Mediterranean Journal of
Pharmacy & Pharmaceutical Sciences
www.medjpps.com

ISSN: 2789-1895 online
ISSN: 2958-3101 print

SHORT COMMUNICATION article

Clinical profile of patients with diabetic foot ulcers at a Tertiary Care Hospital in Lahore Pakistan

Nauman Ismat Butt [*1], **Barak Waris** [1], and **Muhammad Sohail Ajmal Ghoauri** [2]

[1] Department of Medicine and Allied, Chaudhary Muhammad Akram Teaching and Research Hospital, Azra Naheed Medical College, Superior University Lahore, Lahore, Pakistan
[2] Department of Medicine and Neurology, Bahawal Victoria Hospital, Quaid-e-Azam Medical College, Bahawalpur, Pakistan
[*] Author to whom correspondence should be addressed

Article number: 198, **Received:** 20-02-2025, **Accepted:** 29-03-2025, **Published online:** 01-04-2025

HOW TO CITE THIS

Butt et al. (2025) Clinical profile of patients with diabetic foot ulcers at a Tertiary Care Hospital in Lahore Pakistan. Mediterr J Pharm Pharm Sci. 5 (2): 31-35. [Article number: 198]. https://doi.org/10.5281/zenodo.15119155

Keywords: Diabetes mellitus, hypertension, peripheral neuropathy, poor glycemic control, retinopathy

Abstract: Diabetic foot ulcers are moderately severe complications in patients with type 2 Diabetes Mellitus, with peripheral neuropathy and angiopathy often serving as risk factors. This study aimed to examine the clinical characteristics and risk factors linked to diabetic foot ulcers in type 2 diabetes mellitus individuals within the Pakistani demographic. A retrospective cross-sectional design was used, to analyze the medical files of 68 diabetic foot ulcer patients. Data were collected from the Departments of Medicine and Surgery at Chaudhary Muhammad Akram Teaching and Research Hospital, Lahore Pakistan from Sept. to Dec. 2024. Patients' clinical profiles, including demographic data, diabetes duration, diabetes control, HbA1c levels, and the presence of comorbidities were all evaluated. Out of the 68 patients, 70.6% were male having a mean age of 55.6±11.7 years, and 55.9% had diabetes for seven years or more. With regard to clinical factors, 61.8% had peripheral neuropathy, 58.8% had hypertension, 47.1% had retinopathy, 26.5% had nephropathy, 20.6% had ischemic stroke, 8.8% had ischemic heart disease, and 2.9% had hypothyroidism, with 97.1% showing poor glycemic control. This study identified a high rate of comorbidities in patients with diabetic foot ulcers, with inadequate diabetes control being a major contributing factor. Timely detection and management of diabetes and its complications are crucial to alleviating the impact of diabetic foot ulcers.

Introduction

Diabetes mellitus (DM) represents a major global health concern, with 537 million adults affected worldwide in 2021 [1]. This number is projected to increase to 783 million by 2045 [1]. In the South-Asian region including Pakistan and India, DM has reached epidemic levels, contributing to a high prevalence of complications including coronary heart disease (25.8%), nephropathy (30.2%), retinopathy (32.5%), peripheral vascular disease (28.0%), and peripheral neuropathy (26.8%) [2, 3]. Diabetic foot ulcer (DFU) represents a major complication, affecting a quarter of the diabetic population [4]. Of these, 50.0% become infected, leading to hospitalizations, and 20.0% require amputations [4, 5]. DFUs are associated with a significant financial burden, with patients spending four

ISSN: 2789-1895 online
ISSN: 2958-3101 print

times more on treatment than those without DFUs. Predisposing factors for DFUs consist of male sex, long diabetes duration (>10 years), poor glycemic control, neuropathy, nephropathy, hypertension, and peripheral vascular disease, along with other factors like smoking, foot deformities, and poor foot care [4-6]. Early intervention and comprehensive care addressing these risk factors such as neuropathy, retinopathy, nephropathy, hypertension, and poor glycemic control are essential to reducing the burden of DFUs and of DM on the whole [6, 7]. The rationale for conducting this study arises from the growing worldwide impact of DM and its associated complications, particularly DFU, which significantly impact the quality of life and lead to high rates of hospitalization and amputation. In Pakistan, where DM has reached epidemic proportions, the prevalence of DFUs is alarmingly high, and the associated financial burden on patients and healthcare systems is substantial. Despite the known risk factors for DFUs, including neuropathy, nephropathy, hypertension, and poor glycemic control, there is a lack of comprehensive studies that specifically address these factors in the context of DFUs in Pakistani diabetics. This study aims to fill this void by analyzing the demographic, clinical, and risk factor profiles of patients with DFUs, providing critical insights into the underlying causes and helping to inform early detection, prevention, and management strategies. By understanding the specific risk factors and prevalence of DFUs in this population, the study can contribute to improving patient outcomes and reducing the healthcare burden associated with diabetic complications.

