behavioral beliefs, 72.9% also had good intention, while 70.5% of those with very good behavioral beliefs had very good intention. For evaluations of behavior, the corresponding proportions were 67.4% and 65.3%, respectively. Regarding subjective norm, 75.9% of respondents with poor normative beliefs also had poor intention, whereas 77.3% of those with good normative beliefs had good intention. For motivation to comply, 84.3% of respondents in the good category had good intention, while 57.0% of those in the very good category had very good intention. This pattern indicates that more supportive components of attitude and subjective norm tended to accompany stronger intention to prevent child marriage.

This pattern is consistent with the study by Sary [10] in a coastal community, which reported that attitude and subjective norm contributed to changes in parents' intention regarding child marriage, with regression coefficients of 0.277 and 0.198, respectively. The finding also supports the view that decisions concerning child marriage are influenced not only by individual evaluations but also by social expectations and norms within families and communities [11]. However, the cross-tabulations in the present study are descriptive; therefore, these patterns are not interpreted as evidence of statistical significance or causal relationships, but rather as contextual information for interpreting the structural model.

1.4 Effect of attitude and subjective norm on intention

The effects of attitude and subjective norm on intention were analyzed using Structural Equation Modeling–Partial Least Squares (SEM-PLS), and the resulting path coefficients are presented in Table 3.

Table 3. *Path coefficients of attitude and subjective norm on parents' intention to prevent child marriage*

Relationship	Path coefficient (β)	Direction
Attitude → Intention	0.342	Positive
Subjective norm → Intention	0.204	Positive

The results showed a positive path coefficient from attitude to intention (β = 0.342) and from subjective norm to intention (β = 0.204). Of the two variables examined in this article, attitude had the larger path coefficient. Thus, a more favorable attitude and a stronger subjective norm were associated with stronger parental intention to prevent child marriage.

These findings are consistent with the Theory of Planned Behavior, which positions attitude and subjective norm as determinants of intention [8], [9]. The larger coefficient for attitude indicates that parents' evaluation of the consequences of preventing child marriage made a stronger structural contribution to intention than perceived social pressure or support. The direction of these findings is also consistent with Sary [10], who reported coefficients of 0.277 for attitude and 0.198 for subjective norm in a model of changes in parental intention in a coastal community. This similarity in direction underscores the importance of considering both personal and social factors when examining parents' intention to prevent child marriage [12].

From a practical perspective, these results indicate that child-marriage prevention programs should strengthen parents' beliefs regarding the benefits of delaying marriage while simultaneously building social support from families and communities. The literature on child marriage also emphasizes that social norms and environmental expectations can influence marriage-related decisions [13]. Given the cross-sectional design of this study, the path coefficients should be interpreted as structural relationships within the SEM-PLS model rather than as evidence of causality.

4. CONCLUSIONS

This study showed that parental attitude and subjective norm were positively associated with parents' intention to prevent child marriage in the study areas of Pidie Regency. Attitude had a positive path coefficient toward intention (β = 0.342), and subjective norm also had a positive path coefficient (β = 0.204). The path coefficient for attitude was higher than that for subjective norm, indicating a stronger structural contribution of attitude to parental intention within the model.

These findings highlight the importance of strengthening parental attitudes that support the prevention of child marriage and fostering supportive social norms within families and communities. Prevention efforts should therefore not only provide information to parents but also reinforce beliefs about the benefits of delaying marriage and encourage social support from family members and the wider community to strengthen parents' intention to prevent child marriage.

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COMPARATIVE ANALYSIS OF APPLE AND JICAMA CHEWING ON DEBRIS INDEX REDUCTION IN ELEMENTARY SCHOOL STUDENTS

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Abstract

High prevalence of oral health problems in Indonesia is frequently triggered by debris accumulation on tooth surfaces. Mechanical self-cleansing through chewing fibrous and water-rich fruits such as apples and jicama serves as a natural approach to improving oral hygiene. This study aimed to evaluate and compare the differences in the debris index before and after chewing apples and jicama among fifth-grade students at SDN 07 Teladan Bukittinggi. A quasi-experimental research design with a pretest-posttest approach was conducted involving 50 fifth-grade students selected through total sampling. Participants were divided into two equal groups of 25: one group chewed 100 grams of apple and the other chewed 100 grams of jicama, following a standardized 32-cycle bilateral chewing protocol. Debris index was assessed using the Green and Vermillion criteria before and after the intervention. Data were analyzed using Paired Sample T-Test and Independent Sample T-Test with a significance level of $\alpha = 0.05$. Chewing apples significantly decreased the mean debris index from 1.576 (moderate) to 0.620 (good) with a mean reduction of 0.956 ($p = 0.000$). Similarly, chewing jicama significantly reduced the mean debris index from 1.528 (moderate) to 0.556 (good) with a mean reduction of 0.972 ($p = 0.000$). However, the Independent Sample T-Test revealed no statistically significant difference in debris index reduction between the two fruit groups ($p = 0.893$). Both apple and jicama chewing are equally effective as natural self-cleansing mechanisms in significantly lowering the debris index in elementary school students. Incorporating fibrous fruit consumption is highly recommended as a practical preventive measure for maintaining children's oral hygiene.

Keywords: Apple, Chewing, Debris Index, Jicama, Oral Hygiene

1. INTRODUCTION

Oral and dental health issues remain a major global public health burden, affecting billions of individuals worldwide and significantly reducing quality of life through functional impairment and chronic systemic conditions [1, 2]. In developing nations such as Indonesia, the prevalence of oral diseases remains high, with national data from the 2023 Indonesian Health Survey (SKI) indicating that 56.9% of the population suffers from dental issues, while the prevalence in West Sumatra reaches 61.1% [3]. A primary contributing factor to this burden is the rapid accumulation of dental debris—a soft food deposit that adheres to tooth surfaces shortly after eating [4, 5]. If left uncleaned, dental debris accelerates plaque formation and microbial growth, leading to dental caries, halitosis, and periodontal disease [6]. School-aged children are particularly vulnerable to these conditions due to inadequate daily tooth-brushing practices and dietary habits high in refined carbohydrates [7, 8].

While conventional tooth-brushing remains the primary oral hygiene practice, natural mechanical self-cleansing through chewing fibrous and water-rich fruits has emerged as an accessible complementary strategy [9, 10]. Prior studies have demonstrated that chewing fruits such as apples or jicama stimulates salivary flow and provides a mechanical scrubbing action that dislodges debris from enamel surfaces [10, 11]. However, most existing literature focuses either on isolated fruit interventions [12] or on specific target populations such as hearing-impaired children [11]. Comparative evidence evaluating the relative efficacy of different local fibrous fruits—specifically apples (Malus sylvestris Mill.)

and jicama (Pachyrhizus erosus)—under standardized chewing protocols within standard elementary school environments remains limited [11, 13]. This creates a clear research gap regarding which specific fibrous fruit yields optimal natural debris reduction in primary school settings.

To address this gap, this study aimed to evaluate and compare the effectiveness of chewing apples versus jicama in reducing the debris index among fifth-grade elementary school students at SDN 07 Teladan Bukittinggi . By applying a controlled, bilateral chewing protocol, this research determines whether a statistically significant difference exists between the two dietary interventions [3]. The findings provide evidence-based insights into cost-effective, culturally suitable natural self-cleansing methods that can be integrated into school-based oral health promotion programs and daily preventive care habits for children [3, 9].

2. METHODOLOGY

This study employed a quantitative research approach with a quasi-experimental pretest-posttest design. The study was conducted on May 12–13, 2026, in the fifth-grade classrooms at SDN 07 Teladan Bukittinggi, West Sumatra, Indonesia.

The study population comprised all fifth-grade students at SDN 07 Teladan Bukittinggi, totaling 50 students. Total sampling (saturation sampling) was utilized, selecting all 50 students as research participants (17 males and 33 females). Participants were randomly allocated into two equal treatment groups of 25 students each: the apple-chewing group ($n = 25$) and the jicama-chewing group ($n = 25$).

Primary data consisted of individual debris index scores measured before and after the fruit-chewing interventions. Clinical examinations were performed using the Green and Vermillion Debris Index criteria across six index teeth: 16 (buccal), 11 (labial), 26 (buccal), 36 (lingual), 31 (labial), and 46 (lingual). The debris index scores were categorized into three levels: Good (0.0–0.6), Moderate (0.7–1.8), and Poor (1.9–3.0). Diagnostic instruments included dental mirrors, explorers, tweezers, personal protective equipment (PPE), and standardized examination forms [2].

Before intervention, baseline debris indices (pretest) were examined and recorded for all participants. Each participant was then provided with 100 grams of fresh fruit (either Malus sylvestris Mill. or Pachyrhizus erosus cut into 10 uniform pieces). Participants underwent standardized chewing instruction to chew the fruit 32 times across both sides of the jaw (16 cycles on the right side and 16 cycles on the left side). Examinations were overseen by the principal investigator and four calibrated enumerators. Post-intervention debris indices (posttest) were measured immediately after complete consumption [2].

Data underwent editing, coding, entry, and cleaning prior to statistical computation. Data normality was evaluated using the Shapiro-Wilk test. Univariate analysis was presented as mean scores and categorical frequency distributions of the debris index before and after intervention. Bivariate analysis was conducted using the Paired Sample T-Test to evaluate within-group differences in debris index before and after chewing. The Independent Sample T-Test was applied to compare the mean reduction of debris index between the apple and jicama groups. All statistical analyses were performed with a significance threshold set at $\alpha = 0.05$ ($p < 0.05$) [2].

3. RESULTS

A total of 50 fifth-grade students completed the study and were equally divided into the apple group ($n = 25$) and the jicama group ($n = 25$).

1.1 Debris Index Before and After Chewing Apple

As presented in Table 1, the mean debris index of participants in the apple group before intervention was 1.576, which corresponds to the moderate category. After chewing 100 grams of apple, the mean debris index significantly decreased to 0.620, improving to the good category. This intervention resulted in a mean score reduction of 0.956.

Table 1. Mean Debris Index Before and After Chewing Apple

Treatment Group	N	Mean Debris Index	Debris Category	Score Reduction
Before Chewing Apple	25	1,576	Moderate	0.956
After Chewing Apple	25	0,620	Good	

1.2 Debris Index Before and After Chewing Jicama

As shown in Table 2, the baseline mean debris index in the jicama group was 1.528 (moderate category). Following the jicama-chewing intervention, the mean debris index dropped to 0.556 (good category), yielding a mean reduction of 0.972.

Table 2. Mean Debris Index Before and After Chewing Jicama

Treatment Group	N	Mean Debris Index	Debris Category	Score Reduction
Before Chewing Jicama	25	1.528	Moderate	0.972
After Chewing Jicama	25	0.556	Good	

1.3 Statistical Analysis of Within-Group and Between-Group Differences

The Paired Sample T-Test demonstrated a statistically significant difference in debris index scores before and after intervention in both the apple group ($\boldsymbol{p = 0.000}$) and the jicama group ($\boldsymbol{p = 0.000}$) (Table 3).

Table 3. Paired Sample T-Test Results Within Treatment Groups

Treatment Group	N	Mean Debris Index	p-value
Before Chewing Apple	25	1.576	0.000
After Chewing Apple	25	0.620	
Before Chewing Jicama	25	1.528	0.000
After Chewing Jicama	25	0.556	

To compare the relative efficacy between the two fruits, an independent-samples t-test was performed on the mean reduction values. Although the jicama group exhibited a slightly higher mean reduction (0.972) compared to the apple group (0.956), the Independent Samples t-test yielded $p = 0.893$ ($p > 0.05$), indicating no statistically significant difference in debris index reduction between chewing apples and chewing jicama (Table 4).

Table 4. *Independent Sample T-Test Comparison Between Apple and Jicama Groups*

Treatment Group	N	Mean Reduction	p-value
Apple Group	25	0.956	0.893
Jicama Group	25	0.972	

4. DISCUSSION

The findings of this study confirm that chewing both apples and jicama significantly reduces the debris index in primary school children, shifting their oral hygiene status from moderate to good. The observed reductions are attributed to the synergistic combination of mechanical friction, high water content, and stimulated salivary flow during mastication [2].

The significant reduction in debris index following apple consumption ($p = 0.000$) aligns with mechanical cleansing principles. During mastication, the firm texture and high fibrous content of apples sweep across enamel surfaces, physically dislodging loosely attached food remnants. Furthermore, the natural tartness and organic acids present in apples act as gustatory stimuli that enhance salivary gland secretion. Increased salivary flow facilitates the mechanical flushing of the oral cavity and accelerates the dissolution of food particles [2]. These results corroborate previous findings by Nabila et al. [12] and Hartari et al. [14], who reported marked decreases in debris index following apple consumption due to natural self-cleansing mechanisms.

Similarly, jicama consumption demonstrated a significant reduction in debris index ($p = 0.000$). Jicama possesses a dense cellular matrix with high water and dietary fiber content. Chewing 100 grams of jicama requires substantial masticatory effort and muscular engagement, which induces friction against tooth surfaces and stimulates mechanoreceptors in the periodontal ligament, triggering profuse salivary output. The 32-cycle bilateral chewing protocol ensured uniform contact across both right and left dental arches, maximizing salivary distribution and debris clearance [2]. This outcome is consistent with research by Maulina et al. [15] and Trisnawati et al. [16], who observed significant oral hygiene improvements following jicama consumption in elementary school students.

Comparing the two interventions, the Independent Sample T-Test revealed no statistically significant difference between apple and jicama chewing ($p = 0.893$). Although jicama produced a numerically larger reduction (0.972 vs. 0.956), both fruits performed with comparable clinical efficacy. The slight descriptive edge of jicama may stem from its higher fiber density and resistance to initial bite pressure, requiring greater masticatory force. Conversely, apple counterbalances its slightly lower fiber density through gustatory stimulation via mild acidity, which boosts salivary secretion rate. Thus, while the physiological pathways differ slightly—jicama relying more on mechanical force and apple on gustatory stimulation—both achieve equivalent self-cleansing outcomes [2]. This finding supports Noviyanti et al. [17], who similarly reported no significant difference in plaque clearance efficacy between jicama and apple chewing.

These findings carry important practical and clinical implications for public health and school-based oral health initiatives. Because apples and jicama are widely available, affordable, and culturally accepted in regions like West Sumatra, incorporating them into daily dietary habits serves as an effective, non-pharmacological self-cleansing strategy. While fibrous fruits cannot replace regular tooth-brushing with fluoridated toothpaste, they represent a viable complementary approach for children to maintain oral cleanliness after meals during school hours when tooth-brushing facilities may be unavailable [2].

5. CONCLUSIONS RECOMMENDATIONS

This study evaluated and compared the effectiveness of chewing apples (Malus sylvestris Mill.) and jicama (Pachyrhizus erosus) on debris index reduction among fifth-grade elementary school students at SDN 07 Teladan Bukittinggi. Based on the statistical and clinical findings, the conclusions are drawn as follows:

1. Chewing 100 grams of apple significantly reduces the debris index in children from a moderate category (1.576) to a good category (0.620), yielding a mean score reduction of 0.956 ($p = 0.000$).
2. Chewing 100 grams of jicama significantly lowers the debris index from a moderate category (1.528) to a good category (0.556), yielding a mean score reduction of 0.972 ($p = 0.000$).
3. There is no statistically significant difference in debris index reduction between chewing apples and chewing jicama ($p = 0.893$). Both fibrous fruits demonstrate equivalent clinical efficacy as natural mechanical self-cleansing agents for improving oral hygiene in elementary school children

Based on the study findings and inherent limitations, several practical and future research recommendations are proposed. School authorities and healthcare practitioners are encouraged to integrate fibrous fruit consumption (such as apples and jicama) into school-based oral health promotion programs and School Dental Health Initiatives (UKGS). Consuming fibrous fruits after meals serves as an accessible, cost-effective, and enjoyable complementary self-cleansing practice, particularly during school hours when tooth-brushing facilities may be limited.

