VALIDITY AND PRACTICALITY OF A DASH DIET E-BOOKLET FOR PATIENTS WITH HYPERTENSION IN PRIMARY HEALTH CARE SETTINGS

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Abstract

Hypertension is a major non-communicable disease that requires appropriate dietary management to prevent complications. Educational media play an important role in improving patients' understanding of hypertension management, including the implementation of the Dietary Approaches to Stop Hypertension (DASH) diet. This study aimed to develop and evaluate the validity and practicality of a DASH Diet e-booklet for hypertensive patients in the working area of Lubuk Buaya Public Health Center, Padang. This research employed a Research and Development (R&D) approach using the ADDIE model consisting of Analysis, Design, Development, Implementation, and Evaluation stages. Product validation was conducted by two material experts and two media experts, while practicality testing involved 15 hypertensive patients. Data were collected using validation questionnaires, practicality questionnaires, and pre-test and post-test instruments. The results showed that the e-booklet obtained a validity score of 79% from material experts and 75% from media experts, both categorized as valid. The practicality test yielded a score of 84.27%, categorized as very practical. Furthermore, respondents' knowledge increased from 58% before intervention to 82% after intervention, indicating a 24% improvement. These findings indicate that the developed DASH Diet e-booklet is valid, practical, and potentially useful as an educational medium for hypertensive patients.

Keywords: DASH diet, e-booklet, hypertension, educational media, ADDIE.

1. INTRODUCTION

Hypertension is one of the most prevalent non-communicable diseases worldwide and is often referred to as a "silent killer" because it frequently develops without noticeable symptoms. According to the World Health Organization (WHO), approximately 33% of the global population experienced hypertension in 2023 [1]. In Indonesia, the prevalence of hypertension increased from 25.8% in 2013 to 34.11% in 2018 [2]. In West Sumatra, the prevalence among adults aged over 18 years reached 25.16%, while Padang City reported a prevalence of 21.75% [3].

Management of hypertension can be carried out through pharmacological and non-pharmacological approaches [4]. One recommended non-pharmacological strategy is the Dietary Approaches to Stop Hypertension (DASH) diet, which emphasizes reduced sodium intake, increased consumption of fruits, vegetables, fiber, and low-fat dairy products, as well as reduced intake of saturated fats [5]. Previous studies have shown that adherence to the DASH diet can effectively reduce blood pressure and improve hypertension control [5], [6].

Adequate knowledge is essential for successful dietary management among hypertensive patients. Previous studies have demonstrated a significant relationship between knowledge level and adherence to hypertension dietary recommendations. Therefore, educational interventions are necessary to improve patients' understanding and support healthy lifestyle modifications Previous research entitled "The Relationship between Knowledge Level and

Dietary Compliance in Hypertension Patients at Astambul Community Health Center" obtained a p-value of 0.000, indicating a significant relationship between knowledge level and dietary compliance in hypertension patients [7]. Another related study on knowledge level and adherence to hypertension diet among the elderly reported that 72.2% of elderly hypertension patients at Pajang Community Health Center had insufficient knowledge regarding hypertension management [8].

The rapid growth of smartphone use has created opportunities for delivering health education through digital media [9]. E-booklets offer several advantages, including easy accessibility, flexible distribution, attractive visual presentation, and the ability to provide more comprehensive information compared with conventional leaflets [10]. Digital educational media can therefore serve as an effective tool for disseminating health information.

The developed DASH Diet e-booklet differs from previously available health education media in several important ways, particularly in terms of format, content contextualization, and educational approach. Unlike conventional printed leaflets or static booklets, this e-booklet is designed as a digital learning medium that can be accessed through smartphones and other electronic devices, making it more flexible and suitable for patients in primary health care settings. Furthermore, the content is developed using a health literacy–based approach, ensuring that information is presented in simple language, clear visuals, and user-friendly explanations adapted to patients' educational levels. Importantly, the material is also contextualized to local dietary patterns, integrating DASH diet principles with commonly consumed Indonesian foods, which enhances relevance and practical applicability in daily life.

