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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