Materials and methods

This retrospective cross-sectional study was carried out at the Departments of Surgery and Medicine at Chaudhary Muhammad Akram Teaching and Research Hospital, Azra Naheed Medical College, Superior University Lahore, Lahore, Pakistan. DFUs were labeled according to the Wagner Classification. Diagnosis of type 2 DM (T2DM) was based on an HbA1c level (>7.0%), two random blood glucose readings of ≥200 mg/dL, a history of diabetes, or the use of anti-hyperglycemic drugs. Peripheral neuropathy was diagnosed based on clinical findings of pain, paraesthesia, and sensory dysfunction following a glove-and-stocking pattern in the limbs. The presence of microaneurysms, hard exudates, macular edema, and neovascularization during an eye exam confirmed the diagnosis of retinopathy. Nephropathy was diagnosed based on microalbuminuria found in urinalysis, a urine albumin-to-creatinine ratio between 30-300 mg/g, and an estimated glomerular filtration rate >60 mL/min/1.73 m^2, suggesting early-stage nephropathy without evidence of chronic kidney disease. A history of acute myocardial infarction or unstable angina was used to diagnose ischemic heart disease. Hypertension was defined by blood pressure readings greater than 140/90 mm Hg on two separate occasions, ambulatory blood pressure >140/90 mm Hg at least 15 days apart, or a documented history of antihypertensive treatment. Hypothyroidism was diagnosed through elevated TSH levels and low free T4 levels or the use of thyroid hormone replacement therapy. Ischemic stroke was identified by sudden loss or weakness of limb function (monoplegia or hemiplegia) confirmed through a CT brain scan.

Ethics statement: The study was conducted in accordance with the ethical standards set by the 1964 Declaration of Helsinki and its 2000 amendments, based on assessing medical records only with no direct exposure to the patients. Permission for data collection and ethical approval was obtained from the Head of the Department.

Data Collection: Data was gathered from the medical records of 68 DFU patients using consecutive non-probability sampling from Sept. to Dec. 2024. Exclusion criteria encompassed patients having a history of amputation or limb surgery, chronic liver disease, malignancy, radiation therapy, chronic kidney disease, those undergoing hemodialysis, or pregnant patients. Incomplete records were also excluded. Demographic details including gender, age, and duration of diabetes were recorded, and medical files were assessed for information

ISSN: 2789-1895 online
ISSN: 2958-3101 print

on diabetes control and the presence of conditions like neuropathy, retinopathy, nephropathy, ischemic stroke, hypertension, hypothyroidism, and ischemic heart disease.

Statistical analysis: The data were analyzed using SPSS version 23, with descriptive statistics including percentage, frequency, mean, and standard deviation.

Results

In **Table 1**, medical records of 68 patients were included in this study, with 70.6% being male and 29.4% female. The mean age was 55.6±11.7 years, with the majority of patients aged ≥ 55 years (58.8%). The mean diabetes duration was 9.70±6.70 years and 55.9% had diabetes for ≥ 7 years. The mean HbA1c (%) level was 10.3±2.20, with 97.1% of patients having poor/uncontrolled diabetes. As depicted in **Table 1**, 61.8% exhibited peripheral neuropathy, retinopathy was present in 47.1%, and 26.5% had nephropathy. Hypertension was found in 58.8% while 20.6% had a history of ischemic stroke. Hypothyroidism was seen in 2.9% and ischemic heart disease in 8.8%.

Table 1: Demographic and clinical variables of the participants

Demographic and clinical variables		**Frequency**	**Percentage**
Gender	Female	20	29.4
	Male	48	70.6
Age	≤ 54 years	28	41.2
	≥ 55 years	40	58.8
Duration of diabetes	≤ 6 years	30	44.1
	≥ 7 years	38	55.9
Diabetes Control	Good/controlled	02	2.9
	Poor/uncontrolled	66	97.1
Peripheral Neuropathy	Present	42	61.8
	Absent	26	38.2
Retinopathy	Present	32	47.1
	Absent	36	52.9
Nephropathy	Present	18	26.5
	Absent	50	73.5
Hypertension	Present	40	58.8
	Absent	28	41.2
Ischemic Stroke	Present	14	20.6
	Absent	54	79.4
Hypothyroidism	Present	02	2.9
	Absent	66	97.1
Ischemic Heart Disease	Present	06	8.8
	Absent	62	91.2
Qualitative variables			
Mean age (years)		55.6±11.7	
Mean diabetes duration (years)		09.7±06.7	
Mean HbA1c (%)		10.3±02.2	