In addition to being informative, this e-booklet is designed to support self-management and behavioral change, which is a key requirement in hypertension control. Compared to leaflets that are often limited in content and quickly discarded, or earlier digital booklets that tend to be static and less structured, this e-booklet offers a more systematic, engaging, and reusable learning resource. It includes practical features such as portion guidance, sodium intake simplification, visual food guides, and daily dietary checklists, which strengthen patients' ability to implement dietary recommendations consistently. Therefore, this e-booklet is considered more effective in supporting patient education in primary health care because it combines accessibility, clarity, and practical application in a single learning medium.

Preliminary observations conducted at Lubuk Buaya Public Health Center indicated that hypertension education primarily relied on printed leaflets. Health workers reported several limitations, including limited information capacity, dense text presentation, and low visual attractiveness, which reduced patients' interest in reading educational materials. Consequently, there is a need to develop a more innovative and engaging educational medium. Therefore, this study aimed to develop and evaluate the validity and practicality of a DASH Diet e-booklet for hypertensive patients in the working area of Lubuk Buaya Public Health Center, Padang

2. METHODOLOGY

A This study employed a Research and Development (R&D) design using the ADDIE model, consisting of Analysis, Design, Development, Implementation, and Evaluation stages [11].

The research was conducted in the working area of Lubuk Buaya Public Health Center, Padang, from April 2025 to March 2026. The product developed in this study was a DASH Diet e-booklet intended as an educational medium for hypertensive patients.

Product validation involved four expert validators consisting of two material experts and two media experts. Practicality testing was conducted among 15 hypertensive patients selected through purposive sampling based on predetermined inclusion criteria [12]. The relatively small sample size used in this study, consisting of 2 expert validators and 15 hypertensive patients, is justified by the nature of this research as a Research and Development (R&D) study at the preliminary stage of product development. At this stage, the main objective is not to generalize findings to a broader population, but to assess the initial feasibility of the developed product, evaluate content and media validity, and examine the practicality of the e-booklet for end users. Early-stage product trials in R&D studies may appropriately involve small groups of approximately 10–20 participants, particularly in limited field testing or small group trials. Therefore, the use of 15 respondents in this study is considered adequate to obtain initial feedback on usability and practicality before progressing to larger-scale implementation. Consequently, the small sample size should not be viewed as a limitation, but rather as a methodological characteristic aligned with the preliminary development phase within the ADDIE model,

especially during the development and limited implementation stage. Respondents were required to be able to communicate effectively, read and write, operate a smartphone, and be willing to participate in the study.

Data collection was carried out using validation questionnaires, practicality questionnaires, and pre-test and post-test instruments. Validation data were used to assess the appropriateness of content and media design, while practicality data were used to evaluate ease of use, attractiveness, and comprehensibility of the developed product [11], [13], [14]. This study is positioned at the preliminary product development and limited field testing stage, where the developed e-booklet is still in its initial prototype form and continuously refined based on expert judgment. At this stage, practical testing is conducted only on a small and limited group of participants, and the study has not yet reached large-scale effectiveness testing. This approach aligns with the ADDIE development model, particularly the Development, Implementation (limited trial), and Evaluation stages, which emphasize iterative improvement before broader application. The research instrument used is a closed-ended questionnaire presented in a checklist format, where respondents are required to select predefined responses without open-ended items, using a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). This scale is applied in both the media validity and practicality tests. In terms of validity, the study applies content validity through expert judgment involving media and nutrition experts, where evaluation and revision are prioritized over statistical testing, while empirical validity using correlation-based statistical analysis is not conducted due to the preliminary nature of the study, which focuses on expert validation and initial practicality assessment rather than large-scale inferential analysis.

