

Diabetic Foot: Its Mode of Presentation and its Grades According to Wifl Classification at A Tertiary Care Hospital

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ABSTRACT

Objective: To ascertain the method of presentation, analyze, and distribute the diabetic foot lesions in accordance with the Wifl classification of diabetic foot ulceration in a tertiary care hospital of Pakistan.

Methodology: This cross-sectional study was carried out at Department of General Surgery, Pakistan Institute of Medical Sciences Islamabad, from January to December 2022. All adult patients with DFUs were enrolled consecutively. Patients with healed foot ulcerations were excluded. Data regarding age, gender, duration of diabetes, co morbidities, severity of wound, ischemia, severity of infection was noted on a proforma according to Wifl classification.

Results: A total of 76 patients presented with DFUs with mean age of 51.03 ± 7.041 years, (range 40 - 70 years). There were 52(68.4%) males and 24(31.6%) females. The duration of diabetes was <5 years in 40(52.6%) followed by 5-10 years in 21(27.6%) patients. According to wound severity, 55(72.4%) patients presented with grade 2 (Deep Ulcer with exposed bone, joints or tendons) followed by 16 (21.1%) with grade 1 (Small Superficial Ulcer without gangrene). According to Ischemia, 44 (57.9%) patients presented with grade 1, 13(17.1%) presented with grade 2 and 19(25.0%) presented with grade 3. There is a significant association of severity of DFUs with age and duration of disease.

Conclusion: Diabetic patients commonly present with grade 2 of DFUs followed by grade 1, while presentation with ischaemia were of grade 1.

Keywords: Diabetic Foot Ulcer, Diabetic Mellitus, Wifl classification

Authors' Contribution:

^{1,2}Conception; ¹Literature research; ¹manuscript design and drafting; ^{3,4}Critical analysis and manuscript review; ⁵Data analysis; Manuscript Editing.

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Introduction

In 2000, it was estimated that 2.8% of people worldwide had diabetes; by 2030, that number is forecast to rise to 4.4%, with the total number of diabetics likely to increase from 171 million in 2000 to 366 million in 2030.¹ Globally 10-25% of all diabetics suffer some type of foot issues over their course of disease, ranging from minor calluses to large abscesses. Foot ulcers remain one of the most unpleasant symptoms of a diabetic patient.² Diabetes foot (DF) is a potentially fatal condition

where inadequate blood sugar control can result in serious foot complications such ulcers, infections, and even amputations.³ Diabetic foot is defined by WHO and the International Working Group on Diabetic Foot as the foot of diabetic patients who have deep tissue ulceration, infection, or destruction along with neurological abnormalities and various types of peripheral vascular disease in the lower limb.⁴ There are many known risk factors for Diabetic Foot Ulcer (DFU) like being elderly, having diabetes for a long period with poor glucose

control, neuropathy, and having peripheral vascular disease.⁵

Because DFUs heal slowly, they can be challenging to treat. Diabetes-related vascular problems can significantly impede blood flow, which in turn can impede the healing of diabetic foot ulcers. Debridement, unloading, wound care, and infection control are commonly included in treatment. In addition to keeping the wound hydrated and clean, wound care entails preventing further damage. Debridement is a technique used to reduce infection by excising necrotic tissue from a lesion. Using special shoes or casts to lessen weight on the region that has been ulcerated is known as offloading, and using antibiotics and other drugs is known as infection treatment.⁶ The rate of diabetic foot is startlingly high in Pakistan. In Pakistan, DFUs are a major health concern due to a high prevalence of diabetes, associated comorbidities, and restricted access to treatment. Pakistani healthcare professionals should also be aware of the high frequency of DFUs and take appropriate action to identify and treat them as soon as possible.⁷ Pakistan is ill-equipped to deal with DM and DFUs complications due to a scarcity of DFU management centers. According to published research, the prevalence of DFUs in Pakistan varies between 13% to 50.9%.⁸ The purpose of this study was to find the method of presentation, analyzing, and allocating the diabetic foot lesions at a Pakistani tertiary care hospital in accordance with the Wlfl classification of diabetic foot ulceration.

Methodology

After taking approval from Ethical Review Committee, this prospective cross-sectional study was carried out at Department of General Surgery, Pakistan Institute of Medical Sciences Islamabad from January to December 2022. All adult diabetic patients who consented to participate, and presented with DFUs were enrolled consecutively.