Discussion

In the current study, we evaluated the predisposing factors linked to DFUs in a group of 68 T2DM patients. The results revealed several major factors that notably elevated the risk of DFUs including male gender, advanced age, long-term diabetes, and inadequate diabetes control. It also evaluated the risk factors associated with DFUs

ISSN: 2789-1895 online
ISSN: 2958-3101 print

in a cohort of 68 patients with T2DM. These findings highlighted several key factors that significantly increased the risk of DFUs, including male gender, increasing age, prolonged duration of diabetes, and poor diabetes control. These results align with the previous studies that have similarly identified these factors as major contributors to DFU risk [8, 9]. The prevalence of peripheral neuropathy in the current study was 61.8%, which is in line with the other previous studies where neuropathy rates have ranged between 23.0% and 42.0% [10, 11]. Neuropathy is a recognized and significant contributing factor to the development of DFUs, and its high prevalence in our cohort underscores its importance in the development of DFUs. However, unlike other studies, this study did not observe a significant association with nephropathy or thyroid dysfunction with the risk of DFUs [11, 12]. This discrepancy may be explained by the specific characteristics, differences in healthcare access, foot care practices, or genetic factors of our study population, which could have influenced the findings. These results emphasize the need for early identification and continuous monitoring of patients at risk, especially those with neuropathy and inadequate glycemic control. It is suggested that increased follow-up for these patients to prevent the advancement of diabetic foot complications. DFUs are difficult to heal, prone to infections, and often recur even after treatment. Studies suggest that DFUs recur in 40.0% of cases within one year, 60.0% within three years, and 65.0% within five years after healing [13, 14]. This underscores the persistent nature of DFUs and reinforces the need for continuous management and preventive care to reduce the chances of recurrence. An early diagnosis and prompt treatment of DFUs are crucial in preventing complications, reducing the risk of infection, and improving healing outcomes. Timely intervention can help minimize the severity of the ulcer, prevent recurrence, and avoid more serious consequences, such as amputation. Early identification allows for effective management strategies that may improve the overall well-being of patients and reduce the overall healthcare burden associated with DFUs. Regular foot care education, early intervention, and tailored management strategies are essential for lowering the occurrence and severity of DFUs in individuals with T2DM [12, 14-16]. However, this study has certain limitations, primarily, the retrospective cross-sectional design limits the ability to establish causal links, as the data were derived from pre-existing medical records. The use of consecutive non-probability sampling may not fully represent the broader population of DFU patients, limiting the generalizability of the findings. The study excluded patients with conditions such as prior amputations, malignancy, chronic liver disease, and those undergoing hemodialysis, which may limit the applicability of the results to these groups. The accuracy of the data relied on the completeness and correctness of patient chart documentation, which may have been inconsistent. In addition, the study did not examine the severity of DFUs, nor did it explore other potentially influential factors such as smoking, alcohol use, or atherosclerosis, which could play significant roles in the development and progression of DFUs.

Conclusion: This study highlights the significant prevalence of comorbidities in diabetic foot ulcer patients in Pakistan, with poorly controlled diabetes being a key contributing factor. It is recommended to examine the role of additional risk factors, the severity of foot ulcers, and how they relate to diabetes control and comorbid conditions.

References

1. Seshadri H, Karthikeyan V, Rudrakumar M, Seshadri P, Vasudevan D, Ranganathan V, et al. (2024) Out-of-pocket expenditure among patients with diabetic foot ulcer in a tertiary care hospital of south India: A cross-sectional study. International Wound Journal. 21 (4): e14552. doi: 10.1111/iwj.14552
2. Pradeepa R, Mohan V (2021) Epidemiology of type 2 diabetes in India. Indian Journal of Ophthalmology. 69 (11): 2932-2938. doi: 10.4103/ijo.IJO_1627_21