Data analysis was conducted using descriptive percentage analysis. The validity and practicality of the product were assessed by comparing the obtained scores with the maximum possible scores and converting them into percentage values. The results were then interpreted based on predetermined criteria for validity and practicality. In addition, pre-test and post-test data were used to assess changes in respondents' knowledge before and after using the developed educational media. Differences between pre-test and post-test scores were analyzed to identify changes in knowledge following the intervention [15], [16], [17]. The analysis of pre-test and post-test differences was conducted using a paired sample t-test for normally distributed data, the Wilcoxon signed-rank test for non-normally distributed data, and the normalized gain (N-Gain) to measure the level of improvement. This study was approved by the Health Research Ethics Committee of Universitas Perintis Indonesia (Protocol No. 25-09-1786). All participants provided informed consent prior to data collection.

3. RESULTS

3.1 Analysis Stage

The characteristics of the respondents in this study can be seen in Table 1.

Tabel 1. The characteristics of the respondents

No	Karakteristik	n	p
1	Jenis Kelamin		
	Laki-laki	6	40,0%
	Perempuan	9	60.0%
	Total	15	100.0%
2	Umur		
	35-45 tahun	4	26,7%
	46-55 tahun	8	53,3%
	> 55 tahun	3	20,0%
	Total	15	100.0%
3	Pendidikan		
	SD	0	0,0%
	SMP	2	13,3%
	SMA	7	46,7%
	PT	6	40,0%
	Total	15	100,0%

According to Table 4.1, 60% of the respondents were female, 53.3% were aged 46–55 years, and 46.7% had a Senior High School level of education.

The analysis stage identified several limitations of the educational media currently used for hypertension counseling at Lubuk Buaya Public Health Center. Existing leaflets provided limited space for information delivery, contained excessive text, and lacked attractive visual elements. These limitations reduced patients' interest in reading and hindered effective health education.

Based on these findings, an e-booklet was selected as an alternative educational medium because it allows more comprehensive information delivery, supports visual presentation, and can be distributed easily through smartphones. This is consistent with previous studies which

reported that booklets provide sufficient space to present more comprehensive information. In addition, e-booklets contain a greater number of pages. Booklets can therefore offer a more detailed and comprehensive overview of dietary management for patients with hypertension [18]

3.2 Design Stage

The design stage involved preparing educational content and designing the e-booklet layout. The content covered basic information about hypertension, classification, complications, risk factors, DASH diet principles, recommended food choices, sample menus, food exchange lists, warning signs for high-sodium foods, and practical dietary tips.

The e-booklet was developed using Canva Premium. Green, yellow, and red color schemes were selected to enhance readability and emphasize important information. Illustrations and visual elements were incorporated to improve user engagement and understanding. The color selection in this e-booklet was based on the meaning and psychological function of colors in health education media. Green was used as it is associated with health, balance, and freshness, and it can create a calming effect for readers. Red was applied as a warning sign to draw attention to limitations in the consumption of certain food ingredients for individuals with hypertension, while yellow was used to emphasize key points so that important information is more easily recognized and remembered. This combination of colors reflects careful consideration to enhance readability, reader comfort, and the effectiveness of health message delivery [19].

3.3 Development Stage

The development stage focused on producing the prototype and conducting product validation. The DASH Diet e-booklet was developed based on the results of the analysis and design stages. The developed product was validated by two material experts and two media experts. The validation results are presented in Table 1.

Table 2. Validity Test Results of the DASH Diet E - Booklet

	Validator	Percentage (%)	Category
1.	Material Experts	79.00	Valid
2.	Media Experts	75.00	Valid

Based on Table 1, the developed DASH Diet e-booklet met the validity criteria according to both material and media experts. The material experts suggested several revisions, including improving sentence structure, replacing inappropriate terminology, and clarifying dietary recommendations. Meanwhile, the media experts recommended improving color contrast, increasing text readability, adjusting illustrations, and enhancing visual consistency throughout the e-booklet. The suggested revisions were incorporated before proceeding to the implementation stage.

3.4 Implementation Stage

The implementation stage was conducted to assess the practicality of the developed DASH Diet e-booklet. The practicality test involved 15 hypertensive patients in the working area of Lubuk Buaya Public Health Center [20]. Respondents were asked to access and read the e-booklet using their smartphones

and subsequently complete the practicality questionnaire. The results of the practicality assessment are presented in Table 2.

