

PREVALANCE OF DIABETIC FOOT ULCERS IN DIABETES MELLITUS PATIENTS IN LAHORE, PAKISTAN.A CROSS-SECTIONAL STUDY

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DOI: <https://doi.org/10.5281/zenodo.17096932>

Keywords

Diabetes Mellitus, Diabetic Foot Ulcer, Wagner Grading System, Cross-Sectional Study, Neuropathy

Article History

Received: 20 June 2025

Accepted: 29 August 2025

Published: 11 September 2025

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Abstract

Background: Diabetes mellitus (DM) is a major global public health challenge, linked with significant health issues, disability, and death. Among DM complications, diabetic foot ulcers (DFUs) are particularly severe and are leading causes of hospitalization in diabetic patients, especially in developed countries. Assessing the prevalence and severity of DFUs is essential for effective prevention and management. **Objective:** To determine the prevalence of diabetic foot ulcers among patients with diabetes mellitus in Lahore, Pakistan. **Methods:** A cross-sectional observational study included 384 patients with diabetes mellitus, selected through non-probability purposive sampling from various hospitals in Lahore. Both male and female participants were evaluated for diabetic foot ulcers using the Wagner Grading System. The study was conducted over six months, and data were analyzed using SPSS version 23. **Results:** A total of 384 people were included in the study, with an average age between 50 and 59 years. The study found that 77.3% of these people had diabetic foot ulcers (DFUs). The highest number of DFUs was seen in the 50 to 59 age group, making up 30.9% of all cases. More men than women had DFUs, with 59.7% of the participants being male and 40.3% female. Based on the Wagner classification, 37.5% of the participants had Grade 2 ulcers, which are deep ulcers that do not involve bones. 28.6% had Grade 1 ulcers, which are shallow ulcers. 24.5% had no ulcers (Grade 0). 6.8% had Grade 3 ulcers, which are deep ulcers with bone involvement, and 2.6% had Grade 4 ulcers, which involve gangrene in a specific area. **Conclusion:** The study concluded that the majority of DFU cases among patients with diabetes mellitus in Lahore were Grade 2 ulcers, with a higher prevalence in males compared to females. The age group most affected was 50–59 years, highlighting the need for targeted preventive strategies and early interventions in this high-risk group.

INTRODUCTION

Diabetes mellitus, or DM, is one of the biggest and fastest-growing health problems around the world. It's a long-term illness that affects how the body uses sugar, leading to high blood sugar levels because the body isn't making enough insulin or isn't using it properly. This disease is now affecting millions of people everywhere and is a major reason for early death, sickness, and high medical costs. The International Diabetes Federation's Diabetes Atlas, from 2024, says that about 589 million adults between the ages of 20 and 79 had diabetes in 2024. If things keep going the same way, that number is expected to go up to 783 million by 2045 (1). Notably, more than three-quarters of those affected live in low- and middle-income countries (LMICs), where healthcare systems often lack the resources to adequately prevent and manage long-term complications (1).

Pakistan has become one of the main areas where the diabetes problem is getting worse. In 2021, it was found that around 33 to 34 million adults in Pakistan had type 2 diabetes, and more than 26% of adults were affected (2). This puts Pakistan in the top three countries with the most people living with diabetes in the world. Several factors are causing this rise, such as fast urban growth, people leading less active lives, increasing obesity rates, and not enough knowledge about how to take care of themselves. Also, about 9 million people are not aware they have diabetes, which makes the situation even more serious (3). The growing number of diabetes cases in Pakistan affects not just the health of individuals but also the country's healthcare system, which is already facing challenges due to limited resources and facilities (3).

Diabetic foot ulcer (DFU) is one of the most severe and troubling complications of diabetes. It is a deep wound that develops in the skin below the ankle in people with diabetes. This happens because of several factors like nerve damage, poor blood flow, and difficulty in healing wounds (4). DFUs can greatly affect a person's daily life, make it hard to move around, and often lead to infections that can cause serious problems like gangrene. They are the most common reason for amputations that are not caused by injuries and are a major cause of long-term disability (4).

The worldwide rate of DFUs is about 6.3% (with a 95% confidence interval of 5.4–7.3%), but this number changes a lot depending on the region (5). A detailed review found that DFUs are common in Asia at about 5.5%, in Africa at 7.2%, in Europe at 5.1%, and as high as 13% in North America (5). The longer someone has diabetes, the worse their blood sugar control is, the more likely they are to have nerve damage, and the more risk they face, especially if they are male. DFUs are not just common—they can lead to very bad results. Research shows that 15–20% of DFUs lead to amputations, and the chance of dying within five years is about 50%, which is similar to some cancer rates. These numbers show how serious DFUs are and how important it is to find good ways to prevent and treat them (4).

