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Correlation between the Level of Knowledge, Attitude, and Behaviour of the Community towards Diabetic Foot Ulcers at the Haji General Hospital East Java Province

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Abstract
Diabetes mellitus (DM) is a global health problem with a steadily increasing prevalence, including in Indonesia. One of the most serious chronic complications of DM is a diabetic foot ulcer. Public awareness of DFU prevention remains low; therefore, research to assess the community's level of knowledge, attitudes, and practices regarding DFU is essential to determine the extent to which preventive measures have been implemented. The aim is to determine the level of knowledge, attitudes, and practices of the community regarding diabetic foot ulcers at Haji Regional General Hospital, East Java Province. The method of this research is observational, with a cross-sectional approach. The Population consisted of patients at Haji Regional General Hospital in East Java Province who were diagnosed with diabetic foot ulcers. Inclusion criteria included adult patients who were willing to participate in the study. The sampling method used was consecutive sampling. Results: The highest proportion of respondents had poor knowledge (39.7%), good attitudes (52.9%), and poor practices (52.9%) regarding diabetic foot ulcers. The association between knowledge level and DFU had a p-value of 0.450 (>0.05), indicating no significant relationship. However, attitudes and practices toward DFU had p-values of 0.052 (<0.05) and 0.00 (<0.05), respectively, indicating a significant association between these variables and DFU among patients at Haji Regional General Hospital, East Java Province. In conclusion, the knowledge level was not significantly associated with the occurrence of diabetic foot ulcers. In contrast, attitude and practice levels showed a significant relationship with DFU among patients at Haji Regional General Hospital, East Java Province.

Keywords: Diabetic Foot Ulcer (DFU), Knowledge, Attitude, Practice, Behaviour

Introduction

Diabetes mellitus (DM) is a complex metabolic disorder primarily manifested by chronic hyperglycemia, or elevated blood glucose levels. This condition is caused by defects in insulin secretion, insulin action, or both, leading to various physiological complications. Diabetes mellitus (DM) is a global health problem with a steadily increasing prevalence. One of the most common and serious chronic complications of DM is diabetic foot ulcers (DFU), which can lead to lower limb amputation, disability, and reduced quality of life (Boulton et al., 2020).

The prevalence of diabetes is increasing globally at an alarming rate, with the International Diabetes Federation reporting 537 million people diagnosed with diabetes in 2021. This figure is expected to rise to 643 million by 2030 and reach 783 million by 2045 (Cho, 2018). In Africa, more than fifty per cent of adults with diabetes live in some of the continent's most populous countries, such as South Africa, Nigeria, and Ethiopia (Mutyambizi, 2018).

Diabetic foot ulcers occur due to a combination of diabetic neuropathy, impaired peripheral blood flow (angiopathy), and decreased wound healing. According to the WHO, approximately 15–25% of diabetic patients will develop a foot ulcer during their lifetime, and 85% of amputations in diabetic patients are preceded by poorly managed foot ulcers (WHO, 2020). The high incidence and complications of diabetic foot ulcers are often associated with delayed early detection and poor foot care and diabetes management practices (Al-Rubeaan et al., 2021).

Beyond the health implications, foot ulcers also pose a substantial financial burden on patients and the healthcare system. The costs associated with treating foot problems can be significant, including medical consultations, diagnostic tests, wound care supplies, and potential surgical interventions. Furthermore, the need for hospitalisation due to complications can result in additional healthcare costs and a loss of productivity for patients, who may be unable to work during their recovery (Bus, 2020).

Community behaviour in preventing diabetic foot ulcers encompasses knowledge, attitudes, and practices related to diabetic foot care. Recent studies have demonstrated that adopting good behaviours, such as regular foot examinations, wearing suitable footwear, maintaining foot hygiene, and controlling blood sugar levels, can significantly reduce the risk of foot ulcers (Mekonen et al., 2022).

However, in various regions, awareness and preventive behaviour remain low, leading to high rates of DFU and subsequent complications (Okello et al., 2021). This study assessed the level of public knowledge, attitudes, and behaviour regarding diabetic foot ulcers to determine the extent to which the community is implementing preventive measures.