Patients with healed foot ulcers were not included in the study. Ulceration, color change, or a rupture in the foot's normal skin that persisted for at least two weeks were indicators of DFU. A thorough physical examination and history were taken. Study variables included age, gender, duration of diabetes, co morbidities, severity of wound, ischemia, severity of infection, graded according to Wlfl classification and management. SPSS version 25 was used to collect and analyze the data. Descriptive analysis was done and p values less than 0.05 were considered significant.

Results

A total of 76 patients presenting with diabetic foot were included in the study. Mean age of the patients was 51.03 ± 7.041 years, minimum age was 40 and maximum age 70 years. Patients were divided into 3 groups on the basis of age. 40 patients (52.6%) were of age 40-50 years, followed by 32(42.1%) patients from 51-60 years and only 4(5.3%) patients of age > 60 years. There was total 52(68.4%) males and 24(31.6%) female patients. The results showed that duration of diabetes was < 5 years in 40 (52.6%) followed by 5-10 years in 21(27.6%) patients. Most common co morbidity was hypertension that was found in 31(40.8%) patients followed by Hyperlipidemia in 24 (31.6%) patients. From total 76 patients, 62(81.6%) presented in emergency. The demographic data of the patients is presented in table I. The Society for Vascular Surgery (SVS) developed the Wlfl classification to classify these three main risk factors that result in amputation, and it was used to grade the severity of the patients. It addresses wound, ischemia, and foot infection the three most significant factors that increase a limb's risk of amputation and it was used to grade the severity of the patients. It addresses wound, ischemia, and foot infection—the three most significant factors that increase a limb's risk of amputation

Table I: Demographic Data of the Patients (n=76)		
	Frequency (n)	Percent (%)
Age (years)		
40-50	40	52.6
51-60	32	42.1
> 60	04	5.3
Gender		
Male	52	68.4
Female	24	31.6
Duration of Diabetes		
< 5 years	40	52.6
5-10 years	21	27.6
>10 years	15	19.7
Comorbidities		
No	11	14.5
Hypertension	31	40.8
Hyperlipidemia	24	31.6
Ischemic heart disease	04	5.3
Others	06	7.9
Presented in		
Emergency	62	81.6
OPD	14	18.4

Table II: Severity of diabetic Foot According to Wifl classification (n=76)		
	Frequency	Percent
Wound		
Grade 1	16	21.1
Grade 2	55	72.4
Grade 3	5	6.6
Ischemia (Ankle BP)		
Grade 1	44	57.9
Grade 2	13	17.1
Grade 3	19	25.0
Wound Infection		
Grade 1	26	34.2
Grade 2	20	26.3
Grade 3	30	39.5

Each letter or parameter in the SVS Wifl classification is assigned a 4-grade scale, with 0 being

Table III: Association of Severity of DFUs with Gender (n=76)				
	Male n (%)	Female n (%)	Total	P value
Wound				
Grade 1	9 (17.3)	07 (29.2)	16	0.181
Grade 2	38 (73.1)	17 (70.8)	(21.1)	
Grade 3	05 (9.6)	0 (0.0)	55 (72.4) 05 (6.6)	
Ischemia (Ankle BP)				
Grade 1	30(57.7)	14 (58.3)	44	0.06
Grade 2	12 (23.1)	01 (4.2)	(57.9)	
Grade 3	10 (19.2)	09 (37.5)	13 (17.1) 19 (25.0)	
Foot Infection				
Grade 1	17 (32.7)	09 (37.5)	26	0.75
Grade 2	15 (28.8)	05 (20.8)	(34.2)	
Grade 3	20 (38.5)	10 (41.7)	20 (26.3) 30 (39.5)	

non-existent, 1 mild, 2 moderate, and 3 severe. The results of this study showed that according to wound severity, 55 (72.4%) patients presented with grade 2 (Deep Ulcer with exposed bone, joints or tendons followed by 16 (21.1%) patients with grade 1 (Small Superficial Ulcer without gangrene). According to Ischemia (Ankle BP), 44 (57.9%) patients presented with grade 1, 13 (17.1%) presented with grade 2 and 19 (25.0%) presented with grade 3. According to wound infection as shown in table II. Chi-square test was applied to determine the association of severity of DFU with respect to age, gender and duration of diabetes. The results showed that there was no significant difference in in severity of DFUs with respect to age as shown in table III. The association of severity of DFUs and age is shown in table 4 and the results displayed that there was a significant difference (0.000) in severity of DFUs and age. The patients of age >50 years had more severe DFUs