Future studies should consider extending the observation period to evaluate long-term debris index retention and plaque formation rates. Furthermore, researchers are advised to incorporate additional physiological parameters, such as direct saliva flow rate (salivary volume and pH) measurement, and compare other local fibrous fruits or vegetables to broaden the scope of natural oral self-cleansing strategies.

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UTILIZATION OF CORN COB HEMICELLULOSE IN SWELLING TABLET FORMULATIONS AS A NOVEL APPROACH OF DIETARY THERAPY

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Abstract

Weight loss through dietary modification and exercise is often difficult to sustain, while anti-obesity medications may be limited by adverse effects. Therefore, a safe and effective alternative is needed. Natural dietary fiber is a promising approach because it can suppress appetite and increase satiety. Hemicellulose derived from agricultural waste, particularly corn cobs, offers a sustainable raw material for developing swelling tablets. The incorporation of crosslinking agents, such as citric acid, polyvinyl alcohol (PVA), and sodium trimetaphosphate (STMP), is expected to improve tablet characteristics, swelling capacity, and water absorption.

This study aims to develop a swelling tablet formulation based on hemicellulose extracted from corn cob waste. Chemical modification of hemicellulose is intended to enhance its ability to form a gastrointestinal-resistant gel and increase water absorption capacity. This approach is expected to support weight management while improving the utilization of agricultural waste. The research also supports the National Medium-Term Development Plan (RPJMN), particularly Asta Cita 4 on strengthening human resources and public health through science-based interventions, and Asta Cita 5 on sustainable development and the green economy through agricultural waste utilization.

An experimental approach was employed to formulate and characterize hemicellulose-based swelling tablets. The research stages included: (1) raw material preparation; (2) hemicellulose extraction; (3) characterization of extracted hemicellulose; (4) swelling tablet formulation;

(5) evaluation of swelling behavior and water absorption capacity; and (6) data analysis to determine the optimum formulation.

Keywords: Innovation, Technology, Research Projects, etc.

1. INTRODUCTION

The prevalence of obesity continues to rese worldwide, including in Indonesia, making it on of the most serious public health challenges of the 21st century. Obesity is associated with an increased risk of various chronic diseases, including diabetes mellitus, cardiovascular diseases, stroke and other metabolic disorders. Conventional approach to obesity management, which primarily rely on reducing nutritional intake and increasing physical activity, ofen fail to achieve sustainable long-terms outcome. This is largely due

to difficulties in maintaining adherence to dietary and lifestyle medifications, as well as fluctuations in body weight and the tendency to regain weight after initial loss. Therefore, there is growing need for safe, effective and sustainable alternative strategies for long term weight management. Pharmacological therapies for obesity may be associated with adverse effects and high treatment costs, which can limit their accessibility and long-term use for some individual. Therefore, there is need to develop alternative approach that are safe, effective, affordable and widely acceptable to the community. Dietary fiber promotes faster and prolonged satiety through several mechanisms, including

increasing chewing time, increasing gastric volume, and enhancing the viscosity of the gastric and intestinal contents. These effects induce gastric distension, thereby delaying hunger signals (4,5). Viscous and highly swelling fibers are considered effective in suppressing appetite. Several studies have demonstrated that the consumption of viscous dietary fiber can significantly reduce body weight, body mass index (BMI), and waist circumference, even without strict caloric restriction. Furthermore, a high-fiber diet may reduce the risk of cardiovascular disease, diabetes, and certain types of cancer (6,7).

However, not all types of dietary fiber exert the same effects on weight reduction. Viscous soluble fibers tend to be more effective in suppressing appetite than insoluble fibers, such as bran and wheat fiber (3). One of the most promising materials as a source of hemicellulose is corn cob. Corn cobs are abundant agricultural waste in Indonesia and remain underutilized, which may contribute to environmental pollution. Corn cobs are rich in dietary fiber, accounting for approximately 80–90% of their dry weight. The fiber fraction of corn cobs is predominantly composed of cellulose and hemicellulose (8).



Figure 1 Corn cob

Corn cob contain approximately 35% xylan. Making them one of the most promising sources of non-starch dietary fiber for further development (9). Hemicellulose is a branched-chain polysaccharide, predominantly composed of arabinoxylan, with an amorphous structure and high water-absorption capacity. Therefore, modification of hemicellulose is required to enhance its swelling capacity and structural integrity, allowing it to swell fully without disintegrating upon water absorption (10). The incorporation of Citric Acid (CA), Polivinyl Alcohol (PVA), Tripolyphosphate (STTP) promotes the formation of a cross-linked gel network.

Study (2) reported that a late-stage clinical trial demonstrated the safety and efficacy of Plenity. Obese patients who consumed this hydrogel for 24 weeks experienced an average body weight reduction of 6.4% from baseline. In addition, natural dietary fibers have the advantage of low fermentability, resulting in minimal bloating and gastrointestinal

discomfort. A study investigating hemicellulose as a dietary supplement at a dose of 1–2 g/day reported that hemicellulose acts as a prebiotic by increasing Bifidobacteria in the gut and potentially reducing intestinal inflammation (9). Study (15) reported that hemicellulose is an abundant source of biopolymer that remains underutilized commercially. Study (16) further demonstrated that the combination of hydrophilic polymers, particularly chitosan and polyvinyl alcohol (PVA), can form hydrogels with good swelling capacity. The type and ratio of polymers play an important role in determining the degree of swelling, matrix strength, and release rate. Study (17) reported that a

crosslinking time of 10 minutes resulted in improved release and penetration profiles, possibly because the polymer network became less densely crosslinked and more porous. Therefore, the degree of intermolecular crosslinking should be optimized to enhance the swelling index.

2. METHODOLOGY

This study was conducted from March to September 2026 at the Laboratorium Terpadu Universitas Islam Negeri Sumatera Utara, Medan, Indonesia. The research was conducted in several stages using a laboratory-based experimental method, with corn cobs serving as the source of hemicellulose. The research procedures were carried out according to the following

2.1 Hemicellulosa Preparation Stage 1 Preparation of Corn Cob

The corn cob werw cleaned using 0.1 M hydrochloric acid (HCl) and then drained. The cleaned corn cobs were dred at 60 º C for 2 h. Subsequently, the dried corn cob were ground and sieved trough and 80 Mesh sieve. The resulting corn cob powder was then subjected to extraction using 80% ethanol.

Stage 2 Delignification

The corn cob powder was subjected to a delignification process using 2% potassium hydroxide (KOH) solution. Following delignification, the material was fitered and washed to remove residual alkali and other soluble components.

Stage 3 Hemicellulose extraction

Hemicellulose was extracted by preparing a suspension of the delignified pulp in 10% sodium hydroxide (NaOH) solution at a solid-to-liquid ratio of 1:10. The suspension was maintained at 50 ºC for 2 h. The resulting alkaline filtrate was subsequently neutralized to ph 5-6.

Stage 4 Hemicellulose Precipitation and Purification

Hemicellulose was precipitated by adding 95% ethanol at ratio of 2:1 and allowing the mixture to stand for 5 h at 4 ºC. The mixture was then centrifuged to separate the precipitated hemicellulose. The resulting precipitated was dried at 50 ºC and subsequently dialyzed for 24 h to remove residual salts and ather low-molecular weight impurities

Stage 5 Hydrolysis and Characterization

The extracted hemicellulose was subjected to hydrolysis using HCl 1% and heated at 100 ºC. Following hydrolysis, the solution was neutralized using sodium hydroxide (NaOH) and then filtered. The hemicellulosa sample obtained from corn cob extraction was subsequently subjected to a yield determination using following equation:

$$RY = \frac{Wt - Wo}{Wt} \times 100\%$$

Ry = Residual yield (%)
Wt = final weight
Wo = initial weight

2.2 Preparation of Hemicellulose-Based Swelling Tablets Preparation of the Hemicellulosa Solution

Hemicellulose (5 g) was dispersed in distilled water at a ratio of 1:20 (w/v) and stirred at 400 rpm until a homogeneous dispersion was obtained. The dispersion was then divided into three portions for the cross-linking reaction.

Crosslinking Chitosan/PVA

A 5% (w/v) PVA solution was prepared by dissolving PVA in distilled water at 80

°C. A 1% (w/v) chitosan solution was prepared in acetic acid solution. The PVA solution was then added to the chitosan solution, followed by the addition of the hemicellulose dispersion The mixture (60:25:15 % b/b) was stirred until a homogeneous formulation was obtained.

Crosslinking Chitosan/STPP

Citric acid (2% w/w) was then added to the Chitosan solution (1% in Acetic Acid), followed by the addition of the hemicellulose mixture as a cross-linking agent.

Crosslinking Chitosan/PVA/STPP

A 5% (w/v) PVA solution was prepared by dissolving PVA in distilled water at 80

°C. A 1% (w/v) chitosan solution was prepared in acetic acid solution. The PVA solution was then added to the chitosan solution, followed by the addition of TPP 2%, the hemicellulose dispersion The mixture was stirred until a homogeneous formulation was obtained.

The resulting mixture was added Citric Acid 2% and then dried at 50 °C. The dried material was subsequently passed through a 50-mesh sieve and compressed into tablets using a compression force of 5 kN.

The resulting hemicellulose was characterized based on its extraction yield and physicochemical properties using Fourier-transform infrared spectroscopy (FTIR), scanning electron microscopy (SEM) and X-ray diffraction (XRD)..

3. RESULTS

The isolated hemicellulose was obtained as a white powder. Lignin and hemicellulose were not effectively separated, resulting in a yield of less than 20%.

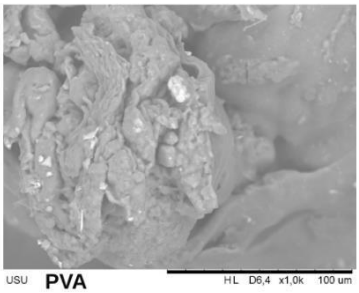
3.1 The results of the FTIR analysis are presented below

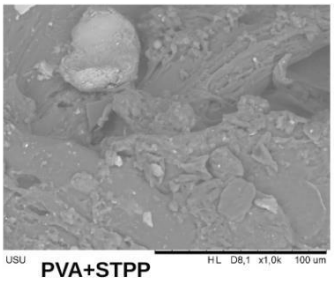
The formation of ester bonds between STPP and PVA was indicated by the presence of a C=C stretching band at approximately 1551 cm^{-1}, Keton 1692, C=0 (420-490)

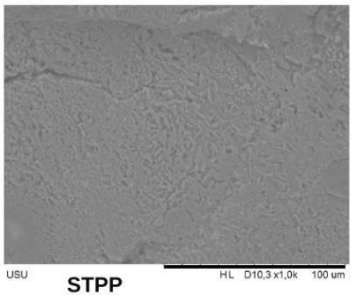
The formation of ionic interactions and cross-linked networks between STPP and

hemicellulose was indicated by the characteristic Aldyhade C=0 and C-0 bands of STPP in the range of 1200-1700 cm^{-1}.

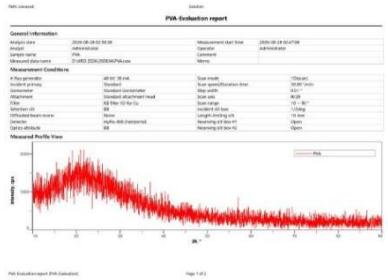
3.2 The results of the scanning electron microscopy (SEM) are presented below



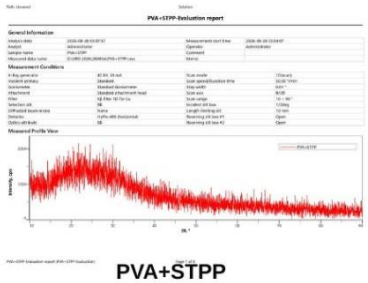




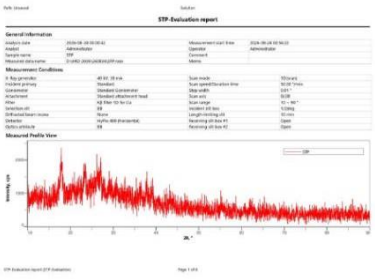
3.3 The results of the X-ray diffraction (XRD) are presented below



PVA



PVA+STPP



STPP

It exhibits a good degree of crystallinity based on XRD analysis, high porosity based on SEM analysis, as well as good thermal stability. The tablets possess moderate hardness and can swell gradually in the stomach, preventing them from easily disintegrating.

4. CONCLUSIONS

1. The combination of hemicellulose with chitosan–PVA and hemicellulose with chitosan–PVA–STPP formed cross-linked polymer networks, resulting in hydrogels with good swelling capacity, appropriate porosity, and an optimal degree of interchain cross-linking.
2. Cross-linking of hemicellulose with chitosan–STPP resulted in the formation of a more stable gel matrix.
3. The combination of hemicellulose with chitosan–PVA and hemicellulose with chitosan–PVA–STPP produced intact tablets without visible cracks, as confirmed by visual inspection. The tablets also exhibited relatively uniform weights across individual units.
4. The combination of hemicellulose with chitosan–PVA and hemicellulose with chitosan–PVA–STPP produced tablets with good swelling capacity, enabling them to expand while maintaining structural integrity without disintegration for 2–4 h.

ACKNOWLEDGEMENTS

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ASSOCIATION BETWEEN POSITIVE THINKING AND SELF-ESTEEM AMONG POST-MASTECTOMY PATIENTS AT JENDERAL AHMAD YANI GENERAL HOSPITAL IN METRO

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Abstract

Purpose: To determine the association between positive thinking and self-esteem among post-mastectomy patients at Jenderal Ahmad Yani General Hospital, Metro, Indonesia, in 2026. Methods: This quantitative analytical cross-sectional study involved 57 respondents selected by accidental sampling from a population of 131 patients. Data were collected using questionnaires from 2 to 9 March 2026. Positive thinking and self-esteem were classified into two categories each. The association was evaluated using a two-sided Fisher's exact test. An unadjusted odds ratio and 95% confidence interval were estimated. Findings: Positive thinking was reported by 48 respondents (84.2%), and high self-esteem by 45 (78.9%). Positive thinking was significantly associated with high self-esteem (p = 0.015; odds ratio = 7.321; 95% confidence interval: 1.570-34.146). Seven respondents with positive thinking had low self-esteem, while four with negative thinking had high self-esteem. Practical implications: The findings support attention to self-esteem and psychological needs during post-mastectomy nursing care. The cross-sectional design does not establish that positive thinking causes higher self-esteem; prospective studies are needed to evaluate this relationship.

Keywords: positive thinking; post-mastectomy; self-esteem

1. INTRODUCTION

Breast cancer remains a major health concern worldwide. The World Health Organization estimated that 2.4 million women were diagnosed with breast cancer and 694,000 people died from the disease globally in 2024 1 . In Indonesia, the 2021 national health profile reported 3,040 suspected breast cancer findings and 18,150 breast lump or tumour findings from screening 2 . These screening findings should be distinguished from confirmed cancer diagnoses. The burden of breast disease highlights the importance of care that addresses both treatment and patients' psychological needs.

Mastectomy can alter how patients perceive their bodies and evaluate themselves. A study of patients after unilateral mastectomy identified associations between body image disturbance, self-acceptance, perceived social support, and other clinical or personal characteristics3 . Self-esteem concerns a person's evaluation of their own worth and includes global and domain-specific aspects4 . In an Indonesian study, self-esteem was associated with quality of life among patients after mastectomy5 . Understanding self-esteem is therefore relevant to nursing care during recovery.