Research methodology

The study, entitled "Correlation between the Level of Knowledge, Attitudes, and Behaviour of the Community towards Diabetic Foot Ulcers," used a descriptive analytical approach with a cross-sectional research design. This study was conducted at the Haji Regional Hospital, East Java Province, from May to August 2025. The Population in this study consists of all diabetic foot ulcer patients treated at the Haji Hospital in East Java Province. The sample used in this study is the Population of diabetic foot ulcer patients treated at the Haji Hospital of East Java Province who meet the inclusion and exclusion criteria.

The sampling method employed in this study was a purposive sampling technique, which involved fulfilling the inclusion and exclusion criteria. The inclusion criteria for this study were adults over 18 years old, patients with diabetic ulcers, and the ability to read and write. The exclusion criteria included diabetic ulcer patients who were uncooperative and unable to follow the research procedures. The instruments used in this study were a questionnaire and the Wagner scale to classify diabetic foot ulcers. The questionnaire was administered and completed by the respondents themselves after the researcher explained the intent and purpose, and they signed the consent form to participate. The researcher also maintained the principle of confidentiality.

This study conducted univariate and bivariate analyses. Univariate analysis presented data to distribute the frequency and percentage of each studied variable. Bivariate analysis examined the influence of knowledge, attitudes, and behaviour on the incidence of diabetic foot ulcers using the chi-square test.

The research, entitled 'Correlation between the Level of Knowledge, Attitudes, and Behaviour of the Community towards Diabetic Foot Ulcers at the Haji Regional General Hospital, East Java Province,' has passed a feasibility test by the health ethics committee at the Haji Regional General Hospital, with ethics number 445/156/KOM.ETIK/2025.

Results

Sixty-eight patients with diabetic foot ulcers were treated at the Haji Regional Hospital, East Java Province, from May to August 2025, who met the inclusion and exclusion criteria.

Table 1. Characteristics of Respondents with Diabetic Foot Ulcers Based on Age and Gender

Variable	n	Percentage (%)
Age		
20-30 years old	1	1.5 %
31-40 years old	3	4.4 %
41-50 years old	17	25 %

51-60 years old	30	44.1%
> 61 years old	17	25 %
Total	68	100 %
Gender		
Male	35	51.5 %
Female	33	48.5 %
Total	68	100 %

Based on Table 1 above, the majority of cases of diabetic ulcers were reported in the 51-60 age group, with 30 respondents (44.1%), followed by the 41-50 age group, with 17 respondents (25.7%), and the 61-year-old age group, with 17 respondents (25.7%). The fewest cases were in the 31-40 age group, with 3 (4.4%), and 1 respondent (1.5%) in the 20-30 age group.

Table 2. Characteristics of the level of knowledge, attitudes and behaviour of respondents with diabetic foot ulcers

Variable	Bad n (%)	Currently n (%)	Good n (%)	Mean	Median	Std. Deviation
Knowledge	27 (39.7%)	25 (36.8%)	16 (23.5%)	1,84	2.00	0.784
Attitude	0	32 (47.1%)	36 (52.9%)	2.53	3.00	0,503
Behavior	36 (52.9%)	26 (38.2%)	6 (8.8%)	1.56	1.00	0,655

Based on Table 2 above, the results show that the majority of diabetic foot ulcer patients seeking treatment in Indonesia have poor knowledge (27 (39.7%) respondents). The majority of diabetic foot ulcer patients seeking treatment in Indonesia have good attitudes (36 (52.9%) respondents). The majority of diabetic foot ulcer patients seeking treatment in Indonesia have poor behaviour (36 (52.9%) respondents).

