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ORIGINAL ARTICLE

Prevalence of ulcer disease among patients with diabetes mellitus at Royal Prima Hospital Medan

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ABSTRACT

Background: Diabetes mellitus is a chronic metabolic disorder with a rapidly increasing prevalence, often leading to serious complications such as diabetic ulcers, which significantly affect quality of life and increase healthcare costs. This study aimed to determine the prevalence of ulcers in patients with diabetes mellitus treated at Royal Prima Medan Hospital and to analyze the associated factors.
Methods: This quantitative observational study employed a retrospective design and analyzed medical record data collected between 2021 and 2025. A total of 58 patients were selected using purposive sampling. Data analysis was conducted using the Chi-Square test and ANOVA with a 95% confidence level.
Results: The majority of the respondents were male (63.8%) and within the 56–65-year age group (34.5%). The most common skin condition was diabetic ulcers (82.8%), followed by diabetic bullae (12.1%) and viral infections (5.2%). The mean blood glucose level was 246.33 mg/dL, indicating hyperglycemia. Statistical analysis revealed no significant association between gender and skin disease type ($p = 0.895$) and no significant difference in blood glucose levels across types of skin disease ($p = 0.135$).
Conclusion: There was no significant correlation between skin disease type and blood glucose levels, suggesting that clinical management should also address other behavioral and metabolic factors.

Keywords: diabetes mellitus, ulcer prevalence, blood glucose

Introduction

Diabetes mellitus (DM) is a chronic metabolic disorder with a steadily increasing global and national prevalence.[1] The World Health Organization reports a rapid rise in DM cases worldwide, identifying it as a major public health concern.[2] Data from the 2023 National Basic Health Research Survey indicate a sharp increase in DM prevalence in Indonesia, particularly among populations of productive age and those with unhealthy lifestyles.[3] DM not only impairs quality of life but also leads to serious complications, one of the most common being diabetic ulceration. Diabetic foot ulcers are prevalent among individuals with DM and pose a high risk of progressing to severe infection and amputation.[4] Silalahi et al.[5] emphasize that diabetic foot ulcers are a leading cause of amputation in DM patients, resulting in reduced mobility, dependency on long-term care, and elevated healthcare costs.

Healing of diabetic ulcers is often slow due to impaired circulation and peripheral neuropathy in patients with DM. Neuropathy causes loss of sensation, leading to unnoticed injuries, while chronic

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hyperglycemia delays cell regeneration and increases susceptibility to infection. Chen et al.[6] highlight that uncontrolled blood glucose levels significantly contribute to impaired wound healing and raise the risk of complications such as amputation. In addition to metabolic factors, patient behavior plays a critical role in diabetic ulcer healing. Adherence to medication regimens and wound care protocols is essential for maintaining adequate glycemic control. Zamaa et al.[7] found that medication adherence is strongly associated with glycemic stability, which directly influences both the rate and success of wound healing in diabetic ulcers. Wound care practices are also key determinants in preventing infection and promoting faster recovery. Dimantika et al.[8] state that modern wound care approaches, such as contemporary dressing techniques, can create an optimal healing environment, maintain moisture balance, enhance tissue regeneration, and reduce complication risks. Alfreyzal et al.[9] further report that education for patients and their families on DM management and foot care plays an essential role in preventing ulcer formation.

Despite these advancements, the implementation of optimal wound care remains a challenge in several healthcare facilities, often due to limited availability of local data. Royal Prima Hospital Medan, which treats a large number of DM patients, lacks sufficient data on the prevalence of diabetic ulcers. This study aims to describe the prevalence of diabetic ulcers and to identify factors that influence ulcer healing, including age, sex, body mass index, treatment adherence, and wound care techniques, in alignment with the findings of Bakri et al.[10]. The results are expected to support the development of effective interventions and enhance the quality of life among patients with DM.

The general objectives of this study are to determine the prevalence of diabetic ulcers among patients treated at Royal Prima Hospital Medan; to identify factors influencing ulcer healing, including treatment adherence, wound care techniques, and demographic characteristics such as age, sex, and body mass index; to analyze the relationship between treatment adherence and wound care techniques with the degree of ulcer healing; and to formulate evidence-based recommendations to improve the care system for diabetic patients with ulcer complications.