Positive thinking may be relevant to the way patients interpret physical changes and cope with illness. Recent trials have reported improvements in selected psychological outcomes following structured interventions involving mindfulness or cognitive behavioural approaches6, 7 . However, these interventions and their outcomes differ from positive thinking as assessed in an observational study. Evidence about psychological interventions cannot by itself establish an association between positive thinking and self-esteem in a particular clinical population.

A preliminary survey at Jenderal Ahmad Yani General Hospital, Metro, in November-December 2025 identified 21 patients undergoing mastectomy and 110 post-mastectomy patients attending routine follow-up and hormonal therapy at the oncology polyclinic. These local findings support attention to psychological needs after surgery. This study aimed to determine the association between positive thinking and self-esteem among post-mastectomy patients at this hospital in 2026.

2. METHODOLOGY

This quantitative study used an analytical cross-sectional design. It was conducted in the surgical ward and surgical oncology polyclinic of Jenderal Ahmad Yani General Hospital, Metro, Indonesia, from 2 to 9 March 2026. The study population comprised 131 post-mastectomy patients, and the sample consisted of 57 respondents selected using accidental sampling.

Eligible participants were patients who had undergone mastectomy at the hospital, were willing to participate, were fully conscious, and could communicate effectively. Patients with visual impairment, patients who were uncooperative, and those with cognitive impairment or severe mental disorders were excluded.

The independent variable was positive thinking, and the dependent variable was self-esteem. Data were collected using questionnaires assessing these variables. Positive thinking was classified as positive or negative, while self-esteem was classified as high or low. Frequencies and percentages were used to describe each variable.

The association was evaluated using a two-sided Fisher's exact test because one expected cell frequency in the two-by-two table was below five. Statistical significance was assessed at $p < 0.05$. An unadjusted odds ratio (OR) and its 95% confidence interval (CI) were used to describe the association between positive thinking and high self-esteem. Ethical approval was obtained from the Health Research Ethics Committee of Poltekkes Kemenkes Tanjungkarang under approval number 093/KEPK-TJK/II/2026.

3. RESULTS

3.1 Univariate Analysis

Positive thinking and high self-esteem were the predominant categories in the sample. The distributions of both variables are presented in Table 1.

Table 1. Distribution of positive thinking and self-esteem among respondents

Variable	Category	n	%
Positive thinking	Negative	9	15.8
Positive thinking	Positive	48	84.2
Self-esteem	Low	12	21.1
Self-esteem	High	45	78.9

Note: n = 57 for each variable.

3.2 Bivariate Analysis

Table 2 presents the distribution of self-esteem according to positive thinking category.

Table 2. Association between positive thinking and self-esteem among respondents

Positive thinking	High self-esteem n (%)	Low self-esteem n (%)	Total n (%)
Positive	41 (71.9)	7 (12.3)	48 (84.2)
Negative	4 (7.0)	5 (8.8)	9 (15.8)
Total	45 (78.9)	12 (21.1)	57 (100.0)

Note: Percentages use the total sample (n = 57) as the denominator. Two-sided Fisher's exact test: p = 0.015. OR = 7.321; 95% CI: 1.570-34.146, comparing positive with negative thinking for high self-esteem.

Positive thinking was significantly associated with self-esteem. Respondents with positive thinking had higher odds of high self-esteem than those with negative thinking (OR = 7.321; 95% CI: 1.570-34.146). The confidence interval was wide, indicating substantial uncertainty in the estimated magnitude of the association.

4. DISCUSSION

This study identified a significant association between positive thinking and self-esteem among post-mastectomy patients. The result is consistent with the proposed relationship between patients' thinking patterns and their evaluations of themselves. Nevertheless, the observed odds ratio describes an association at one point in time. It does not show that positive thinking causes an increase in self-esteem or that changing thinking patterns would produce the same magnitude of benefit.

Related intervention studies provide context for this finding. Pehlivan and Eyi reported improved self-esteem and body perception after mindfulness-based meditation and yoga among women undergoing modified radical mastectomy6 . Ream and colleagues found improvements in selected aspects of positive psychological well-being and coping self-efficacy following brief cognitive c therapy, but no significant intervention effects on optimism or benefit finding7 . These studies assessed different interventions and outcomes. They support further investigation of psychological care after breast cancer surgery, while providing indirect evidence for the specific association examined here.

The relationship was not uniform across respondents. Seven patients classified as having positive thinking nevertheless had low self-esteem, while four patients classified as having negative thinking had high self-esteem. These combinations indicate that thinking category alone does not fully describe an individual's self-esteem. Research on patients after mastectomy has associated body image with self-acceptance, perceived social support, and clinical characteristics3 , while self-esteem research distinguishes global evaluations from evaluations within specific life domains4 . These findings offer possible explanations for variation between patients. However, the present study did not evaluate these explanations, so the reasons for the two discordant groups cannot be established from its data.

For nursing practice, the findings suggest that assessment of self-esteem should accompany attention to patients' thinking patterns and psychological concerns. Positive thinking should not be assumed to exclude low self-esteem, and patients reporting negative thinking may still retain a strong sense of self-worth. Education, counselling, and appropriate psychological or family support may be considered according to individual needs. Their effects on self-esteem require evaluation through intervention research rather than inference from this cross-sectional association.

Several limitations should be considered. The cross-sectional design does not establish temporal order or causality. Accidental sampling at a single hospital limits generalisability. The negative-thinking group contained only nine respondents, contributing to imprecision in the odds ratio. Questionnaire responses may be affected by reporting bias, and dividing scores into two categories can conceal differences within each group. The bivariate analysis did not adjust for potential confounding factors.

Larger prospective studies with clearly specified measurement procedures and multivariable analyses are needed.

5. CONCLUSIONS

Among post-mastectomy patients at Jenderal Ahmad Yani General Hospital, Metro, in 2026, 45 respondents (78.9%) had high self-esteem. Positive thinking was demonstrated by 48 respondents (84.2%). There was a significant association between positive thinking and self-esteem (two-sided Fisher's exact test, p = 0.015).

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THE EFFECT OF EDUCATIONAL VIDEO MEDIA ON THE INCREASE OF KNOWLEDGE ABOUT SIBLING RIVALRY IN KINDERGARTEN

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Abstract

The Effect of Educational Video Media on Increasing Knowledge About Sibling Rivalry in Kindergartens in Kunciran Jaya, Tangerang.
Background: Sibling Rivalry is a situation where there is competition or between siblings which can endanger a person's personal and social adjustments. Sibling Rivalry can change behavior into regression, aggression or aggression or resentment towards parents and siblings, have a sense of competition or enthusiasm to compete, and there is jealousy or jealousy by seeking more attention which can create an unhealthy relationship. kind to others. Research objective: this research was conducted to determine the effect of educational video media on increasing knowledge about sibling rivalry in kindergartens in Kunciran Jaya, Tangerang. Research Methods: The research design is a quantitative research with quasi-experimental methods. Statistical tests were carried out using the normality test. If the results are normal, it will be continued with the dependent test until the t-test. If the resulting data is not normal, a non-parametric test will be carried out, namely the Wilcoxon test. Research results: paired t test results in the control group study p value 0.000 and the experimental group p value 0.000. the results of the independent t test showed that the average difference was small and the p value was 0.045 (<0.05). Conclusion: there is an average effect before and after giving educational video media on increasing parental sibling rivalry knowledge, but there is no significant effect on educational video media on increasing parental knowledge.

Keywords: Educational Video Media, Parents Knowledge Of Sibling Rivalry**.**

1. INTRODUCTION

To deal with sibling rivalry behavior, special parenting strategies are needed, which involve parents guiding early childhood competition in a way that has a positive impact on the family. Sibling rivalry is one of the common issues in families. With proper parenting, parents can still guide their children to grow and develop very well. Parents should also be fair to their children, which can help reduce sibling rivalry behavior. Various alternatives to reduce sibling rivalry behavior can include approaches that make children feel involved in the family. Therefore, if a child already has closeness and good interactions with their siblings, it is expected to help reduce sibling rivalry behavior. The reality approach can be used as an alternative in reducing sibling rivalry behavior. The reality approach views that an individual is considered problematic when trying to control others; essentially, only the individual themselves can control their own behavior. Every individual has a desire to be loved and to have someone, especially children who still want to be loved by their parents, and only they themselves actually have their parents.6

2. METHOD

The method used was a quasi-experimental method with a non-equivalent control group research design. This study was conducted with two groups, namely the control group and the experimental group, each consisting of 31 respondents. The same pre-test and post-test were given to both groups on the same day. The results of one group were compared after the other group completed the final test or post-test. Data analysis was done using a paired sample T-Test.

3. RESULTS

Based on Table 4.1, it shows that the average score of parents' knowledge about sibling rivalry before the intervention (pre-test) was 10.19, and after being given the intervention using an educational video, the average score (post-test) was 16.16.

Tabel 4.1 Parents' knowledge distribution before and after the intervention using an educational video about sibling rivalry.

Pre-test	10.19	9.00	3.060	31
Post-test	16.16	17.00	1.951	31

Paired T-Test

Table.4.2 The difference in parents' knowledge about sibling rivalry before and after the pre-test and post-test using educational videos

Hasil	Mean	Std. Error Mean	SD	N	P Value
Pre-test	10.19	.550	3.060	31	0.00
Post-test	16.16	.350	1.951	31	

4. DISCUSSION

Educational videos can increase parents' knowledge because they have advantages as outlined in theory, which states that educational videos can clarify message delivery so there isn't too much text, are not boring because they include images and sound, and the information can be received clearly and quickly to understand. This aligns with Annisa Ayu's research (2019), which states that sibling rivalry is a competition that causes jealousy between siblings, and in handling it, parents need to have knowledge about sibling rivalry to prevent it in children. In Dadang Darmawan's research (2018), it is stated that sibling rivalry is a competition between siblings for parents' attention and affection. This competition occurs after the arrival of a new sibling. The issue that arises in sibling rivalry is the lack of time and attention that a family has. The rate of child abuse committed by siblings is 26.6 %.

In Linda Oktaviani's 2022 study in Tangerang Regency, it was mentioned that 40% of mothers expressed feeling happy with the presence of their younger sibling. This was assessed through the

affection they showed to their younger sibling, such as prioritizing their sibling's needs and helping take care of them. However, the other 60% stated that their child experienced changes in behavior after their younger sibling was born, for example becoming more spoiled and constantly seeking attention from their parents, and even sometimes hitting their younger sibling when their parents were not watching.

Problems between siblings are often experienced within the family environment. In some cases, having different treatment for each child can lead to issues between siblings, such as jealousy, which can become a major problem for their relationship. Therefore, parents should be able to act as mediators and guide each child because it can create feelings of envy toward the sibling who is favored. Every individual has a desire to be loved and to have someone, especially children who still want to be loved by their parents and feel that they are the only ones who have them.

Based on Haryani's research, 65.55% of preschool-aged children show negative behavior towards their friends and siblings, such as pinching, hitting, and grabbing their friends' belongings. In addition, children also do unexpected things like snatching their younger sibling's toys or food roughly, biting, scratching, scolding loudly, and saying harsh words to their siblings. Meanwhile, according to A. Triana's research, many parents still think sibling rivalry is not an important issue, so they consider it normal and natural for children to experience it, even though sibling rivalry can form a bad personality that will affect the child's future life.

In line with Siti Muniroh's research (2018), it shows that sibling rivalry behavior in preschool children (ages 2-4) is influenced by the spacing between pregnancies. Therefore, it's really important to consider the age gap between children to prevent sibling rivalry. Having more than 4 years between births is better for preventing sibling rivalry because when a child is older than 4, they are more capable of understanding, comprehending, and being independent, which helps them accept their younger sibling more easily.

Based on the Independent T-Test, the results show that the post-test knowledge scores between the intervention group and the control group have a significant value of $p = 0.045$ (p value <0.05), which means there is a significant effect or difference in the use of educational videos when looking at academic education levels. From the data collected, the intervention group scored higher compared to the control group. The average post-test score for the group was 16.16, indicating its effectiveness in increasing parents' knowledge about sibling rivalry. Educational videos have been proven to be effective, which aligns with the previous paired t-test results that stated educational videos influence the difference in parents' knowledge improvement.

The prevalence of sibling rivalry according to McNerney and Joy in the U.S. shows that 55% of children aged 10-15 experience competition within their families, and 45% happens to children aged 2-6, which is considered high. Based on data from the Indonesian Child Protection Commission (KPAI) in 2017, 84.8% of sibling rivalry incidents occur in Indonesia, with 37.4% caused by fathers and 43.4% by mothers. If sibling rivalry is not dealt with promptly, it can lead to serious problems for a child's life in the long run. Therefore, proper handling is needed to reduce the high rates of sibling rivalry, including educational video awareness programs in the community.

Sibling rivalry arises due to factors like parents' attitudes and parenting styles towards their children, birth spacing—especially when it's too close—birth order, the gender of siblings, the number of siblings, and the influence of others. Forms of sibling rivalry include direct and indirect reactions. Direct reactions include hitting, pinching, or kicking. Meanwhile, indirect behaviors include acting out, being fussy, pretending to be sick, crying for no reason, and doing habits or things that haven't been done in a long time.

Educational videos are a type of media that include sound and images that can be seen, like video recordings, slides, audio, and so on, and they have a big impact on teaching about health, such as lessons on sibling rivalry. Educational videos can make messages clearer so they're not too wordy, help overcome limitations of space, time, and the senses—like showing very large objects in reality, pictures, frame films, or model films. Educational videos can also be used for tutorial lessons, making learning less boring, easier to understand, and quicker to grasp.

According to PMK RI No. 28 of 2017, midwives have the authority to carry out counseling and health education. In providing counseling and education, a midwife needs media or tools to help clients better understand the health education being given. Therefore, according to this study, educational videos can be used by midwives to deliver health education. Monitoring the growth and development

of preschool-aged children includes care, stimulation, and affection. The need for affection in preschool-aged children refers to emotional needs, where children receive love from their parents, a sense of safety and comfort, feeling valued by their surroundings, and so on. These needs will influence the child's life in the future.

Parenting style is really important for a child's future life. Having a good parenting style in the family will foster love and care among family members. So, the way parents raise their kids can affect the child's ability to face the world. Parents who raise their children with a bad parenting style can cause sibling rivalry. This aligns with Hulock's view in 1989, which stated that parents who treat the first child differently from the second can create feelings of envy and hatred, leading to competition and conflict between siblings.

5. CONCLUSION

Based on the results of the research and discussion above, it can be concluded that educational video media is effective in increasing parents' knowledge about sibling rivalry. This is shown by the fact that there is a difference in the average score of parents' knowledge about sibling rivalry before being given the educational video. There is a difference in the average score of parents' knowledge about sibling rivalry after being given the educational video. There is a difference in the average score of the effectiveness of the educational video on parents' knowledge about sibling rivalry.

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ASSOCIATION OF ACCEPTOR AGE, PERCEPTIONS OF CONTRACEPTIVE SIDE EFFECTS, AND COUNSELING QUALITY WITH THREE-MONTH INJECTABLE CONTRACEPTIVE SELECTION AT RSIA MASYITA MAKASSAR

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Abstract

Objective: This study aimed to examine the associations between acceptor age, perceptions of contraceptive side effects, counseling quality, and the selection of three-month injectable contraception at RSIA Masyita Makassar.
Methods: A quantitative cross-sectional study was conducted among 60 family planning acceptors recruited using accidental sampling. Data were collected through interviews and questionnaires assessing age, perceptions of contraceptive side effects, perceived counseling quality, and contraceptive method selection. Descriptive statistics were used to summarize the study variables, and bivariate associations were examined using the chi-square test at a significance level of 0.05.
Results: Of the 60 respondents, 41 (68.3%) were aged 20–35 years, 37 (61.7%) reported positive perceptions of contraceptive side effects, and 40 (66.7%) rated counseling quality as good. Overall, 34 respondents (56.7%) selected three-month injectable contraception. The reported chi-square analyses showed no statistically significant associations between method selection and age ($p = 0.771$), perceptions of side effects ($p = 0.986$), or counseling quality ($p = 0.854$).
Conclusion: No statistically significant associations were identified between the three examined variables and the selection of three-month injectable contraception in this sample. These findings should be interpreted in light of the cross-sectional design, sample size, sampling method, and the statistical assumptions underlying the analyses. Comprehensive, balanced, and understandable contraceptive counseling remains an important component of informed contraceptive decision-making.
Keywords: Acceptor age; contraceptive counseling; contraceptive side effects; injectable contraception; method selection

Keywords: Acceptor Age; Contraceptive Counseling; Contraceptive Side Effects; Injectable Contraception; Method Selection.