Table 3. Characteristics of Respondents with Diabetic Foot Ulcers According to Wagner Criteria

Ulkus kaki diabetik Kriteria Wagner	Frequency	Percentage (%)	mean	median	Std. Deviation
Grade 0	0	0	3.18	3.00	1.145
Grade 1	4	5.9 %			
Grade 2	19	27.9 %			
Grade 3	14	20.6 %			
Grade 4	23	33.8 %			
Grade 5	8	11.8 %			
Total	68	100 %			

Based on the table above, the frequency distribution shows that the majority of diabetic foot ulcer patients treated at Haji Hospital were at Grade 4, namely Gangrene on the forefoot (23 respondents) (33.8%). The fewest diabetic foot ulcer patients were at Grade 1, with 4 respondents (5.9%), and Grade 5, with 8 respondents (11.8%).

Table 4. Analysis of the influence of knowledge level on diabetic ulcers

Diabetic foot ulcer Wagner criteria	Knowledge Level			P Value
	Bad	Currently	Good	
Grade 0	0	0	**0**	0.450*

Grade 1	1	3	0
Grade 2	9	7	3
Grade 3	5	6	3
Grade 4	7	8	8
Grade 5	5	1	2
Total	27	25	16

***P value > 0,005**

Based on the table above, it is evident that the majority of respondents had poor knowledge, with 27 individuals, and the most patients who experienced diabetic foot ulcers were at grade 4, comprising 23 individuals. The results of the square test with p = 0.450 showed that there was no significant relationship between the level of knowledge and diabetic foot ulcers.

Table 5. Analysis of the Influence of Attitude Levels on Diabetic Ulcers

Diabetic foot ulcer Wagner criteria	Attitude Level			P Value
	Bad	Currently	Good	
Grade 0	0	0	**0**	0.005*
Grade 1	0	1	3	
Grade 2	0	6	13	
Grade 3	0	5	9	
Grade 4	0	13	10	
Grade 5	0	7	1	
Total	0	32	36	

***P value > 0,005**

Based on the table above, it is evident that the majority of respondents had a good attitude, with 36 individuals, and the most patients experiencing diabetic foot ulcers were at grade 4, comprising 23 individuals. The results of the square test, with a p-value of 0.052, showed a significant relationship between the level of attitude towards diabetic foot ulcers.

Table 6. Analysis of the Influence of Behaviour Level on Diabetic Ulcers

Diabetic foot ulcer Wagner criteria	Behavior Level			P Value
	Bad	Currently	Good	
Grade 0	0	0	**0**	0.000*
Grade 1	4	0	0	
Grade 2	16	1	2	
Grade 3	10	2	2	
Grade 4	5	16	2	
Grade 5	1	7	0	
Total	36	26	6	

***P value > 0,005**

Based on the table above, it shows that the most respondents have bad behaviour, as many as 36 people, and the most patients who experienced diabetic foot ulcers were at grade 4, as many as 23 people. The results of the square test, with a p-value of 0.000, indicate a significant relationship between the level of behaviour and diabetic foot ulcers.

Discussion

In patients with diabetes mellitus, knowledge reflects their understanding of diabetes, its complications, and preventive measures for diabetic foot ulcers (DFU). Patient attitudes serve as a bridge between knowledge and action. Attitudes also reflect patients' affective and motivational evaluations of the importance of foot care, which predispose them to health behaviours. Patient behaviour is the most crucial factor because it

directly impacts daily activities, such as washing feet regularly, checking for minor wounds, maintaining blood sugar levels, and wearing appropriate footwear.

The results of this study indicate that the majority of respondents (39.7%) had insufficient knowledge regarding the prevention of DFU. However, statistical analysis revealed no significant relationship between the level of knowledge and the incidence of DFU ($p = 0.450$). This study is in line with the findings of Alsaigh et al. (2022), who reported that good knowledge influences DM and diabetic foot care. According to Alrashed (2024), patients with higher levels of education have better knowledge and practices of diabetic foot care than those with lower levels of education. Therefore, it is crucial to assess patients' knowledge and practices of diabetic foot care, particularly in relation to educational level, to identify areas for improvement.

These findings confirm that many patients do have a general understanding of diabetes and the risk of DFU, but not all translate this understanding into daily actions. This can be caused by various factors, such as low motivation, limited time, long-standing habits that are difficult to change, and external factors such as family support and socioeconomic conditions. Therefore, good knowledge does not automatically guarantee DFU prevention. These results align with research in Iran, which showed a significant correlation between knowledge and foot care practices. Most respondents had low knowledge (84.8%) and poor foot care practices (49.6%) (Pourkazemi, 2020).