In Pakistan, the situation seems even worse. A review of 12 studies with 14,201 patients showed that 12.16% of people had diabetic foot ulcers (DFU), which is much higher than the global average (6). This review also found that DFU rates have been increasing over the past twenty years, mainly because more people are developing diabetes and there's not enough proper prevention. In Punjab, the problem is especially serious. A study done between December 2018 and June 2019, involving 1,503 diabetic patients, found that 16.83% had DFU. Urban areas had a higher rate, at 17.96%, compared to 13.91% in rural areas. This might be because of differences in lifestyle, obesity, and how people access healthcare (4).

In Lahore, which is the second biggest city in Pakistan and a major city with lots of people, there isn't much clear information available about diabetes foot ulcers (DFUs). A study done at a big hospital that specializes in endocrinology found that 7.02% of people there had DFUs. The study also found that having nerve damage, poor blood flow in the legs, and having diabetes for a long time were linked to a higher chance of getting DFUs (7). Another local study showed that DFUs often lead to serious problems like being hospitalized, getting infections, and even needing amputations. About 13.6% of people with DFUs had to have a limb removed, and 5.5% died while in the hospital. These numbers show how serious DFUs are in Lahore, both for patients and for the healthcare system. However, the

information we have is mostly from people who went to hospitals, so it might not fully represent the situation for all people with diabetes in the city (8).

DFUs have effects that go beyond just the body. They also cause big problems for people's mental health and their money. Having a long-term ulcer can make someone feel lonely, sad, or worried. Plus, the cost of treatment can be very hard on families, especially in countries like Pakistan where not many people have health insurance. For hospitals, DFUs mean more people need to stay longer in the hospital, more expensive treatments are needed, like amputations or therapy. All these things show how important it is to stop DFUs early by checking for them quickly, teaching patients about their condition, and having a team of different healthcare workers help them (4).

Even though the problem is big, there isn't much information about how common diabetes is in Lahore. Most of the studies that exist are done in hospitals, which means they might not show the full picture. These kinds of studies can miss out on people with less severe diabetes or no complications, leading to biased results. It's really important to have good data from the community to help health officials, policymakers, and doctors create better ways to prevent diabetes and use resources wisely. Research from other places shows that programs that focus on foot care, regular check-ups, and quick treatment can lower the chances of getting ulcers and their return. This helps reduce the need for amputations and makes life better for people with diabetes (9).

Because diabetes is very common in Pakistan and diabetic foot ulcers (DFUs) are a big problem, especially in cities, it's important to study this issue at the city level. This study will focus on Lahore to find out how common DFUs are among people with diabetes there. This information will help fill gaps in what we know and support better public health efforts, like educating people, setting up screening programs in communities, and creating specialized clinics for diabetic foot care. This study aims to find out how often DFUs occur in Lahore and what factors are linked to them. By gathering strong, local evidence, the study hopes to help create better ways to prevent and manage DFUs in one of Pakistan's biggest cities.

MATERIALS AND METHODS

This study was a cross-sectional observational survey conducted over six months (April–September) in Lahore. A non-probability purposive sampling technique was employed, and a sample size of 384 patients with diabetes mellitus was determined using a standard prevalence formula (Ejaz et al., 2020). Data were collected from both male and female patients attending five hospitals: Akhuwat Health Services Hospital, Chaudhry Rehmat Ali Memorial Trust Teaching Hospital, Nawaz Sharif Hospital, Aysha Siddiqua Hospital, and Dastak Hospital. Patients aged 39–60 years with diabetic neuropathy, vascular foot disease, or foot deformities were included, while those below 39 years, with gestational or secondary diabetes, amputations, or cardiovascular disease were excluded.

A self-structured questionnaire was used to record demographic and clinical details, and the Wagner Classification System was applied to assess and grade diabetic foot ulcers. Ethical approval was obtained prior to data collection, and informed consent was taken from all participants. Data were analyzed using SPSS version 23, with results presented through frequencies, percentages, bar charts, and pie charts, while mean and standard deviation were calculated for disease severity.