1. INTRODUCTION

Family planning is an essential component of reproductive health services because it enables individuals and couples to make informed decisions regarding pregnancy planning, birth spacing, and contraceptive use. Various contraceptive methods are available, including three-month and one-month injectable hormonal contraception. The selection of a contraceptive method may depend on reproductive intentions, individual preferences, previous contraceptive experiences, perceived side effects, and the information provided by healthcare professionals [1], [2].

Age may be relevant to contraceptive decision-making because individuals at different stages of reproductive life may have different fertility intentions, contraceptive experiences, and preferences. Previous research has examined age as a potential factor associated with contraceptive selection,

although its influence may vary across populations and service settings [3]. Age should therefore be considered alongside other individual and contextual factors rather than treated as an independent determinant of contraceptive choice.

Perceptions of contraceptive side effects may also influence the acceptability of a method. Concerns about menstrual changes, weight gain, and other possible complaints may affect an individual's willingness to initiate or continue a particular contraceptive method [4], [5]. However, perceptions may differ from actual clinical experiences and may be shaped by previous use, information received, and expectations. Understanding these perceptions can help healthcare providers address concerns and support informed decisions.

Counseling quality is another relevant aspect of family planning services. Effective counseling should provide balanced information about available methods, benefits, limitations, possible adverse effects, duration of use, and alternative options. It should also allow clients to ask questions, express their preferences, and participate in decisions about contraception. Previous studies have investigated the relationship between structured counseling, counseling quality, and contraceptive method selection [6], [7]. Nevertheless, the association may depend on the quality of service delivery, the range of available methods, and the characteristics of the population receiving counseling.

Service records from RSIA Masyita Makassar for January–May 2022 documented 592 family planning acceptors: 296 users of three-month injectable contraception, 293 users of one-month injectable contraception, and three implant users. These records indicate that three-month and one-month injectable methods accounted for nearly all recorded contraceptive use during the period. However, the aggregate figures alone do not explain why individual acceptors selected particular methods.

Against this background, the present study examined the associations of acceptor age, perceptions of contraceptive side effects, and perceived counseling quality with the selection of three-month injectable contraception at RSIA Masyita Makassar. The findings are intended to contribute to an understanding of contraceptive selection within this specific service setting.

2. METHODOLOGY

2.1 Study design and setting

This study employed a quantitative survey with a cross-sectional design at RSIA Masyita Makassar. Data were collected from family planning acceptors who attended the service and met the study's eligibility criteria. The exact data collection period and eligibility criteria should be specified in the final manuscript based on the original research records.

2.2 Population and sampling

The study included 60 family planning acceptors recruited using accidental sampling. Participants were selected from eligible acceptors encountered during the data collection period. Because this was a non-probability sampling method, the findings should be interpreted cautiously and should not automatically be generalized to all family planning acceptors in Makassar.

2.3 Variables and operational definitions

The independent variables were acceptor age, perceptions of contraceptive side effects, and perceived counseling quality. The dependent variable was the selection of three-month injectable hormonal contraception.

Age was categorized into three groups: younger than 20 years, 20–35 years, and older than 35 years. Perceptions of contraceptive side effects were classified as positive or negative based on questionnaire scores. Counseling quality was classified as good or less good according to respondents' assessments of the counseling received. Contraceptive selection was classified as selecting or not selecting the three-month injectable method.

The final manuscript should specify the questionnaire items, scoring procedures, cut-off values, and supporting references used to establish these categories. The direction and interpretation of the positive and negative perception scores should also be clearly explained.

2.4 Data collection and statistical analysis

Data were collected through interviews and questionnaire completion. The questionnaire covered respondent age, perceptions of contraceptive side effects, perceived counseling quality, and selected contraceptive method.

Descriptive analysis was conducted using frequencies and percentages. Associations between the independent variables and contraceptive selection were examined using the chi-square test, with a nominal significance level of 0.05.

The appropriateness of the chi-square test should be verified against the expected cell frequencies, particularly for the age categories. If its assumptions are not satisfied, an appropriate exact test should be considered. Statistical results should be finalized after verification against the original dataset and statistical output.

2.5 Ethical considerations

The final manuscript should report the applicable research ethics approval or exemption, the name of the approving institution, and the approval number where applicable. It should also explain how informed consent, confidentiality, and voluntary participation were addressed. These details must be obtained from the actual study documentation rather than inferred.

3. RESULTS

3.1 Distribution of study variables

A total of 60 family planning acceptors participated in the study. The distributions of age, perceptions of contraceptive side effects, perceived counseling quality, and three-month injectable contraceptive selection are presented in Table 1.

Table 1. Distribution of respondents according to study variables

Variable	n	%
Age		
<20 years	6	10.0
20–35 years	41	68.3
>35 years	13	21.7
Perceptions of contraceptive side effects		
Positive	37	61.7
Negative	23	38.3
Perceived counseling quality		
Good	40	66.7
Less good	20	33.3
Three-month injectable contraceptive selection		
Selected	34	56.7
Not selected	26	43.3
Total	**60**	**100.0**

The largest age group was 20–35 years, comprising 41 respondents (68.3%). Positive perceptions of contraceptive side effects were reported by 37 respondents (61.7%), while 40 respondents (66.7%) rated counseling quality as good. In total, 34 respondents (56.7%) selected three-month injectable contraception.

3.2 Association between age and contraceptive selection

The distribution of three-month injectable contraceptive selection across age categories is presented in Table 2.

Table 2. Association between age and three-month injectable contraceptive selection

Age group	Selected, n	Not selected, n	Total, n	Selected (%)
<20 years	4	2	6	66.7
20–35 years	22	19	41	53.7
>35 years	8	5	13	61.5
Total	**34**	**26**	**60**	**56.7**

The proportion selecting three-month injectable contraception was 66.7% among respondents younger than 20 years, 53.7% among those aged 20–35 years, and 61.5% among those older than 35 years. The reported chi-square analysis yielded $\chi^2 = 0.521$, df = 2, and p = 0.771. However, the test assumptions should be checked because some expected cell frequencies may be small.

3.3 Association between perceptions of side effects and contraceptive selection

Among respondents with positive perceptions of contraceptive side effects, 21 selected three-month injectable contraception and 16 did not. Among respondents with negative perceptions, 13 selected the method and 10 did not.

The reported chi-square test yielded $\chi^2 = 0.000$, df = 1, and p = 0.986. The observed proportions selecting the method were similar between the two perception groups.

3.4 Association between counseling quality and contraceptive selection

Among respondents who rated counseling quality as good, 23 selected three-month injectable contraception and 17 did not. Among those who rated counseling quality as less good, 11 selected the method and nine did not.

The reported chi-square test yielded $\chi^2 = 0.034$, df = 1, and p = 0.854. Although the proportion selecting the method differed slightly between the two counseling-quality groups, the reported analysis did not identify a statistically significant association.

4. DISCUSSION

4.1 Age and contraceptive selection

The findings showed no statistically significant association between age and selection of three-month injectable contraception based on the reported analysis (p = 0.771). Although the proportion selecting the method varied across age categories, the observed differences were not statistically significant under the reported test.

This finding does not establish that age has no relationship with contraceptive choice in other populations. The study included only 60 respondents, and the age categories contained unequal numbers of participants. In particular, only six respondents were younger than 20 years. These characteristics limit the precision of comparisons between age groups.

Contraceptive selection may also reflect factors that were not examined in this study, including reproductive intentions, parity, previous contraceptive experience, partner involvement, accessibility of methods, and individual preferences. Consequently, age should be interpreted as one potential correlate among several factors influencing contraceptive decision-making.

4.2 Perceptions of contraceptive side effects and contraceptive selection

The study found no statistically significant association between perceptions of contraceptive side effects and selection of three-month injectable contraception (p = 0.986). Of the respondents, 37 (61.7%) had positive perceptions and 23 (38.3%) had negative perceptions. The proportions selecting the method were nearly identical in the two groups.

One possible interpretation is that the perception categories used in this study did not distinguish respondents' contraceptive choices sufficiently. However, this explanation remains hypothetical and cannot be confirmed from the available data. The relationship may also depend on previous contraceptive experiences, the specific concerns held by respondents, the information provided during counseling, and the availability of alternative methods.

The questionnaire's scoring system and the meaning of positive and negative perceptions require particular attention. Without a clear operational definition and evidence of instrument validity, it is difficult to determine precisely what these categories represent. Future research could assess specific concerns about menstrual changes, weight gain, and other perceived effects rather than relying exclusively on an overall perception category.

4.3 Counseling quality and contraceptive selection

The reported analysis showed no statistically significant association between perceived counseling quality and selection of three-month injectable contraception (p = 0.854). Most respondents rated counseling quality as good, but the distribution of method selection did not differ significantly between the good and less-good counseling groups.

This result should not be interpreted as evidence that counseling quality is unimportant. The study measured respondents' assessments of counseling and examined their association with method selection at a single point in time. It did not establish whether counseling changed respondents' preferences, improved their understanding, or influenced continuation of the chosen method.

The use of a broad counseling-quality category may also have limited the ability to distinguish important dimensions of counseling, such as information about benefits and risks, discussion of alternatives, opportunities to ask questions, and respect for client preferences. Further research could examine these dimensions separately and assess whether the counseling received was consistent with informed, preference-sensitive contraceptive decision-making.

Previous studies have examined the relationship between structured counseling, counseling quality, and contraceptive selection [6], [7]. Differences between those findings and the present results may reflect variations in study populations, research designs, measurement instruments, service settings, or available contraceptive options. Direct comparison should therefore be made only after the specific methods and findings of the cited studies have been verified.

4.4 Study limitations and implications

Several limitations should be considered when interpreting the findings. First, the cross-sectional design permits an assessment of associations but does not establish causal relationships. Second, the relatively small sample and accidental sampling method limit statistical precision and generalizability. Third, the categorization of perceptions and counseling quality may have obscured differences within the original questionnaire scores. Fourth, the available manuscript does not provide sufficient information about instrument validation, potential confounding variables, or research ethics documentation.

The reported statistical tests also require verification against the original dataset, especially the age analysis, because small expected cell frequencies may affect the suitability of the chi-square approximation. The final conclusions should reflect the results of the appropriate analysis.

Despite these limitations, the findings provide a descriptive account of contraceptive selection among the respondents at RSIA Masyita Makassar. Family planning services should continue to provide balanced information, discuss possible side effects and available alternatives, and support clients in choosing methods consistent with their health conditions, reproductive intentions, and preferences.

5. CONCLUSIONS

In this sample of 60 family planning acceptors at RSIA Masyita Makassar, the reported analyses did not identify statistically significant associations between age ($p = 0.771$), perceptions of contraceptive side effects ($p = 0.986$), or perceived counseling quality ($p = 0.854$) and selection of three-month injectable contraception.

These findings should be interpreted cautiously because of the study's cross-sectional design, non-probability sampling, sample size, and the need to verify the assumptions of the statistical tests. The results do not establish that the examined factors are irrelevant to contraceptive decision-making in other settings.

Family planning services should continue to provide comprehensive, understandable, and balanced counseling that enables acceptors to compare available methods and make informed decisions according to their individual needs and preferences.

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THE RELATIONSHIP BETWEEN TODDLER AGE AND THE INCIDENCE OF STUNTING IN KUTAI KARTANEGARA DISTRICT

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Abstract

Background:Kutai Kartanegara Regency is the region with the highest prevalence of stunting in toddlers in East Kalimantan in 2022, reaching 27.1%. Toddler age is one of the characteristics of children that can be related to the incidence of stunting. The purpose of this study is to analyze the relationship between toddler age and the incidence of stunting in toddlers. Method: The type of research that will be conducted uses quantitative research. The research design used is a cross-sectional research design. The population in this study is stunted toddlers in the working area of a community health center in Kutai Kartanegara Regency, totaling 121 toddlers. The required sample size is 32 toddlers. Data analysis uses descriptive analysis and inferential analysis, namely the normality test and the Fisher exact test. Results: The results of toddler age, 40.6% of toddlers aged 1-3 and 3-5 years and 18.8% of toddlers aged 0-1 years. The results of toddler height are 81.3% of toddlers are not stunted and 18.8% of toddlers are stunted. The analysis results obtained a p-value of 0.007 (<0.05) which means there is a relationship between toddler age and the incidence of stunting. Conclusion: there is a relationship between toddler age and the incidence of stunting.

Keywords: Toddler; Age; Stunting

1. INTRODUCTION

Stunting is a linear growth problem in children related to long-term nutritional and health conditions. In 2020, an estimated 149.2 million children worldwide, or approximately 22% of children under five, experienced stunting. In Indonesia, the prevalence of stunting, according to the 2022 Indonesian Nutritional Status Survey (SSGI), was recorded at 21.6%, while the prevalence in East Kalimantan Province was 23.9%. Kutai Kartanegara Regency reportedly had a prevalence of 27.1% in the same year (1). These data indicate that stunting prevention remains a priority, including through strengthening child growth monitoring at the health service level.

Stunting can be related to various interacting factors, including adequate food intake, recurrent infections, parenting patterns, access to health services, sanitation conditions, food security, and the family's socioeconomic situation (2). Its impact is not only visible on physical growth but can also be related to the child's long-term development and health (3). Therefore, identifying groups of children who require more attention is important as part of prevention efforts.

Child age is one of the characteristics that has been studied in stunting research. A study of toddlers aged 12–59 months in Muaro Jambi reported a relationship between child age and stunting incidence (3). Analysis based on data from the Indonesia Family Life Survey also examined age as a factor associated with stunting in children in Indonesia (4). Other research using data from Indonesian children also identified age as a characteristic that needs to be considered, along with maternal factors and vaccination (5). These findings suggest that the relationship between age and stunting needs to be understood within the context of the population and other contributing factors.

Although the relationship between age and stunting has been previously studied, evidence from local populations remains useful for describing patterns found in specific service areas. This study focused on toddlers in the Teluk Dalam Community Health Center (Puskesmas Teluk Dalam) area, Kutai Kartanegara Regency. The results are expected to provide baseline information for health workers in strengthening growth monitoring and nutritional education tailored to children's needs. This study aimed to analyze the relationship between toddler age and stunting incidence.

2. METHODOLOGY

The type of research to be conducted will be quantitative research, namely research in the form of numbers or figures (Sunyoto, 2017). The research design used is a cross-sectional research design.

It began with secondary data collection to compile a research proposal conducted in April 2026, followed by submitting the proposal to Simlitabkes, then revising/improving the proposal and conducting a research ethics test.

The population in this study was 121 stunted toddlers in the Teluk Dalam Community Health Center work area. Since the researcher has a population of more than 100, the researcher can take between 20-25%. The required sample size is 32 toddlers who meet the inclusion criteria of being physically and mentally healthy, toddlers in the Teluk Dalam Community Health Center work area, and whose parents are willing to be respondents.

The processing of primary data obtained includes data entry, data processing and statistical data analysis carried out by computerization, namely by using the SPSS program to carry out data analysis with descriptive analysis and inferential analysis, namely the Normality Test, Fisher Exact Test.