These results differ from research generally showing a significant association between knowledge and diabetic foot ulcers. A cross-sectional study of 483 individuals showed a significant correlation between knowledge and attitudes regarding DFU prevention. Education and marital status influenced knowledge and practice (Awwad and Khader, 2022). A community survey revealed low knowledge about diabetic foot care, but significant differences in practice were observed between groups with and without diabetes or relatives of individuals with diabetes (Alshaikh, 2023).

This study found no significant association between education level and knowledge. This is likely due to limited and inadequate sources of information about diabetes at the community level, resulting in both educated and uneducated groups experiencing a lack of knowledge. This situation requires further research to identify and address the causes (Pourkazemi et al. 2020).

In contrast to knowledge, patient attitudes in this study tended to be more positive, with the majority of respondents expressing a favourable attitude toward DFU prevention (52.9%). Analysis showed that attitude was associated with DFU incidence ($p = 0.052$). Attitude reflects affective and motivational evaluations that influence an individual's readiness to act. Patients with positive attitudes tended to be more cautious, responsive to minor wounds, and more consistent in maintaining foot hygiene.

A community-scale study of knowledge, behaviour, and attitudes in rural North China (n=1,080) showed significant correlations between the components: knowledge was positively associated with both attitude ($r \approx 0.31$) and behaviour ($r \approx 0.26$), with attitude having the strongest relationship with behaviour ($r \approx 0.70$). This suggests that increased knowledge tends to improve attitudes, and positive attitudes, in turn, lead to better foot care practices (Jia, 2022).

The knowledge-practice gap is significant, with many populations having moderate to positive knowledge/attitudes. Still, daily practices (such as examining feet, wearing appropriate footwear, and seeking help when problems arise) remain low. This appears consistent across China, Palestine, Saudi Arabia, and Ethiopia (Dorresteijn, 2023). Structured education consistently improves foot care knowledge and practices; several systematic reviews have shown a decrease in the incidence of DFU/complications, although heterogeneity in methods reduces the certainty of the evidence. Recommendations include recurrent educational programs, hands-on practice (such as demonstration/return-demo), and behavioural reinforcement (Aljaouni, 2024).

Based on behavioural indicators, the majority of respondents (37, 52.9%) exhibited "poor" behaviour in managing diabetic foot ulcers. These results indicate that the majority of patients do not yet have optimal behaviour in treating diabetic foot ulcers. This study aligns with the findings of Widiastuti et al. (2020), who reported that poor foot care behaviour in patients with diabetes mellitus is influenced by a lack of understanding, limited resources, and lifestyle habits that do not support the healing process. Factors such as family support, adherence to treatment, and regular medical check-ups also influence patient behaviour (Widiastuti et al. 2020).

Actual patient behaviour was found to have the strongest association with the incidence of DFU ($p = 0.000$). The majority of respondents exhibited poor behaviour (52.9%), and this group experienced more

DFU with higher degrees of severity, including deep infections and Gangrene. Behaviour is a proximal factor that directly influences foot health, such as whether patients regularly examine their feet, wear appropriate footwear, maintain hygiene, and control blood sugar levels. In other words, daily behaviour plays a role as a protective factor or a significant risk factor in the occurrence of DFU.

Research (Chen et al. 2024) found that diabetic ulcers are in an advanced or chronic condition due to delays in early detection, low patient awareness of the importance of foot care for diabetics, and suboptimal prevention or wound management efforts from an early stage. (Chen et al. 2024)

Research conducted by Aaron et al. (2024) found that special education related to diabetic foot disease (DFD) plays a role in reducing the risk of foot ulcers, increasing patient knowledge and self-care behaviour, improving quality of life, and even reducing the risk of amputation and infection.

Conclusion

Knowledge level did not influence diabetic foot ulcers; however, attitudes and behaviours were significantly associated with diabetic foot ulcers in patients at the Haji Regional General Hospital, East Java Province.

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