Strict ethical considerations were observed, ensuring confidentiality, voluntary participation, informed consent, and the right of participants to withdraw at any stage.

Results

In this study, 384 participants, including both males and females, were involved, with a higher representation of diabetic foot ulcer found in males at 57.3%. The analysis revealed that 56.0% of participants have diabetic foot ulcer at the age range between 50-59. Approximately 46.4% participants had unemployed. As we see the smoking status of participants, (64.6%) reported never smoking in their life. Most of the participants reported (55.7%), medium income status. Approximately, (81.5%) had diabetes in their family. When it comes to duration of diagnosed with diabetes (39.1%) about 1-5 years and mostly reported (95.1%) with type 2 diabetes. Most of the participants, (35.2%) taking diet and insulin to treat their diabetes.

Relatively, (89.3%) participants feel loss of sensations in their hands & feet and most of the contributor, (36.2%) feel numbness in their extremities. Approximately, the duration of the sensation (38.3%) typically lasts between 6-9 months ago. The analysis revealed that (35.7%) participants feel pain and cramps below the knee area during walking. Most of the participants (77.3%) reported had diabetic foot ulcer and majority (65.6%) reported once in their life. About (78.6%) participants received treatment of diabetic foot ulcer. Majority of participants

(78.1%) reported neuropathy and peripheral vascular disease in their lower limbs. Notably, (81.0%) participants regularly inspect their feet. Generally, (71.9%) had leg or foot disability, in which (52.1%) participants reported wound disability, to about (36.7%) duration of disability typically lasts from 1.5 years. According to the Wagner grading system, analysis revealed that 37.5% of participants were reported Grade 2 having deep ulcer with no bony involvement.

Figure 1: Shows the age

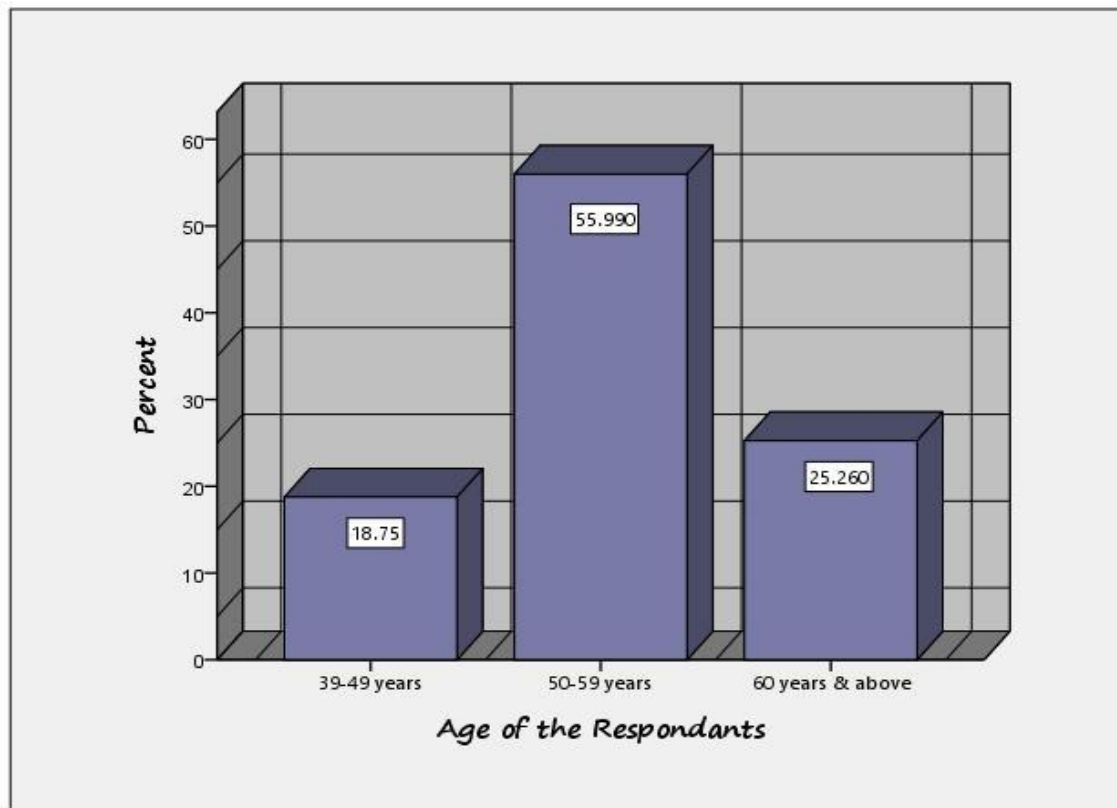
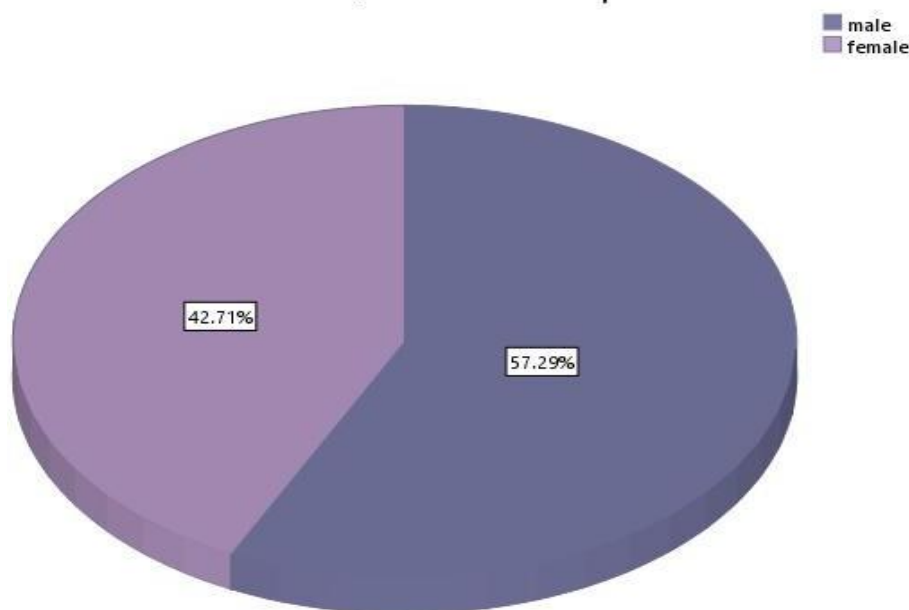