3. RESULTS

4.1 Results

4.1.1 Respondent Characteristics

Table 3.1 Respondent Characteristics

Characteristics	Frequency	Presentation
Toddler Height		
Normal	26	81.3
Stunting	6	18.8
Toddler Weight		
Normal	32	100
Abnormal	0	0
Exclusive Breastfeeding		
Exclusive	32	100
Not Exclusive	0	0
Immunization		
Complete	8	25
Incomplete	24	75
Total	32	100

Source: Primary Data, 2026

Table 3.1 shows that 81.3% of children had normal height. 100% of children had normal weight. 100% of children were exclusively breastfed. 75% of children had incomplete immunizations.

4.1.2 Toddler Age

Table 3.2 Toddler Age

Toddler Age	Frequency	Presentation
0-1 Years	6	18.8
1-3 Years	13	40.6
3-5 Years	13	40.6
Total	32	100

Source: Primary Data, 2026

Based on table 3.2, the results obtained were 40.6% of toddlers aged 1-3 and 3-5 years and 18.8% of toddlers aged 0-1 years.

4.1.3 Toddler Stunting

Table 3.3 Stunting in Toddlers

Stunting	Frequency	Presentation
No Stunting	26	81.3
Stunting	6	18.8
Total	32	100

Source: Primary Data, 2026

Based on table 3.3, the results show that 81.3% of toddlers are not stunted and 18.8% of toddlers are stunted.

4.1.4 The Relationship Between Toddler Age and the Incidence of Stunting

Table 3.4 Relationship between Toddler Age and Stunting Incidence

		Stunting		Total	P-Value Fisher Exact
		No Stunting	Stunting		
Toddler Age	0-1 Years	6	0	6	0.007
	1-3 Years	13	0	13	
	3-5 Years	7	6	13	
Total				32	

Source: Data Analysis, 2026

Based on Table 3.4, the p-value was 0.007 (<0.05), which means there is a relationship between toddler age and the incidence of stunting.

4. DISCUSSION

4.1 Respondent Characteristics

a. Toddler Height

Based on research results, 87.5% of children have normal height. Toddler height is influenced by various interrelated factors, including genetics, nutritional status, health conditions, parenting styles, and the environment. Genetic factors, including parental height, contribute to a child's growth potential, but height growth is not solely determined

by heredity. Adequate nutritional intake, especially energy, protein, vitamins, and minerals, is crucial to support a child's linear growth. Long-term malnutrition can lead to growth disorders and increase the risk of stunting.(6).

b. Toddler Weight

Based on research results, 100% of children had a normal weight. Toddler weight is related to the incidence of stunting because it can reflect a child's growth and nutritional status. Children who are underweight may indicate nutritional problems that could potentially stunt growth if persisted over the long term. Insufficient energy and nutrient intake can lead to suboptimal growth and ultimately contribute to stunting.(7).

c. Exclusive Breastfeeding

Based on the research results, 100% of children were exclusively breastfed. This is in line with research(8)that breast milk is milk produced by the mother and contains all the nutrients needed by the baby for the baby's growth and development needs. Exclusive breastfeeding is when the baby is only given breast milk, without additional fluids such as formula milk, orange juice, honey, tea, water and without additional solid foods such as bananas, papaya, milk porridge, biscuits, rice porridge and porridge, for 6 months.

d. Immunization

Based on research results, 75% of children have incomplete immunization status. Increasing immunity against diseases in infants is done through injections. Incomplete immunizations weaken toddlers' immunity, making them susceptible to infectious diseases. Children who experience infections, if left untreated, are at risk of stunting.(9).

4.2 Toddler Age

Based on research results, 40.6% of mothers have toddlers aged 1-3 years and 3-5 years.(10)The majority of stunted toddlers are in the 24–59 month age group. This age group is a crucial period because nutritional needs increase with growth and development, while the impact of chronic malnutrition from earlier begins to become more apparent in height growth.

4.3 Toddler Stunting

Based on the research results, 81.3% of toddlers were not stunted and 18.8% were stunted. Stunting is defined as impaired linear growth with a height-for-age z-score of less than -2 SD below the median value based on the World Health Organization (WHO) Child Growth Standards.(11).

4.4 The Relationship Between Toddler Age and the Incidence of Stunting

Based on the analysis, there is a relationship between toddler age and stunting incidence. This is in line with research findings.(5)using data from the Indonesia Family Life Survey (IFLS) of 4,570 children aged 0–59 months. Multivariate results showed a relationship between age and stunting; compared to younger age groups, the 12–23 and 24–59 month groups had higher odds ratios for stunting in the study model.

Age is significantly associated with stunting, with older age showing a protective effect. Studies in Nepal and Nigeria reported that older children, particularly those aged 24–59 months, were more likely to be stunted than younger age groups; this suggests a gradual increase in the risk of stunting as children age. Children under 12 months are more vulnerable to stunting due to several key factors. This period is a critical period for growth, where risks include inadequate nutritional intake, such as suboptimal breastfeeding practices.(5).

This is in line with research(12)which states that stunting is influenced by the child's age, where children under 24 months have a 0.250 times (95% CI: 0.104–0.598) lower chance of avoiding stunting compared to children over 24 months.

A child's age is also related to the incidence of stunting in toddlers. Older children (aged 24–59 months) have a higher risk of stunting than younger children (aged 0–24 months). Stunting occurs when a toddler experiences malnutrition during the first 1,000 days of life. This condition begins to appear when a child is 2 years old. Inadequate food intake at this age results in unmet nutritional needs. This is also related to children's increasing nutritional needs as they grow and increase their physical activity.(12).

Stunting at an older age may reflect accumulated exposure to nutritional and health conditions from early life. After the period of exclusive breastfeeding, adequate complementary foods and family diets become crucial in meeting nutritional needs. Recurrent infections, sanitation quality, access to clean water, food security, parenting styles, socioeconomic conditions, and maternal and genetic factors may also play a role. The findings of this study support the importance of routine growth monitoring across all toddler age groups, with particular attention to older children and a comprehensive assessment of diet, medical history, household conditions, and the environment.

5. CONCLUSIONS

In a sample of 32 toddlers in the working area of Teluk Dalam Health Center, Kutai Kartanegara Regency, there was a relationship between age group and the incidence of stunting.

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COMPRESSES FOR HYPERTHERMIA MANAGEMENT IN CHILDREN WITH DENGUE HEMORRHAGIC FEVER: A TWO-CASE STUDY

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Abstract

Background: Hyperthermia is a common nursing problem in children with Dengue Haemorrhagic Fever (DHF). If not treated promptly, a persistent rise in body temperature can lead to serious complications such as seizures, neurological disorders and severe dehydration. This study aims to analyse the use of warm compresses as a nursing intervention to reduce body temperature in children with hyperthermia through a case study. Methods: A descriptive case study involving two research subjects, namely An. AA (8 years) and An. AM (4 years), both diagnosed with DHF and presenting with hyperthermia as a nursing problem. Nursing care was provided over three days in accordance with the Indonesian Standards for Nursing Diagnosis (SDKI), the Indonesian Standards for Nursing Outcomes (SLKI), and the Indonesian Standards for Nursing Interventions (SIKI). Warm compresses were applied to body folds, such as the axillae, using washcloths soaked in warm water at a temperature of 37–40°C for 15–20 minutes. The interventions were carried out with the involvement of the mother as the child's primary carer, in accordance with the principles of family-centred care. Results: A reduction in body temperature was observed in both subjects. Patient AA's body temperature fell from 37.7°C to 36.7°C; whilst Patient AM's body temperature fell from 39.0°C to 36.8°C by the end of the third day of care. The nursing problem of hyperthermia was deemed resolved in both subjects. Conclusion: Warm compresses proved effective as a non-pharmacological intervention in reducing the body temperature of children with hyperthermia resulting from dengue infection. Nurses can apply warm compresses as a non-pharmacological therapeutic measure for children with hyperthermia, whilst also educating families on how to apply warm compresses independently to ensure continuity of care at home.

Keywords: Children, Family-Centred Care, Hyperthermia, Nursing Care, Warm Compress

1. INTRODUCTION

Fever is one of the most common health issues in children with Dengue Haemorrhagic Fever (DHF), representing the body's natural response to combat dengue virus infection. Fever in children with DHF is characterised by a rise in body temperature above 38°C [1]. Data from [2] indicate that the incidence of fever worldwide reaches 17 million cases per year, with 600.000 deaths, and 70 per cent of cases occurring in Asia. In Indonesia, infectious diseases accompanied by fever symptoms, such as DHF, remain a major public health issue, particularly amongst children. Data obtained from [3] reported 257.271 cases of DHF with 1,461 deaths in 2024. The highest proportion of deaths was recorded in the 5–14 age group (47.92 per cent), followed by the 1–4 age group (13.43 per cent). These figures highlight the high incidence of fever in children with DHF both globally and in Indonesia.

Health data reports at the provincial level show figures that do not differ significantly from global and national data. Central Java Province recorded 17.636 cases of DHF throughout 2024 and 6,226 cases by mid-2025, with a total of 54 deaths, the majority of which occurred among school-aged children [4]. The Ir. Soekarno General Hospital in Sukoharjo reported 180 cases of DHF between April and June

2025, with a total of 3 deaths (Sukoharjo Regency Open Data, 2025). These figures illustrate the high incidence of fever, which requires immediate attention.

Research findings indicate that fever is the primary cause of children being admitted to hospital, accounting for 74 per cent of cases. This is linked to the implications of fever, namely an increased risk of clinical complications in children if it is not managed promptly and appropriately. A high body temperature leads to a loss of appetite, resulting in reduced nutritional intake whilst energy requirements increase. If this persists for a prolonged period, it can lead to dehydration and nutritional status disorders [1,5]. A rapid rise in temperature can trigger febrile convulsions in toddlers. Recurrent seizures carry the risk of damaging brain nerve cells and impairing the child's neurological function. Children with a fever usually also feel uncomfortable, are often fussy, have difficulty sleeping, and are restless. This situation not only reduces the child's comfort but also increases the anxiety of the parents caring for them [6,7].

A common nursing issue found in children with DHF and a fever is hyperthermia associated with the disease process (SDKI: D.0130). This nursing problem can lead to other nursing problems such as the risk of nutritional deficit (SDKI: D.0032) and impaired comfort (SDKI: D.0074) [8]. These nursing problems require comprehensive management, including monitoring body temperature, ensuring adequate fluid intake, and educating parents on the management of hyperthermia at home. Appropriate nursing interventions are expected to help reduce the child's body temperature, thereby increasing appetite and improving overall comfort.

Nursing care for children with hyperthermia, according to (SIKI DPP Working Group, 2018), can be provided through pharmacological and non-pharmacological measures. Pharmacological measures involve administering antipyretic medication (to reduce fever); whilst non-pharmacological measures include providing a cool environment, loosening or removing clothing, wetting and fanning the body's surface, administering oral fluids, changing bed linen daily or more frequently in cases of hyperhidrosis (profuse sweating), and applying external cooling methods such as warm compresses [9].

One non-pharmacological method for children with hyperthermia is the nursing intervention of warm compresses. This method involves covering the skin with a soft cloth or towel soaked in warm water at a temperature of approximately 34°C–37°C [10]. The benefits of warm compresses for children include lowering body temperature, improving blood circulation, reducing pain, providing a sense of warmth, comfort and calm, as well as facilitating the discharge of exudate and stimulating intestinal peristalsis [11–13] . When carrying out this intervention, nurses need to involve the family through a Family-Centred Care (FCC) approach. Nurses play a vital role in providing clear information, establishing open communication, and encouraging parents to actively support their child during the procedure. This family involvement can also reduce anxiety caused by hospitalisation and enhance the child's comfort [14].

This warm compress nursing intervention is supported by evidence-based research. Findings from [15] a study indicate that applying warm compresses to the forehead and armpits of children with DHF reduced body temperature from 38.0°C on the first day to 36.5°C on the third day. Another study [16] states that warm compresses are clinically proven to be effective in reducing hyperthermia in children through the induction of peripheral vasodilation, conduction, and evaporation. Warm compresses applied to areas of high vascular constriction, such as the armpits, forehead and groin, are thus able to regulate the hypothalamic set-point and gradually reduce core temperature by 0.8°C to 1.0°C in cases of hyperthermia in children with febrile convulsions [17].

The effectiveness of this thermoregulation is consistent with findings on warm hydrotherapy, such as localised warm water compresses, which can cause peripheral vasodilation to dissipate core heat to the skin's surface, resulting in a significant reduction in mean axillary temperature from 38.88°C to the normothermic threshold of 36.85°C within 60 minutes [16]. In contrast to cold compresses, which can cause paradoxical vasoconstriction, shivering, and increased oxygen consumption, warm compresses can provide a gentle reduction in temperature and optimal comfort during the stable (plateau) phase of fever [18]. This literature review demonstrates that warm compresses are beneficial for reducing body temperature in children with hyperthermia.

The results of a preliminary study conducted in the Flamboyan Ward of the Ir. Soekarno General Hospital in Sukoharjo over a period of approximately one month identified around seven children admitted with a diagnosis of Dengue Fever (DF) or Dengue Haemorrhagic Fever (DHF). The data showed that all children presented with a primary complaint of elevated body temperature as the

dominant clinical manifestation; consequently, hyperthermia became a priority nursing issue requiring immediate attention. This reinforces the urgency of implementing effective, safe, and self-administered non-pharmacological interventions by both nurses and families, one of which is the use of warm compresses. This phenomenon formed the basis for the author's case study to analyse the use of warm compresses to reduce body temperature in children with hyperthermia.

This study aims to describe and analyze two pediatric cases to provide insight into the clinical characteristics, nursing challenges, and considerations in providing nursing care for these conditions. The two cases were selected because they are clinically relevant and provide an opportunity to identify similarities and differences in clinical manifestations, nursing assessments, and care management. Through the analysis of these two cases, this study is expected to provide a deeper understanding of the importance of individualized pediatric nursing care and to support evidence-based clinical decision-making. The results of this study are also expected to serve as practical guidance for pediatric nurses in identifying patient needs, planning appropriate nursing interventions, and improving the quality and safety of pediatric nursing care.

2. METHODOLOGY

The research design was a case study aimed at analysing the administration of the nursing intervention of warm compresses to reduce body temperature in children with hyperthermia. A case study was chosen because it involves a series of nursing care processes, beginning with an assessment to collect data, analysing the data to formulate nursing diagnoses, developing a nursing care plan, implementing nursing interventions, and subsequently conducting an evaluation. A final evaluation was carried out to assess the reduction in body temperature based on the set targets [19,20].

This case study was conducted at the Ir. Soekarno General Hospital in Sukoharjo from December to January 2026. The sampling technique used was purposive sampling with the following inclusion criteria [21]: (1) Subjects comprised two children, both male and female, aged between 1 and 14 years. These two cases were selected to illustrate differences in clinical manifestations, nursing needs, and care management across different age groups, thereby providing practical insights into the delivery of individualized pediatric nursing interventions; (2) Children diagnosed with dengue hemorrhagic fever (DHF) and experiencing hyperthermia—defined as a body temperature above 37.5°C—were included in the study. Body temperature was measured using a digital thermometer placed in the axilla (armpit). Measurements were taken immediately before the warm compress intervention and 20 minutes after the intervention; and (3) Children and their families who were willing to participate in the study. The exclusion criteria for this study were: (1) Children in a state of medical emergency; and (2) Parents who were unable to communicate verbally or non-verbally.