Table 3. Practicality Test Results of the DASH Diet E-Booklet

	Assessment Aspect	Percentage (%)	Category
1.	Ease of Understanding	80.44	Practical
2.	Ease of Use	82.22	Very Practical
3.	Attractiveness	88.67	Very Practical
	Assessment Aspect	**Percentage (%)**	**Category**
	Average	**84.27**	**Very Practical**

Based on Table 2, the developed DASH Diet e-booklet was categorized as very practical. The highest score was obtained in the attractiveness aspect, indicating that respondents perceived the e-booklet as visually appealing and engaging. In addition, the scores for ease of understanding and ease of use suggest that the information presented in the e-booklet was accessible and easy for respondents to comprehend.

To further describe respondents' knowledge after using the developed e-booklet, pre-test and post-test evaluations were conducted. The average pre-test score was 58%, indicating a moderate level of knowledge. Following exposure to the e-booklet, the average post-test score increased to 82%, indicating a good level of knowledge. This represented an increase of 24% percentage points in respondents' knowledge regarding DASH dietary management.

Evaluation Stage

The evaluation stage was conducted to refine the product based on feedback from both content and media experts, ensuring that the developed DASH diet e-booklet is suitable for the subsequent practicality testing phase. The evaluation covered content accuracy, language use, and media design aspects. The following table presents the detailed revisions made based on expert validation.

Table 4. Product Revisions Based on Expert Validation

No.	Section	Validator Findings	Revision Performed
1	Hypertension risk factors (modifiable factors)	Inaccurate terminology in the dietary explanation	Replaced with "high-sodium foods"
2	Animal protein recommendations	Lack of specificity in examples	Clarified as "lean meat/skinless poultry"
3	Unhealthy food examples	Examples were too general and unclear	Revised into more specific examples, such as fast food, instant food, and preserved food
4	Terminology	The use of "salt" was considered less precise	Replaced with "sodium"
5	Color contrast	Poor readability due to high contrast	Adjusted to a softer color scheme
6	Font size	Text was too small in some sections	Increased the font size
7	Animation alignment	Animation was not fully aligned with the content	Revised for better consistency

The following figure illustrates one example of the product design after revision based on expert feedback.

Figure 1. Comparison of E-Booklet Design Before and After Revision

The findings indicate that the developed e-booklet successfully met validity and practicality requirements. The increase in respondents' knowledge also suggests that the e-booklet has potential as an effective educational medium for supporting hypertension management in primary healthcare settings.

Based on expert validation, several revisions were implemented to improve the quality and usability of the e-booklet. First, terminology related to dietary sodium was revised, replacing the term "salt" with "sodium" to ensure scientific accuracy and consistency with dietary guidelines. Second, dietary recommendations for animal protein were refined by adding clearer and more specific examples of healthy food choices. Third, examples of unhealthy foods were improved by providing more concrete and contextually relevant illustrations, such as fast food and processed foods, to enhance patient understanding. In addition, improvements were made in visual design aspects, including color contrast, font size, and alignment of animations and layout elements to increase readability and user engagement. The revised design demonstrated improved clarity, consistency, and overall visual communication, indicating that the e-booklet is more suitable as an educational medium for hypertensive patients in primary health care settings

4. CONCLUSIONS

The DASH Diet e-booklet was successfully developed using the ADDIE model through five stages: Analysis, Design, Development, Implementation, and Evaluation.

The developed e-booklet achieved a validity score of 79% from material experts and 75% from media experts, indicating that the product is valid for use as an educational medium. Practicality testing among hypertensive patients resulted in a score of 84.27%, categorized as very practical. Furthermore, respondents' knowledge increased from 58% before intervention to 82% after intervention, representing a 24% improvement. Therefore, the DASH Diet e-booklet can be considered a valid and highly practical educational medium for hypertensive patients and has the potential to support nutrition education activities in primary healthcare settings.

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