Figure 1: Shows the Age of Participants

Stating the age of the participants 72(18.8%) of the subjects ranged from the age group of 39-49 years, 215(56.0%) ranged from 50-59 years, 97(25.3%) ranged from 59-60 years.

Figure 2: Shows the Gender
Gender of the Respondants



Following Figure shows the percentage of male participant were 220(57.3%) and Female participants were 164 (42.7%) out of 384 participants.

Table 1 Sensations in diabetes:

Valid	Frequency	Percentage
Burning sensation	37	9.6
Tingling in feet	101	26.3
Numbness in feet	139	36.2
Pain and needling sensation	107	27.9
Total	384	100.0

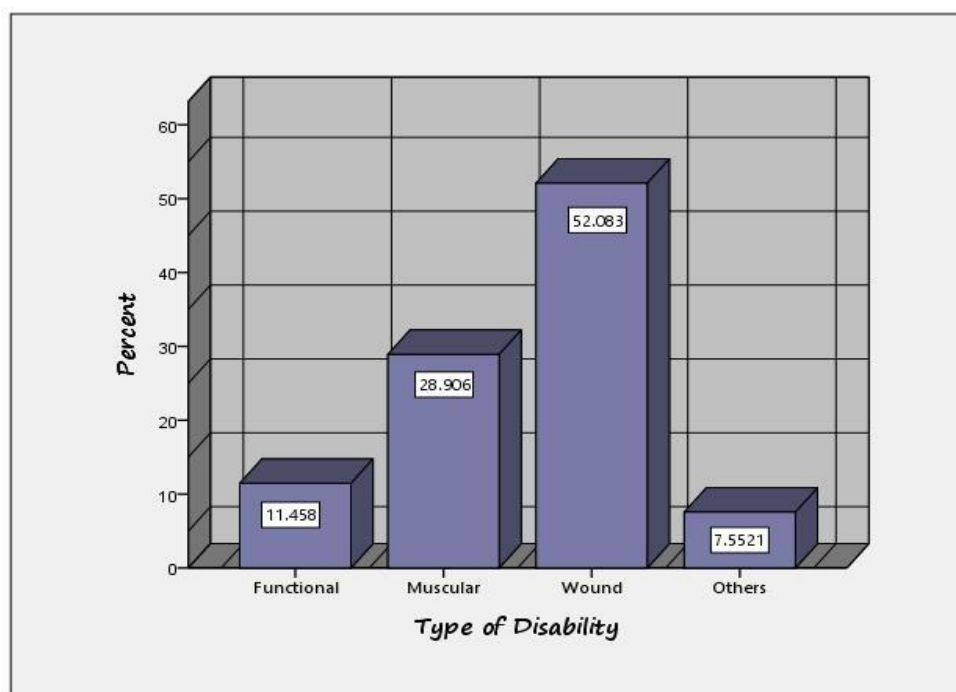
Following table shows the percentage of sensation felt by the respondents including burning sensations 37(9.6%) and tingling in feet 101(26.3%) then numbness in feet 139(36.2%) and others are pain and needling sensations 107(27.9%) out of 384 participants.