ISSN: 2789-1895 online
ISSN: 2958-3101 print

3. Butt NI, Ghoauri MSA, Sabeh D, Waris U, Waris B, Jabbar R (2024) Prevalence of hypertension and its association with diabetic complications in patients with type 2 diabetes mellitus at a Tertiary Care Hospital. Journal of Medical Research and Reviews. 3 (2): 58-63. doi: 10.5455/JMRR.20241016103141
4. Rastogi A, Bhansali A (2016) Diabetic foot infection: An Indian scenario. Journal of Foot Ankle Surgery. 3 (2): 71-79. doi: 10.5005/jp-journals-10040-1052
5. Raghav A, Khan ZA, Labala RK, Ahmad J, Noor S, Mishra BK (2018) Financial burden of diabetic foot ulcers to world: a progressive topic to discuss always. Therapeutic Advances in Endocrinology and Metabolism. 9 (1): 29-31. doi: 10.1177/2042018817744513
6. Bal B, Khanna G, Bhardwaj A, Singh K (2019) Evaluation of risk factors for lower extremity amputation in diabetic foot ulcer: a hospital based observational study in Northern India. International Journal of Research in Medical Sciences. 7 (4): 1190-1195. doi: 10.18203/2320-6012.ijrms20191323
7. Butt NI, Ghoauri MSA, Dur-e-Sabeh, Hasnain M, Waris B (2024) Hyperuricemia in Patients with Type 2 Diabetes Mellitus at a Tertiary Care Hospital in Bahawalpur Pakistan. Sri Lanka Journal of Medicine. 33 (3): 28-34. doi: 10.4038/sljm.v33i3.549
8. Hosseini R, Rasoli A, Baradaran HR (2008) Diabetic foot ulcer risk factors in patients referred to diabetes clinic in Kamkar center in Qom in 2006. Qom University of Medical Sciences Journal. 2 (3): 25-32. doi: 20.1001.1. 17357799.1387.2.3.3.1
9. Pscherer S, Dippel FW, Lauterbach S, Kostev K (2012) Amputation rate and risk factors in type 2 patients with diabetic foot syndrome under real-life conditions in Germany. Primary Care Diabetes. 6 (3): 241-246. doi: 10.1016/ j.pcd.2012.02.004
10. Leese GP, Cochrane L, Mackie AD (2011) Measuring the accuracy of different ways to identify the 'at-risk' foot in routine clinical practice. Diabetic Medicine. 28 (6): 747-754. doi: 10.1111/j.1464-5491.2011.03297.x
11. Shahbazian H, Yazdanpanah L, Latifi SM (2013) Risk assessment of patients with diabetes for foot ulcers according to risk classification consensus of International Working Group on Diabetic Foot (IWGDF). Pakistan Journal of Medical Sciences. 29 (3): 730-734. doi: 10.12669/pjms.293.3473
12. Li X, Wen S, Dong M, Yuan Y, Gong M, Wang C, Yuan X, Jin J, Zhou M, Zhou L (2023) The metabolic characteristics of patients at the risk for diabetic foot ulcer: A comparative study of diabetic patients with and without diabetic foot. Diabetes, Metabolism Syndrome and Obesity. 16: 3197-3211. doi: 10.2147/DMSO.S430426
13. Guo Q, Ying G, Jing O, Zhang Y, Liu Y, Deng M, Long S (2023) Influencing factors for the recurrence of diabetic foot ulcers: A meta-analysis. International Wound Journal. 20 (5): 1762-1775. doi: 10.1111/iwj.14017
14. Armstrong DG, Boulton AJM, Bus SA (2017) Diabetic Foot Ulcers and Their Recurrence. The New England Journal of Medicine. 376 (24): 2367-2375. doi: 10.1056/NEJMra1615439
15. Atair ASM, Mohamed MAI, Abdelfadel AN, Ahmed HA, Atiya SA (2023) Knowledge and practice of foot care among Libyan diabetic patients. Mediterranean Journal of Pharmacy and Pharmaceutical Sciences. 3 (1): 35-42. doi: 10.5281/zenodo.7771360
16. Rhayem NA, Ramah MM, El Khituni (2025) Knowledge and practice of diabetic foot care among diabetic patients in Libya. Mediterranean Journal of Pharmacy and Pharmaceutical Sciences. 5 (1): 123-132. doi: 10.5281/zenodo. 14933622

Acknowledgments: The authors acknowledge the pharmacists who helped in the questionnaire distribution and data collection and all of the patients who took part in this study.
Authors' Contribution: This study was conceived and designed by all authors. All authors did the initial literature research. BW & NIB did the data collection, medical record assembly, and assessment. Data analysis and interpretation were done by NIB & BW. All authors drafted and reviewed the manuscript approved the final version of the manuscript, and agreed to be accountable for its contents.
Conflict of interest: The authors declare the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.
Ethical issues: The authors completely observed ethical issues including plagiarism, informed consent, data fabrication or falsification, and double publication or submission.
Data availability statement: The raw data that support the findings of this article are available from the corresponding author upon reasonable request.
Author declarations: The authors confirm that they have followed all relevant ethical guidelines and obtained any necessary IRB and/or ethics committee approvals.