Method

This study utilized a quantitative observational approach with a retrospective design. The research was conducted at Royal Prima Hospital, Medan. The study population included all diabetic patients treated at the hospital who developed diabetic ulcers between 2021 and 2025. A total of 58 cases were selected using purposive sampling. Data were obtained from medical records covering the years 2021 to 2025. Glycemic control was assessed based on HbA1c values and blood glucose levels extracted from patient records. Data analysis was performed using both descriptive and inferential statistical methods. The Chi-square test and ANOVA were applied with a 95% confidence level ($\alpha = 0.05$).

Results

The distribution of respondents by examination year is presented in Table 1. Most data were collected in 2022, accounting for 43.1% of respondents. This year represented the peak of recorded cases in this retrospective study, followed by a steady decline, with 29.3% of patients examined in 2023 and 27.6% in 2024.

Table 1. Respondent distribution by examination year, age group, gender, and skin disease type

Variable	Category	Frequency	Percentage
Examination Year	2022	25	43.1%
	2023	17	29.3%
	2024	16	27.6%
Age Group (Years)	31–45	12	20.7%
	46–55	13	22.4%
	56–65	20	34.5%
	>65	13	22.4%
Gender	Male	37	63.8%
	Female	21	36.2%
Skin Disease Type	Diabetic ulcer	48	82.8%
	Diabetic bullae	7	12.1%
	Viral infection	3	5.2%

The study population primarily comprised older adults. The largest age group was 56 to 65 years, representing 34.5% of the sample. When combined with participants aged 46 to 55 years and those older

than 65 years, each contributing 22.4%, it becomes clear that most patients experiencing these complications were in late middle age or elderly. This concentration among older adults is interpreted as a reflection of physiological aging, which leads to reduced metabolic efficiency, diminished insulin sensitivity, and decreased skin elasticity, making these individuals more vulnerable to diabetic skin manifestations.

Gender distribution revealed a marked difference between sexes. Male patients accounted for 63.8% of the study population, compared with 36.2% for female patients. This finding suggests that men within this hospital population were more frequently treated for diabetic skin diseases than women. The researchers relate this observation to previous studies indicating that men commonly exhibit poorer glycemic control and differing lifestyle patterns compared with women, factors that may increase their susceptibility to severe complications.

The distribution of skin disease types is summarized in the corresponding table. Diabetic ulcers were the predominant condition, affecting 82.8% of respondents. Other disorders were substantially less common: diabetic bullae were identified in 12.1% of cases, and viral infections were the least frequent, occurring in only 5.2%. The predominance of ulcers underscores their role as the principal dermatologic complication in this cohort, often aggravated by neuropathy and impaired circulation associated with diabetes.

Table 2. Descriptive statistics of respondent blood glucose levels and association with skin disease type

Analysis	Value / Finding
Blood Glucose (mg/dL)	
Number of Respondents	58
Minimum Level	115
Maximum Level	503
Mean	246.33
Standard Deviation	102.088
ANOVA: Blood Glucose by Skin Disease Type	
F-statistic	2.080
p-value	0.135 (p > 0.05)
Chi-Square: Gender vs. Skin Disease Type	
p-value	0.895 (p > 0.05)

The Chi-square test produced a p-value of 0.895 ($p > 0.05$), indicating no statistically significant association between gender and the type of skin disease. Therefore, gender was not significantly associated with the type of skin disease among diabetic patients in this study. The ANOVA test yielded a p-value of 0.135 ($p > 0.05$), suggesting no significant difference in mean blood glucose levels among the different groups of skin disease types. This indicates that blood glucose levels were relatively comparable across all skin disease categories examined.