The concepts investigated in this case study are: (1) Nursing care for children with hyperthermia is a systematic nursing process for children who experience a rise in body temperature above the normal range due to thermoregulatory failure. The nursing process comprises the assessment of vital signs and physiological responses, the establishment of a diagnosis of hyperthermia, the formulation of a nursing care plan, the implementation of independent physical interventions (such as warm compresses) and collaborative antipyretic measures, and the monitoring of body temperature stability; (2) Hyperthermia is defined as a child experiencing a rise in body temperature above the normal limit of >37.5°C due to dengue haemorrhagic fever (DHF); and (3) A warm compress is a method involving the application of a soft cloth or towel soaked in warm water at a temperature of approximately 34°C–37°C to the skin's surface, thereby providing a warm, comforting sensation and reducing body temperature. Warm compresses can be applied to the forehead and body folds such as the knees, elbows, armpits, groin, or the back of the neck for 20 minutes.

Primary data collection was carried out by assessing the child's medical history and main complaints through a medical history interview, observation (direct observation of the child) and physical examination (conducting a physical examination to obtain subjective and objective data through inspection, palpation, percussion and auscultation). Secondary data collection—including identity, demographics, diagnosis, and results of supporting examinations—was carried out by reviewing the child's medical records. The instruments used in the case study were an assessment form, a thermometer, a compress, the Standard Operating Procedure for warm compresses, and an observation sheet (respondent's name, age, gender, and body temperature measurements before and after the compress).

Data analysis was carried out using descriptive analysis presented in narrative and tabular form, with the aim of comparing the results of the case study on the use of warm compresses to reduce body temperature in children with hyperthermia with existing theories in the literature. Based on the data obtained, a nursing diagnosis was established— —in relation to existing theories on hyperthermia; subsequently, a care plan was drawn up, interventions were implemented, and an evaluation was carried out to determine whether these were consistent with existing theories.

This case study adhered to ethical principles in research. The researcher obtained informed consent in the form of a consent form signed or agreed upon between the researcher and the participants, with the consent form being provided to the child's parents. The researcher ensured the confidentiality of the case study subjects by only including the child's initials in the presented case study results, for example, An. X. This research was approved by the Health Research Ethics Committee of Dr Moewardi General Hospital, Surakarta, under Number: 2.371/XI/HREC/2025, on 20 November 2025.

3. RESULTS

3.1 First Case

A nursing assessment of An. AA was conducted on 23 December 2025 at 09:00 WIB in the Flamboyan Ward of the Ir. Soekarno General Hospital, Sukoharjo. An. AA is an 8-year-and-2-month-old girl of the Islamic faith, currently in Year 2 of primary school. The child was admitted to hospital on 21 December 2025 with a medical diagnosis of dengue haemorrhagic fever (DHF). The child's weight was 25.5 kg, and her height was 126 cm; her nutritional status, based on BMI-for-age, was in the median category.

The main complaint reported by the child's grandmother was that her granddaughter's fever had been fluctuating for the past 5 days. The grandmother stated that An. AA first developed a fever on the evening of 18 December 2025 at 19:00 WIB. On 20 December 2025 at 08:00 WIB, the child was taken to the A&E department at Ir. Soekarno General Hospital, Sukoharjo, where hospitalisation was recommended; however, the family declined. As the child's condition did not improve, the grandmother brought the child back for a check-up on 21 December 2025 because the fever persisted, accompanied by nausea and weakness. The child was subsequently admitted to the Flamboyan Ward at 21.20 with the following treatment plan: RL infusion at 65cc/hour, paracetamol injection at 250mg every 4 hours, ranitidine injection at 25mg every 12 hours, and ondansetron injection at 2.5mg every 8 hours.

At the time of the assessment on 23 December 2025, the child was alert and of sound mind and was neatly dressed. Examination of vital signs revealed a pulse rate of 121 beats per minute, a respiratory rate of 25 breaths per minute, and a body temperature of 37.7°C. The physical examination revealed the following: the lips appeared dry; the child's teeth were clean; there was no bleeding from the gums; and the tongue was clean. The skin was clean, with a reddish colour; there was no cyanosis of the nails; skin turgor was elastic; the skin felt warm to the touch; and there was no purpura or petechiae. The results of the haematology laboratory tests dated 23 December 2025 showed: haemoglobin 12.5 g/dL (normal, reference range 10.8–15.6), haematocrit 38.8% (normal, reference range 33–45), white blood cell count 3.7 × 10^3/µl (low, reference range 4.5–13.5), and platelet count 151 × 10^3/µl (low, reference range 184–488).

The nursing diagnosis established was hyperthermia related to the disease process (dengue virus infection), evidenced by a body temperature above the normal range (>37.5°C) and supported by subjective data: the child's grandmother reported that her grandchild had a high, fluctuating fever accompanied by dizziness, weakness and nausea. The nursing plan implemented included the application of warm compresses if the child's body temperature exceeded 37.5°C, for 15–20 minutes in the axillary region to stimulate the hypothalamus to lower the body's temperature set point; monitoring body temperature; administering oral fluids as required by the child; and advising the use of light, sweat-absorbent clothing. Collaboration with the medical team involved the administration of intravenous fluids (Ringer's Lactate infusion at 65 cc/hour and 48 cc/hour) and antipyretic medication (paracetamol infusion at 250 mg and 150 mg every 4 hours or when the child's body temperature exceeded 37.5°C). The care plan for Patient AA was implemented from 23 to 25 December 2025.

A summative evaluation was conducted on December 25, 2025. Subjective data obtained from the patient's grandmother indicated that the child had not had a fever since the previous night, was no longer complaining of dizziness, and had regained her appetite. Body temperature measurements were taken immediately before and 20 minutes after each application of a warm compress showed a decrease in temperature from 37.7°C to 37.5°C on the first day of the intervention and from 37.6°C to 37.1°C on the second day of the intervention. At the final evaluation on the third day, the child's body temperature was recorded at 36.7°C, indicating that it had returned to the normal range, making further application of warm compresses unnecessary. The final physical examination also revealed that the child's skin no longer felt warm to the touch, with a pulse rate of 105 beats per minute and a respiratory rate of 22 breaths per minute (Figure 1).

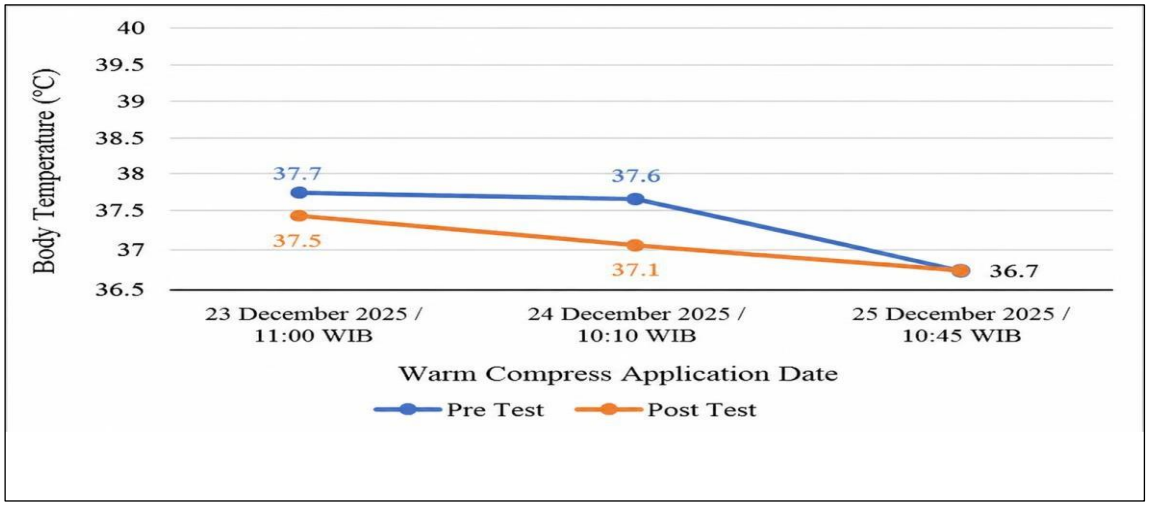


Figure 1. Evaluation of Body Temperature Reduction in Patient AA Before and After the Warm Compress Nursing Intervention

3.2 Case Two

A nursing assessment of Patient AM was conducted on 9 January 2026 at 11.00 WIB in the Flamboyan Ward of the Ir. Soekarno General Hospital, Sukoharjo. Patient AM is a 4-year-and-2-month-old girl of the Islamic faith, currently attending a pre-school (PAUD). The child was admitted to hospital on 8 January 2026 with a medical diagnosis of dengue haemorrhagic fever (DHF). Her weight was 13.5 kg, and her height was 100 cm. Her nutritional status, based on height-for-age (HAZ), was at -1SD; weight-for-age (WAZ) at -2SD; and weight-for-height (WHZ) at -1SD.

The main complaint reported by the child's mother was that her daughter's fever had not subsided. Based on the current medical history, the mother stated that An. AM had developed a fever on the morning of 6 January 2026 at 06:00 WIB. On 7 January 2026 at 18:00 WIB, the child was taken to the A&E department of Ir. Soekarno General Hospital, Sukoharjo, for examination and blood tests. The child was transferred to the Flamboyan Ward at 21:20 with the following treatment plan: RL infusion at 48 cc/hour, paracetamol injection at 140 mg every 4 hours, Ranitidine injection 15 mg every 12 hours, Ondansetron injection 1.5 mg every 8 hours, Paracetamol powder 140 mg every 4 hours, Ventolin nebuliser treatment every 8 hours, Gentamicin injection 35 mg every 12 hours, Nystatin drops 3 × 1 ml, and Cefotaxime injection 350 mg every 8 hours. Past medical history: An. AM had suffered from tuberculosis since the age of 2 and underwent treatment at Surakarta General Hospital from January 2023 to July 2023. The social environment history indicates that some neighbours have contracted dengue haemorrhagic fever and chikungunya.

At the time of assessment on 9 January 2026, the child was alert and oriented, and well-groomed. Vital signs revealed a pulse rate of 130 beats per minute, a respiratory rate of 24 breaths per minute, and a body temperature of 39°C. Physical examination revealed no bleeding from the gums, a clean tongue, a reddish skin colour, no cyanosis of the nails, elastic skin turgor, the child felt warm to the touch, and there were no purpura or petechiae. The results of the haematology

laboratory tests dated 10 January 2026 showed: haemoglobin 13.5 g/dL (normal, reference range 10.8–15.6), haematocrit 41.2% (normal, reference range 33–45), white blood cell count 3.1 × 10^3/µl (low, reference range 4.5–13.5), and platelet count 82 × 10^3/µl (low, reference range 184–488). Serological testing showed positive Anti-Dengue IgG (reference range: negative) and negative Anti-Dengue IgM, indicating a secondary dengue infection.

The established nursing diagnosis was hyperthermia related to the disease process (dengue virus infection), evidenced by a body temperature above the normal range (>37.5°C) and supported by subjective data: the child's mother reported that her child had a high fever that was not subsiding. On the second day of care, laboratory monitoring revealed that An. AM had experienced a drastic drop in platelet count to 82.10^3/µl, indicating that the child had entered a critical phase. Further findings included the family reporting that the child was drinking very little (inadequate oral fluid intake). In light of these circumstances, the researcher established a second nursing diagnosis: Risk of Shock, evidenced by the risk factor of the child's platelet count dropping drastically on the second day of care (82.10^3/µl).

The final evaluation results showed that An. AM's hyperthermia and risk of shock had been successfully managed. Warm compresses were applied for two days, with body temperature measurements taken immediately before and 20 minutes after each application. The measurements showed a decrease in body temperature from 39°C to 37.8°C on the first day and from 38.5°C to 37.5°C on the second day. In the final evaluation on the third day, the child's body temperature was recorded at 36.8°C, indicating that the temperature had stabilized within the normal range and the skin no longer appeared flushed. Meanwhile, shock was successfully prevented during the critical phase even though the platelet count dropped to 64 × 10^3/µL. This was supported by adequate fluid intake—approximately 1,200 mL per day—as well as the administration of Ringer's Lactate solution via intravenous infusion. The child's circulatory stability was demonstrated by monitoring of pulse rate, warm hands and feet, adequate urine output, and the absence of signs of bleeding. Therefore, nursing interventions were discontinued and replaced with education for the family regarding meeting fluid needs.

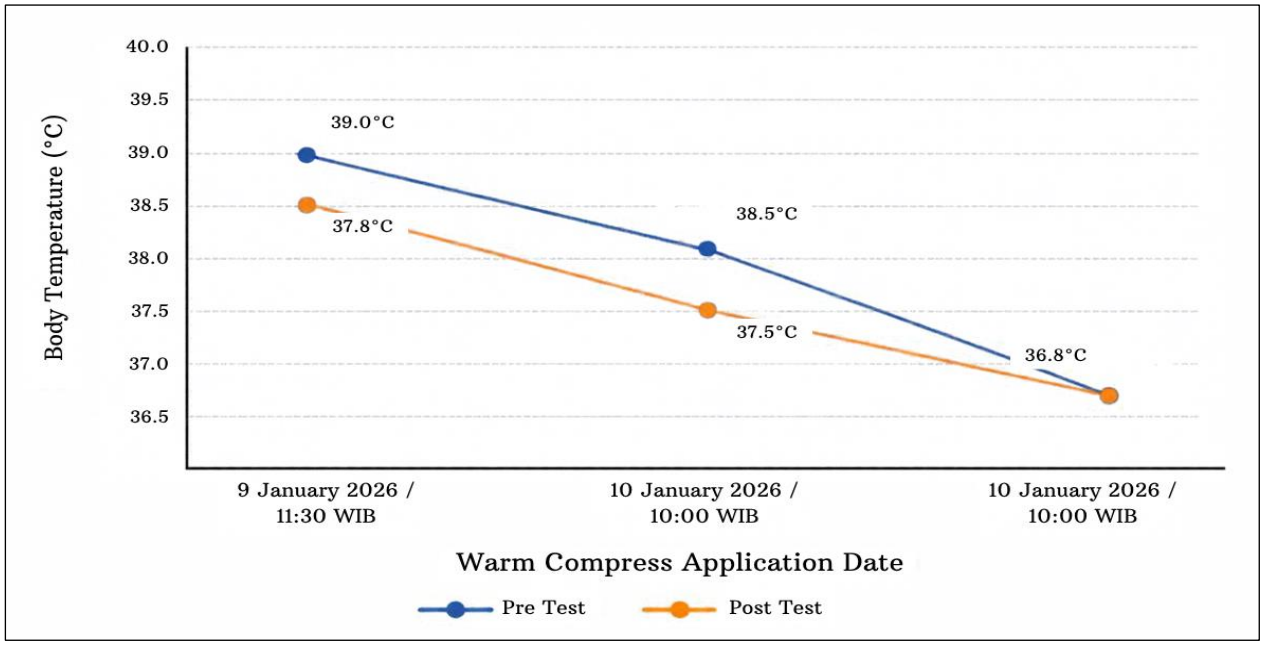


Figure 2. Assessment of Body Temperature Decrease in Patient AM Before and After the Warm Compress Nursing Intervention

4. DISCUSSION

4.1 Nursing Assessment

The results of the case studies on Patient AA and Patient AM in the Flamboyan Ward of the Ir. Soekarno General Hospital, Sukoharjo, revealed that both children experienced an elevated

body temperature as the primary manifestation of DHF. In Patient AA, the body temperature was recorded at 37.7°C with the skin feeling warm to the touch and appearing flushed; whilst in Patient AM, the body temperature reached 39°C accompanied by a pulse rate of 130 beats per minute and dry lips. Subjective data from the family indicated that the child's temperature had not subsided, that they were lethargic, and were drinking less.