Table 2: Diabetic foot ulcers:

Valid	Frequency	Percentage
Yes	297	77.3
No	87	22.7
Total	384	100.0

A total of 384 participants were including in this research from which 297 (77.3%) have diabetic foot ulcer and 87 (22.7%) have no diabetic foot ulcer.

Figure 3



Following table shows the percentage of Type of disability participant and majority of the participant were wound 200 (52.1%) and muscular 111 (28.9%) then functional 44 (11.5%) and others 29 (7.6%) out of 384 participants.

Table 3 Wagner Grading System:

Valid	Frequency	Percentage
No ulcer	94	24.5
Superficial ulcer	110	28.6
Deep ulcer with no bony involvement	144	37.5
Deep ulcer with bony involvement	26	6.8
Localized gangrene	10	2.6
Total	384	100.0

A total of 384 participants were include in this research from which 94 (24.5 %) reported no ulcer, 110 (28.6%) reported superficial ulcer , 144(37.5%) have deep ulcer with no bony prominent ,26(6.8%) have deep ulcer with bony involvement,10 (2.6%) reported with localized gangrene.

Discussion:

Foot ulceration in diabetic patients is largely preventable; however, it remains a serious cause of hospitalization and morbidity among individuals with diabetes mellitus (DM) worldwide. The aim of the present study was to determine the prevalence of

diabetic foot ulcers (DFUs) among patients with DM in Lahore. A total of 384 participants were included, and the prevalence of DFUs was found to be 37.5% (95% CI). These findings highlight that DFUs are a common complication in type 2 DM, with disease duration identified as a major risk factor. The longer the duration of diabetes, the higher the likelihood of developing DFUs, which is consistent with previous literature (10).

In the current study, DFUs were more common among males (59.7%) compared to females (40.3%). This trend aligns with a study conducted in Ethiopia by Yimam (2021), where out of 198 respondents

with DFUs, 53% were males and 47% were females. Similarly, in our study, most cases were reported in individuals aged 50–59 years (30.9%), which is comparable to Yimam's findings, where 43.9% of DFU patients were aged ≥ 48 years (11).

Comparable results were also reported by Tola (2021) in Eastern Ethiopia, where 57.2% of males had DFUs, and the highest prevalence (30.1%) occurred in patients aged 45–59 years. These results are in line with our findings, where the majority of DFU cases were observed in the 50–59 year age group (30.9%) (12).

A cross-sectional study conducted in Pakistan in 2020 also showed a higher proportion of DFUs among males (68%) compared to females (32%), consistent with the male predominance observed in our study (13). Likewise, Akhtar et al. (2022) reported an overall DFU prevalence of 16.8% in Punjab, Pakistan, with a slightly higher rate in females (17.5%) than males (15.4%). In contrast, the current study found a much higher prevalence (77.3%) and observed DFUs more frequently in males. Using the Wagner grading system, Akhtar et al. noted that most ulcers were classified as Grade 2, which is also in agreement with our findings (14).

In contrast to our higher prevalence (77.3%), Galvão et al. (2021) reported a DFU prevalence of 26.2%, with the mean age of patients around 62 years, whereas in the current study, the most affected group was aged 50–59 years (15). Furthermore, Ghobadi et al. (2020) in Kermanshah found a higher proportion of female DFU cases (57.4%), which differs from our study, where males were predominantly affected (16). Overall, the present study confirms that DFUs are a prevalent and serious complication among type 2 DM patients in Lahore, particularly among middle-aged males with a longer duration of diabetes.

Conclusion:

The result of the study concluded that most of the patients with DFU in Diabetes Mellitus had reported in Grade 2 ulcer and Males had greater prevalence having DFU than Females with age rang 50-59.

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