Discussion

Univariate analysis results showed that most respondents were in the late adulthood to elderly age group, predominantly aged 56–65 years. This finding aligns with reports from the Indonesian Ministry of Health indicating that the prevalence of diabetes mellitus increases significantly among individuals aged over 45 years, corresponding with a decline in metabolic function and insulin sensitivity associated with aging.[3] Advancing age is also closely associated with the development of various diabetic complications, including dermatological manifestations. The aging process reduces skin elasticity, impairs microcirculation, and diminishes tissue regeneration capacity, making elderly diabetic patients more vulnerable to impaired wound healing and skin infections.[11]

Regarding gender, most respondents in this study were male. This result is consistent with findings by Bakri et al.[10] who reported that men tend to have poorer glycemic control than women, leading to a higher risk of diabetic complications, including skin disorders. Furthermore, research by Arania et al.[12] noted that lifestyle factors, physical activity, and treatment adherence also contribute to differences in complication risk between men and women. The results showed that the average blood glucose level among respondents was within the hyperglycemic range, with a relatively wide variation in values. Chronic hyperglycemia is a major factor contributing to microvascular (microangiopathic) and neural (neuropathic) damage, both of which directly affect skin integrity and wound healing.[13,14] Uncontrolled hyperglycemia disrupts the physiological inflammatory response, impairs leukocyte function, and delays granulation tissue formation. Consequently, wounds in diabetic patients heal slowly and are more susceptible to infection.[15,16] This finding explains the high prevalence of elevated blood glucose levels among respondents presenting with skin disorders.

Analysis indicated that diabetic ulcers were the most prevalent skin disorder among respondents. This observation is consistent with previous studies reporting that diabetic ulcers are the most frequent cutaneous complication in diabetic patients, particularly among those with poor glycemic control and a long disease duration.[17] Diabetic ulcers develop as a result of combined factors, including peripheral neuropathy, impaired peripheral circulation, and repetitive unrecognized trauma.[18,19] These conditions are further compounded by immune dysfunction in diabetic patients, increasing susceptibility to secondary infection and slowing the healing process. In contrast, diabetic bullae and viral infections were less common. Diabetic bullae represent a relatively rare manifestation that typically occurs spontaneously in individuals with poorly controlled diabetes.[20] Viral skin infections may also arise due to reduced immune resistance, though their prevalence is lower compared with diabetic ulcers.[21]

The analysis revealed no significant relationship between gender and the type of skin disease. This finding suggests that both male and female diabetic patients have a similar likelihood of developing specific skin disorders. This result is consistent with the study by Siahaan & Hasugian[22] which found that the main factors influencing the occurrence of wound complications in diabetic patients are glycemic control, duration of diabetes, and adherence to wound care, rather than gender. Therefore, gender is not a primary determinant of skin disease type in diabetic patients.

The study found no significant difference in blood glucose levels among respondents based on the type of skin disease. This indicates that various diabetic skin disorders may arise within a similar range of blood glucose levels. This finding supports the understanding that skin complications in diabetes mellitus are influenced not only by immediate blood glucose levels but also by long-term factors such as disease duration, treatment adherence, wound care practices, and vascular or neuropathic status. Consequently, prevention and management of skin complications in diabetic patients should be comprehensive and continuous.

Conclusion

Respondent characteristics varied in age, gender, and types of skin disease, including diabetic ulcers, diabetic bullae, and viral infections. Blood glucose levels also varied among individuals within and between disease groups, reflecting the heterogeneity of metabolic conditions among patients. There were no significant differences in average blood glucose levels across the types of skin disease, indicating that skin disease type is not a determining factor for variations in glycemic status. These consistent analytical findings suggest that factors other than skin disease type play a greater role in influencing blood glucose levels. The type of skin disease alone cannot distinguish differences in glycemic status among diabetic patients. Therefore, clinical management strategies should address multiple contributing factors beyond dermatologic presentation to achieve optimal metabolic control. Future research should include additional clinical and behavioral variables such as diabetes duration, treatment adherence, dietary patterns, body mass index, and antidiabetic therapy, supported by larger sample sizes and balanced group proportions, to provide a more comprehensive understanding. For healthcare practitioners, glycemic management should take into account both clinical and behavioral aspects rather than focusing solely on skin disease type.

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