The fever phase of dengue infection is characterised by a sudden rise in temperature to 38–40°C lasting 2–7 days, accompanied by malaise, anorexia and general weakness. These manifestations are consistent with the clinical findings observed in both children [22]. An elevated body temperature affects the cardiovascular system. Every 1°C rise in temperature can increase the heart rate by approximately 8–13 beats per minute as a compensatory response to increased metabolic demand. This is consistent with the findings in An. AM, who experienced tachycardia when their temperature reached 39°C. This response is a physiological mechanism by which the body maintains tissue perfusion and oxygen supply when metabolism increases due to fever [23].

In addition to the rise in temperature, patient AM was found to have a platelet count as low as 82,000/µL, indicating that the child had entered the critical phase of DHF. During this phase, increased capillary permeability may lead to plasma leakage and pose a risk of hypovolaemic shock. This condition is exacerbated by the fact that the child is not drinking enough and the mucous membranes of the lips appear dry, which confirms the presence of a risk of fluid volume depletion. The critical phase of DHF is characterised by plasma leakage, haemoconcentration, and a significant reduction in platelet count [22,24].

A comparison of the two cases shows that although both children experienced hyperthermia as the primary manifestation of DHF, their clinical conditions and nursing priorities differed. Patient AA had a relatively mild increase in body temperature (37.7°C), accompanied by warm skin and a flushed appearance, whereas Patient AM had a higher body temperature (39°C), tachycardia, dry lips, and a greater risk of fluid volume deficit during the critical phase. These differences highlight the importance of individualized pediatric nursing assessment, as managing body temperature alone is insufficient to meet the clinical needs of children with complex DHF.

4.2 Nursing Diagnosis

The assessment findings for Patient AA and Patient AM led to the establishment of the primary nursing diagnosis: hyperthermia related to the disease process (dengue virus infection), evidenced by a body temperature above the normal range (>37.5°C). This diagnosis was based on subjective data, including complaints of fluctuating fever, weakness, and inadequate fluid intake, as well as objective data, including elevated body temperature (37.7°C in Patient AA and 39°C in Patient AM), skin that felt warm to the touch, redness, and an increased pulse rate.

According to the Indonesian Nursing Diagnosis Standards (SDKI Working Group, DPP PPNI, 2016), hyperthermia is a condition in which body temperature rises above the normal range due to a failure of thermoregulatory mechanisms. This diagnosis is established when major signs—such as an elevated body temperature and warm skin—are present, and may be accompanied by minor signs such as tachycardia and flushed skin. These findings are also consistent with the research [25] which states that hyperthermia is a priority nursing issue in children with dengue haemorrhagic fever (DHF), where children generally exhibit a body temperature above 38°C accompanied by warm skin and an increased pulse rate as identifiable major signs. The clinical data for both children met these major and minor characteristics; therefore, both theoretically and clinically, the diagnosis of hyperthermia associated with the disease process (dengue virus infection) – evidenced by a body temperature above the normal range (>37.5°C) – is valid and can be established [26].

In the case of An. AM, an additional diagnosis was also established, namely risk of shock, evidenced by the risk factor of a drastic drop in the child's platelet count on the second day of treatment (82.10³/µl). This diagnosis arose because, on the second day of treatment, there was a significant decrease in platelets to 82,000/µL, indicating the critical phase of DHF, accompanied by clinical findings of reduced fluid intake and dry lip mucosa. The critical phase of dengue is characterised by increased capillary permeability, leading to plasma leakage and posing a risk of hypovolaemic shock if not adequately managed [22].

According to the Indonesian Nursing Diagnosis Standards (SDKI Working Group, DPP PPNI, 2016), the risk of shock is defined as a condition at risk of experiencing inadequate tissue perfusion due to circulatory impairment. Risk factors supporting this diagnosis include fluid loss, increased capillary permeability, and severe infectious disease. Laboratory findings, such as thrombocytopenia, and the child's clinical condition support the diagnosis of risk of shock [27]. The diagnostic priority in this case remains focused on hyperthermia as the immediate problem, as an elevated body temperature directly affects the child's comfort, increases metabolic demands, and accelerates fluid loss. This aligns with the principle of prioritising nursing problems based on urgency and the threat to the child's physiological stability. Meanwhile, the risk of shock in An. AM is a potential diagnosis requiring close monitoring to prevent complications [6].

The main difference between the two patients lies in the additional diagnosis of risk of shock in An. AM, which was not found in An. AA. Although both patients met the clinical criteria for hyperthermia, An. AM exhibited more severe clinical manifestations, including a higher body temperature (39°C), tachycardia, decreased fluid intake, dry lips, and a significant decrease in platelet count (82,000/µL). In contrast, An. AA primarily presented with mild hyperthermia (37.7°C), warm and flushed skin, and no additional clinical issues such as those found in An. AM. These differences indicate that diagnoses and nursing care priorities must be determined based on each patient's individual clinical findings, not merely on the shared diagnosis of dengue hemorrhagic fever (DHF). Therefore, Patient AM requires more intensive monitoring of hydration status, circulation, and potential signs of plasma leakage, whereas nursing care for Patient AA primarily focuses on managing body temperature and monitoring clinical responses.

4.3 Nursing Plan

Based on the nursing diagnosis of hyperthermia related to the disease process (dengue virus infection), evidenced by a body temperature above the normal range (>37.5°C), the planned nursing interventions for An. AA and An. AM focus on the management of hyperthermia through a non-pharmacological approach and close monitoring of the children's physiological condition. This plan was drawn up with reference to the outcomes set out in the Indonesian Nursing Outcomes Standards (SLKI Working Group, DPP PPNI, 2019), namely thermoregulation (L.14134) with indicators of a body temperature within the normal range (36.5–37.5°C), a pulse rate within the normal range for the child's age, no skin redness, and the child appearing more comfortable.

The main planned intervention is Hyperthermia Management (I.15506) in accordance with the Indonesian Nursing Intervention Standards (SIKI Working Group, DPP PPNI, 2018). To achieve the outcomes, the actions undertaken include: monitoring body temperature, monitoring vital signs, applying warm compresses to the axillary area, recommending increased fluid intake as tolerated, and providing education to the family regarding the warning signs of dengue fever. This intervention was selected because it is supportive, safe, and appropriate for children [26].

The warm compress intervention was chosen because it is supportive, safe, and appropriate for children. Warm compresses work by stimulating vasodilation of peripheral blood vessels, allowing body heat to be released through the skin. This intervention can be used as a non-pharmacological therapy to help reduce body temperature before or alongside pharmacological therapy, depending on the child's condition [16]. A study conducted by Marlina et al. (2023)on children with hyperthermia demonstrated a reduction in average body temperature of 1–2°C following a single application. These findings support the implementation of warm compresses as an evidence-based intervention in pediatric nursing practice.

Further interventions were carried out for Patient AM to manage the risk of shock; close monitoring of haemodynamic status was planned, including monitoring of blood pressure, pulse rate, capillary refill time (CRT), fluid balance, and laboratory results for platelet count and haematocrit (SIKI Working Group, DPP PPNI, 2018). Adequate fluid replacement is a crucial part of management, as fever can increase fluid loss from the body. This is consistent with findings emphasising that adequate fluid management is vital in preventing dengue cases from progressing to severe dengue in children. Appropriate management aims to maintain fluid balance and prevent complications during the fever phase [16,18].

The management of hyperthermia also indirectly supports efforts to prevent the risk of shock in children with DHF. During the fever phase, uncontrolled high fever is one of the main challenges as it can accelerate fluid loss, thereby worsening hypovolaemia, which carries a risk of leading to

shock [22]. Fever control is an important part of supportive management, given that high fever during the critical phase of DHF contributes to haemodynamic instability through mechanisms involving increased vascular permeability and an uncontrolled cytokine response. Effective management of hyperthermia using warm compresses not only reduces body temperature but also helps maintain the child's fluid balance and prevents deterioration into hypovolaemic shock [22,27].

The main difference in the planning of nursing interventions for the two patients lies in the additional focus on circulation and fluid management for Patient AM. Both patients received warm compresses, body temperature monitoring, vital sign checks, and hydration education to address hyperthermia. However, An. AM required additional monitoring of hemodynamic status, fluid balance, platelet count, and hematocrit due to the risk of shock and clinical signs suggesting possible fluid deficiency. In contrast, the care plan for An. AA primarily focused on regulating body temperature and maintaining adequate hydration. These differences highlight the importance of tailoring pediatric nursing interventions to individual clinical conditions, particularly regarding the risk of complications during the critical phase of DHF.

4.4 Nursing Implementation

Nursing care for Patient AA and Patient AM was provided over three days of hospitalisation, with the primary focus on the management of hyperthermia through the application of warm compresses and close monitoring of the children's physiological conditions. The implementation of these measures was based on an intervention plan drawn up in accordance with the Indonesian Nursing Intervention Standards (SIKI Working Group, DPP PPNI, 2018), specifically the intervention for hyperthermia management (I.15506). On the first day, the interventions carried out included measuring body temperature, monitoring pulse and respiratory rates, and applying warm compresses to the axillary area for 15–20 minutes using lukewarm water (±32–34°C). The choice of location for the compresses took into account areas with large blood vessels to accelerate the process of heat dissipation through peripheral vasodilation. Following the application of the warm compress, Patient AA's body temperature decreased from 37.7°C to 36.7°C; whilst Patient AM's decreased from 39°C to 36.8°C. This response indicates a physiological effect in the form of increased heat transfer from the body to the environment [18].

An increase in skin surface temperature can physiologically stimulate vasodilation of peripheral blood vessels, thereby accelerating heat loss mechanisms via conduction and evaporation. Conversely, exposure to cold temperatures can cause vasoconstriction and shivering. It is this mechanism that forms the scientific basis for why warm compresses are more strongly recommended in the non-pharmacological management of hyperthermia in children, as they work in harmony with the body's natural thermoregulatory system; whereas cold compresses actually trigger a counterproductive compensatory response [13].

On the second day, the intervention continued with regular monitoring of temperature and vital signs, as well as the reapplication of warm compresses when the temperature exceeded 37.5°C. In patient AM, there was a drop in platelet count to 82,000/µL, indicating the critical phase of DHF. Other hyperthermia interventions included close monitoring of haemodynamic status, including central venous pressure (CRT), fluid balance, and observation for signs of bleeding. The critical phase of dengue is a period of high risk for plasma leakage and shock; therefore, intensive monitoring is essential even as the temperature begins to fall [22].

This warm compress applies Myra E. Levine's Energy Conservation Nursing Theory Model. The principle of energy conservation is achieved through a warm compress that dilates blood vessels without triggering a shivering response, thereby conserving the child's metabolic reserves. A gradual reduction in body temperature safeguards brain nerve cells from the threat of febrile convulsions, thereby preserving structural integrity. The conservation of personal integrity is achieved by providing a soothing sensation of warmth, whilst minimising the child's fear and stress. The conservation of social integrity is implemented by actively involving parents during the application of the compress to reduce family anxiety and to foster independence in self-care at home [24,28].

During the application of warm compresses, nurses actively involve parents as part of the implementation of the Family-Centred Care concept; the family acts as a partner in the delivery of nursing care to support the child's comfort and cooperation during hospitalisation [23,29,30]. This is relevant to the conditions observed in both children, where, at the start of the warm compress

procedure, the children displayed fussy and uncooperative behaviour. Such reactions are commonly observed in children undergoing hospitalisation, as the unfamiliar hospital environment can trigger anxiety, fear and resistance to nursing interventions [30–32].

The differences in the implementation of nursing care for the two patients were primarily evident in the need for monitoring and additional interventions based on their respective clinical conditions. For Patient AA, the interventions over the course of three days focused primarily on managing hyperthermia through the application of warm compresses, monitoring body temperature, and vital signs. Meanwhile, for Patient AM, in addition to receiving the same hyperthermia management interventions, more intensive monitoring was required for hemodynamic status, fluid balance, platelet count, hematocrit, and signs of bleeding due to the risk of shock during the critical phase of DHF. Family involvement was also implemented for both patients to help improve the children's comfort and cooperation during procedures. These differences demonstrate that although the primary interventions provided were the same, the implementation of nursing care needed to be tailored to the severity of the condition and the risk of complications in each patient.

4.5 Nursing Evaluation

A nursing evaluation was carried out to assess the extent to which the planned outcomes were achieved following the application of warm compresses to Patient AA and Patient AM, who were diagnosed with hyperthermia related to the disease process (dengue virus infection), as evidenced by a body temperature above the normal range (>37.5°C). The evaluation refers to the Thermoregulation outcome (L.14134) in accordance with the Indonesian Nursing Outcome Standards (SLKI Working Group, DPP PPNI, 2019), the indicators of which include a body temperature within the normal range (36.5–37.5°C), a pulse rate within the normal range for their age, no skin redness, and the child appearing more comfortable.

On the first day, following the application of warm compresses for 15–20 minutes, both children's body temperatures decreased, although they had not yet fully returned to the normal range. Patient AA's temperature dropped from 37.7°C to 37.5°C, whilst Patient AM's fell from 39°C to 38.5°C. On the second day following the application of warm compresses, Patient AA's body temperature also fell further from 37.6°C to 37.1°C and showed no signs of excessive redness. Meanwhile, An. AM's temperature also fell from 37.8°C to 37.5°C, and the patient was in the critical phase with a platelet count of 82,000/µL. A decrease in body temperature in children still requires high vigilance, as during the critical phase of dengue, the risk of plasma leakage and shock increases. This is consistent with research by [33] which confirms that a drop in temperature in DHF does not always indicate improvement, but may instead be an early sign of the critical phase. Therefore, assessment should not only focus on body temperature, but also on the child's haemodynamic stability and fluid status.

On the third day, both children's body temperatures were within the normal range (Patient AA 36.8°C and Patient AM 37.1°C), their pulse rates were age-appropriate, their skin was no longer flushed, and they appeared more comfortable and were no longer fussy. Based on the indicators in the SLKI, it can be concluded that the thermoregulation outcome has been achieved. The results of the analysis indicate that the hyperthermia issue in both children has been resolved. The warm compress treatment administered was in line with the Hyperthermia Management guidelines (I.15506), namely monitoring temperature at regular intervals, applying external cooling (warm compresses), and recommending increased fluid intake. The evaluation results indicate that this intervention was effective in gradually reducing body temperature without causing side effects such as shivering. The findings of this case study are also consistent with the research by Marlina et al. (2023),which demonstrated that warm compresses are effective in significantly reducing the body temperature of children with hyperthermia within 15–20 minutes of treatment.

The results of the evaluation for both patients showed that the nursing outcome of thermoregulation was achieved after three days of intervention, as indicated by body temperature returning to the normal range, the skin no longer appearing red, a pulse rate appropriate for their age, and the children appearing more comfortable and less fussy. The difference lay in the response to the decrease in temperature and the accompanying clinical conditions. Patient AA reached a temperature of 36.8°C on the third day, while Patient AM reached 37.1°C with a condition requiring further monitoring due to a decrease in platelet count to 82,000/µL. Thus,

although the thermoregulation outcome was achieved in both patients, the evaluation of Patient AM continued to include monitoring of hemodynamic status and fluid balance to anticipate the risk of shock.

This case study has several limitations. First, the study findings are based on only two pediatric patients; therefore, their generalizability to the broader population of children with DHF remains limited. Second, the absence of a control group means that the observed decrease in body temperature cannot be definitively attributed to the warm compress intervention. Third, both patients also received other interventions simultaneously as part of the standard management of DHF, which may have contributed to changes in their clinical condition. Therefore, the independent effect of warm compresses on body temperature cannot be isolated. Further research with a larger sample size and an appropriate control group is needed to determine the effectiveness of warm compresses as a supportive intervention in the management of DHF in children.

5. CONCLUSIONS

This case study describes the application of warm compresses to the axillary region (at a temperature of 37°C–40°C for 15–20 minutes) in two children with dengue hemorrhagic fever (DHF) who were experiencing hyperthermia. After the intervention was carried out for three consecutive days, both patients showed a gradual decrease in body temperature until it reached the normal range (36.7°C–36.8°C), accompanied by an improvement in associated symptoms. These findings indicate that the application of warm compresses is associated with improved body temperature regulation in both cases. This intervention may be considered as a complementary nursing measure in the management of fever, involving families through a Family-Centered Care approach to support body temperature monitoring and home care for children. However, these findings are limited to two cases and therefore cannot definitively prove the intervention's effectiveness or its impact on the prevention of complications.

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THE EFFECT OF RED SPINACH JUICE AND HONEY ON CHANGES IN HEMOGLOBIN LEVELS AMONG PREGNANT WOMEN AT THE SENAPELAN COMMUNITY HEALTH CENTER (PUSKESMAS)

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Abstract

Anemia is a condition characterized by a decrease in hemoglobin (Hb) levels or a reduction in the number of red blood cells in the blood. The most common type of anemia among pregnant women is iron-deficiency anemia, which arises from an insufficient intake or inadequate stores of iron to meet the body's requirements during pregnancy. This study aims to analyze the effect of consuming red spinach juice mixed with honey on increasing hemoglobin levels in pregnant women in their second and third trimesters within the working area of the Senapelan Community Health Center (Puskesmas) in 2026. The study employs a quantitative approach with a pre-experimental, one-group pretest-posttest design. The sample consists of 30 pregnant women, selected using a total sampling technique. The study was conducted at the Senapelan Community Health Center from June 1 to June 21, 2026. Data analysis was performed using univariate and bivariate methods, while hypothesis testing was conducted using a paired-sample t-test. The intervention involved the consumption of 250 ml (approximately one glass) of red spinach juice once daily, before a meal, for 7 consecutive days. Hemoglobin levels were measured using an "Easy Touch" Hb monitoring device. The results show a mean change of 1.487 g/dL (11.460 – 9.973 = 1.487 g/dL), with a p-value of <0.001. This indicates a significant increase in hemoglobin levels among pregnant women in their second and third trimesters following the consumption of red spinach juice and honey. These findings are expected to serve as a reference for utilizing red spinach juice and honey as a non-pharmacological intervention to help increase hemoglobin levels in pregnant women, and to provide a foundation for future research.

Keywords: Pregnancy; Anemia; Hemoglobin; Amaranthus Tricolor; Honey.

1. INTRODUCTION

Anemia is a condition in which the volume of red blood cells in peripheral circulation falls below the normal range, thereby hindering the adequate transport of oxygen to tissues and impairing the body's normal physiological functions. Anemia has a significant impact on population health, hindering physical and cognitive growth, and ultimately affecting socio-economic development. This condition represents a serious global public health issue, particularly in low- and middle-income countries[1].

Approximately one-quarter of the world's population suffers from anemia. Children and women—especially pregnant women—are at a higher risk[2]. Based on its underlying causes, anemia can be classified into three types: anemia resulting from nutritional deficiencies, anemia associated with underlying diseases, and anemia caused by genetic factors. Deficiencies in iron,

folate, vitamin B12, vitamin A, vitamin C, and other nutrients can lead to nutritional-deficiency anemia—a condition frequently encountered in low- and middle-income countries [3].

Iron deficiency (ID) is a primary cause of anemia, accounting for approximately 50% of all cases. The occurrence of iron deficiency and iron-deficiency anemia (IDA) can be influenced by geographical, cultural, dietary, economic, and genetic factors (such as single-nucleotide polymorphisms in the *TMPRSS6* gene) [1]. IDA during pregnancy is linked to adverse health outcomes for both the mother and the infant, including preterm birth, infants who are small for their gestational age, low birth weight, and even perinatal mortality. Common preventive and management strategies for addressing iron deficiency and IDA during pregnancy include the administration of iron-containing supplements, medical treatment, and nutritional counseling regarding diet [4].

Anemia is a major public health issue, primarily affecting young children, pregnant and postpartum women, adolescent girls, and women of reproductive age who are menstruating. Globally, it is estimated that 40% of all children aged 6–59 months, 37% of pregnant women, and 30% of women aged 15–49 years suffer from anemia. It is estimated that anemia affects half a billion women aged 15–49 years and 269 million children aged 6–59 months worldwide. In 2019, 30% (539 million) of non-pregnant women and 37% (32 million) of pregnant women aged 15–49 years were affected by anemia. According to the WHO, the African and Southeast Asian regions are the most severely affected, with an estimated 106 million women and 103 million children suffering from anemia in Africa, and 244 million women and 83 million children in Southeast Asia. The WHO notes that low- and middle-income countries, such as Indonesia, are at the highest risk for high rates of anemia. This is supported by 2019 data, which indicates that Indonesia is among the countries with a high number of pregnant women suffering from severe anemia [5].

According to the Indonesian Ministry of Health (Kemenkes RI) in 2023, maternal and infant mortality rates in Indonesia remain the third highest in the ASEAN region, with anemia identified as a contributing factor to these high figures [6]. Data from the Riau Province Health Office indicates that there were 18,756 cases (34.23%) of anemia among pregnant women in 2021, 15,634 cases (21.15%) in 2022, and 19,187 cases (39.18%) in 2023, resulting in a three-year average of 31.52% [7].

The demand for iron increases significantly during the second and third trimesters of pregnancy as the pregnancy progresses. This increased iron requirement is essential to meet the mother's nutritional needs, support fetal growth and development, and prevent the onset of anemia. Although the expansion of blood volume in the second and third trimesters is not as pronounced as it is in early pregnancy, the need for iron continues to rise due to an increase in the mother's hemoglobin mass, the transfer of iron to the fetus, and a greater demand for oxygen driven by the fetus's rapid growth. If these iron requirements are not met, pregnant women are at risk of developing anemia, which can lead to various adverse health outcomes for both the mother and the fetus [8].

Anemia can have detrimental effects on both the mother and the fetus. In the mother, it may cause complications such as frequent dizziness, fainting, miscarriage, prolonged labor due to suboptimal uterine contractions, and postpartum hemorrhage. For the fetus, the consequences of maternal anemia include stunted fetal growth, premature birth, and the occurrence of congenital defects [9].

One non-pharmacological approach that can be used to help increase hemoglobin (Hb) levels in pregnant women is the consumption of red spinach juice. Iron deficiency during pregnancy is a primary cause of anemia, necessitating an intake of iron-rich foods.

Red spinach offers several advantages over other natural alternatives for boosting Hb levels in pregnant women. It contains iron, folic acid, vitamin C, and antioxidants—all of which play a crucial role in the formation of red blood cells. Furthermore, the vitamin C content in red spinach enhances optimal iron absorption, thereby supporting a more effective increase in hemoglobin levels. Additionally, red spinach is easily accessible, affordable, and can be prepared as a juice. Beyond its benefits for the mother, the nutrients in red spinach also support fetal growth and development throughout pregnancy [10].

Research conducted by Hayati (2025) indicates that, prior to the intervention, the average Hb level among the pregnant women studied was 9.63 mg/dL. Following the regular consumption of a blend of red spinach juice and honey, the average Hb level rose to 11.19 mg/dL—an increase of approximately 1.563 mg/dL—demonstrating that this juice is effective in raising Hb levels in anemic pregnant women. The study employed a pretest-posttest design without a control group, with a sample of 16 anemic pregnant women selected based on specific criteria (purposive sampling). The intervention consisted of a 150 ml mixture of red spinach juice and honey, consumed twice daily. Red spinach can thus serve as a natural alternative for addressing anemia during pregnancy [11].

The high prevalence of anemia among pregnant women during the second and third trimesters is a health issue that warrants significant attention. If left untreated, anemia can lead to complications for both the mother and the fetus. This can increase the risk of low birth weight and hemorrhaging, which may lead to morbidity and mortality for both mother and infant. A lack of awareness and understanding regarding the importance of nutrition and iron intake during pregnancy highlights the need for preventive measures and interventions to address anemia among pregnant women. Consequently, the researcher is interested in conducting a study titled "The Effect of Red Spinach Juice and Honey on Increasing Hemoglobin Levels in Pregnant Women in the Second and Third Trimesters."

2. METHODOLOGY

This study employs a pre-experimental design, specifically a one-group pretest–posttest design, without a control group. The materials and tools used to prepare the red spinach juice include 100 grams of red spinach, 250 ml of water, 1 tablespoon of honey, and an observation sheet. The intervention consists of the consumption of 250 ml (equivalent to one glass) of red spinach juice daily for seven days.

The study was conducted at the Senapelan Community Health Center (Puskesmas Senapelan) from June 1 to June 21, 2026. The population comprised all pregnant women in their second and third trimesters experiencing anemia within the working area of the Senapelan Community Health Center, totaling 30 individuals. A total sampling technique was used, meaning all members of the population who met the study criteria were included as participants. The final sample consisted of 30 respondents.

1. Inclusion Criteria

a. Pregnant women in their second or third trimester with mild anemia (hemoglobin levels of 9–10 g/dL)

b. Within the reproductive age range of 20–35 years

c. Willing to participate as respondents

d. Willing to consume 250 ml (equivalent to one glass) of red spinach juice once daily, before meals, for 7 consecutive days

3. RESULTS

a) Respondent Characteristics

Table1. 1. Respondent Characteristics by Age

Range Usia	F	Persentase
20	1	**3.3 %**
21	1	**3.3 %**
22	2	**6.7 %**

23	2	**6.7 %**
24	2	**6.7 %**
25	4	**13.3 %**
26	3	**10.0 %**
27	3	**10.0 %**
28	2	**6.7 %**
29	3	**10.0 %**
30	3	**10.0 %**
31	2	**6.7 %**
32	1	**3.3 %**
33	1	**3.3 %**
TOTAL	**30**	**100 %**

Based on Table 1.1, the characteristics of respondents by age in the working area of the Senapelan Community Health Center (Puskesmas) show a total of 30 respondents, ranging in age from 20 to 33 years old. The largest group of respondents is 25 years of age, consisting of 4 individuals (13.3%).

1) Analisa Univariat

a. **Average Hemoglobin Levels Before and After Administration of Red Spinach Juice**

The research results regarding the distribution of average hemoglobin levels among pregnant women in their second and third trimesters who were given red spinach juice—conducted within the working area of the Senapelan Community Health Center (Puskesmas) in 2026—are outlined as follows:

Table 1. 2. Distribution of Average Hemoglobin Levels Before and After the Administration of Red Spinach Juice and Honey

Perlakuan	N	Mean	Std.Dev	Min	Max
Sebelum diberikan jus bayam merah & madu	30	9.973	0.5078	9	10.8
Sesudah diberikan jus bayam merah	30	11.460	0.3035	11	12

Based on Table 1.2, it can be concluded that among 30 pregnant women in their second and third trimesters within the working area of the Senapelan Community Health Center (Puskesmas) in 2026, the mean hemoglobin level prior to the administration of red spinach juice was 9.973 g/dL, with a minimum value of 9 g/dL and a maximum value of 10.8 g/dL. Furthermore, it was found that among the same 30 pregnant women in their second and third trimesters in the Senapelan Community Health Center working area, the mean hemoglobin level following an

intervention consisting of red spinach juice and honey was 11.460 g/dL, with a minimum value of 11 g/dL and a maximum value of 12 g/dL.

2) Analisa Bivariat

The Effect of Red Spinach Juice Consumption on Increasing Hemoglobin Levels

The study results indicate an effect of consuming red spinach juice and honey on hemoglobin levels in pregnant women in their second and third trimesters at the Senapelan Community Health Center (Puskesmas) in 2026 :

Tabel 2.1 Analysis of the Effects Before and After the Administration of Red Spinach Juice and Honey

Perlakuan	N	Mean	Std. Dev	Sig
Sebelum	30	9.973	0, 2403	0.000
Sesudah		11.460	0, 2825	

Based on Table 4.4, it can be concluded that the mean hemoglobin level before the administration of red spinach juice and honey was 9.973 g/dL, while the mean hemoglobin level after the administration of red spinach juice and honey was 11.460 g/dL. Statistical analysis using a T-test yielded a p-value of 0.000 ($p < 0.05$), indicating that the administration of red spinach juice and honey has an effect on the hemoglobin levels of pregnant women in their second and third trimesters at the Senapelan Community Health Center (Puskesmas).

4. DISCUSSION

a) Analisa Bivariat

1) The Effect of Red Spinach Juice and Honey on Increasing Hemoglobin Levels

Based on Table 4.4, the mean hemoglobin level of pregnant women before the intervention—consisting of the administration of red spinach juice and honey—was 9.973 g/dL, which increased to 11.460 g/dL following the intervention. Statistical analysis using a Paired T-test yielded a p-value of 0.000 ($p < 0.05$), indicating a significant effect of the red spinach juice and honey intervention on increasing hemoglobin levels among pregnant women in the second and third trimesters within the working area of the Senapelan Community Health Center (Puskesmas) in 2026.

These findings are consistent with research conducted by Hayati, Sari, and Nasution (2025) at the Sumiariani Midwife Clinic. That study demonstrated an increase in hemoglobin levels among pregnant women following the administration of a combination of red spinach juice and honey. Prior to consuming the mixture, the mean hemoglobin level was 9.63 mg/dL, which rose to 11.19 mg/dL after the intervention. An average increase of approximately 1.563 mg/dL was observed, suggesting that this juice is effective in raising hemoglobin levels in pregnant women suffering from anemia. The statistical analysis resulted in a p-value of 0.000, confirming that the combination of red spinach juice and honey has a significant effect on increasing hemoglobin levels in pregnant women with anemia [11].

The results of this study are consistent with the research conducted by Intiyaswati and Primihastuti (2026) in the Darmo sub-district, Surabaya. The study showed that the mean hemoglobin level among pregnant women was 9.99 g/dL before consuming red spinach juice and honey, and 10.44 g/dL after the intervention. The mean difference between the measurements taken before and after the intervention was -0.45, indicating that the consumption of red spinach juice and honey has an effect on increasing hemoglobin levels. Both red spinach

and honey are considered to have a relatively high iron content. Their efficacy is further supported by their abundance of iron, folic acid, and vitamin C, which assist in the formation of red blood cells, the prevention of anemia, and the elevation of hemoglobin levels [12].

These findings also align with the study by Mizawati and Maigoda (2023), which indicated that the intervention variables (red spinach juice combined with iron tablets, or iron tablets alone) and parity had a similar effect on the hemoglobin levels of pregnant women at a private midwifery clinic (PMB) in Bengkulu City [13].

Based on the research conducted, it is concluded that the administration of red spinach juice combined with honey has a significant effect on increasing hemoglobin levels in pregnant women during the second and third trimesters. This increase is likely due to the iron (Fe) content in red spinach, which serves as a primary component for hemoglobin synthesis, while the vitamin C present in both red spinach and honey enhances iron absorption in the body. Furthermore, vitamin B12 and folic acid contribute to the formation of new red blood cells, thereby accelerating the rise in hemoglobin levels. Consequently, red spinach juice and honey can serve as a non-pharmacological, complementary therapy alongside iron tablet supplementation for the prevention and management of anemia in pregnant women.

5. CONCLUSIONS

The Mean Hemoglobin Level Among Pregnant Women In Their Second And Third Trimesters Prior To The Intervention—Consisting Of Red Spinach Juice And Honey—Was 9.973 G/Dl. Following The Intervention, The Mean Hemoglobin Level For This Group Was 11.460 G/Dl. There Is A Significant Effect Of Administering Red Spinach Juice And Honey On The Increase In Hemoglobin Levels Among Pregnant Women In Their Second And Third Trimesters Within The Working Area Of The Senapelan Community Health Center (Puskesmas) In 2026, With The Paired T-Test Yielding A P-Value Of 0.000 ($P < 0.05$).

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