	Age Groups (years)			Total	P-value
	40-50 n (%)	51-60 n (%)	> 60 n (%)		
Wound					
Grade 1	14(35.0)	02 (6.3)	0 (0.0)	16 (21.1)	0.000
Grade 2	26 (65)	28(87.5)	01 (25.0)	55 (72.4)	
Grade 3	0 (0.0)	02(6.3)	03 (75.0)	05 (6.6)	
Ischemia (Ankle BP)					
Grade 1					0.000
Grade 2	35(87.5)	09(28.1)	0(0.0)	44 (57.9)	
Grade 3	05(12.5)	08(25)	0(0.0)	13 (17.1)	
	0(0.0)	15(46.9)	4(100)	19 (25.0)	
Foot Infection					
Grade 1	25(62.5)	01(3.1)	0(0.0)	26 (34.2)	0.000
Grade 2	10(25)	10(31.3)	0(0.0)	20 (26.3)	
Grade 3	05(12.5)	21(65.6)	4(100)	30 (39.5)	

	Duration of Diabetes (years)			Total	P-value
	< 5	5-10	>10		
Wound					
Grade 1	14 (35.0)	0(0.0)	02(13.3)	16(21.1)	0.000
Grade 2	26 (65.0)	20 (95.2)	09(60)	55(72.4)	
Grade 3	0 (0.0)	01(4.8)	04(26.7)	05 (6.6)	
Ischemia (Ankle BP)					
Grade 1	35(87.5)	06 (28.6)	03(20.0)	44(57.9)	0.000
Grade 2	05(12.5)	08 (38.1)	0 (0.0)	13(17.1)	
Grade 3	0(0.0)	07 (33.3)	12(80.0)	19(25.0)	
Foot Infection					
Grade 1	25(62.5)	01(4.8)	0(0.0)	26(34.2)	0.000
Grade 2	10(25.0)	09(42.9)	01(6.7)	20(26.3)	
Grade 3	05(12.5)	11(52.4)	14(93.3)	30(39.5)	

as compared to patients <50 years. The association of severity of DFUs and duration of diabetes is shown in table 4 and the results displayed that there was a significant difference (0.000) in severity of DFUs and age. The patients of duration of diabetes had more severe DFUs as compared to patients <50 years.

Discussion

One common diabetic complication that can have major consequences is foot disease. Diabetic peripheral neuropathy, angiopathy, hyperglycemia,

and infection, either alone or in combination, are responsible for a significant number of foot problems in people with diabetes mellitus.⁹ It imposes a significant load on the global healthcare system. Diabetes patients are at risk of acquiring a variety of problems, which can cause foot injury. The most prevalent cause of hospitalization among diabetes patients is foot infection, followed by amputation of a lower extremity.¹⁰

This study showed the mean age of the patients was 51.03±7.04 years, with 68.4% males. The results

showed that duration of diabetes was <5 years in 40(52.6%) followed by 5-10 years in 21(27.6%) patients. Diabetic foot disease is more common in the older age group as compared to younger ones. Local and international that also showed a male predominance. These results are in accordance with other studies.¹¹⁻¹⁴ Aslam et al in their study reported that males exhibited a higher prevalence of DFUs at 56.8% and majority of patients >60 years.⁷ In another study, from a total of 509 subjects suffered from diabetic foot ulcer participated were 339(66.6%) males and 170(33.4%) females. The mean age of the respondents was 48.26±10.387 years.⁸

Different grading systems are used to assess the severity of DFUs in patients. In our study patients' severity was graded according to Wifl classification. According to wound severity, 55(72.4%) patients presented with grade 2 followed by 16(21.1%) patients with grade 1, while according to Ischemia, 44(57.9%) patients presented with grade 1 followed by 19(25.0%) presented with grade 3. A study that used Wagner's classification system for DFUs classification, showed 4(10.3%) patients with the foot at risk were in grade-0, 9(23.1%) patients with superficial ulceration and erythema, 4(10.3%) patients of deep ulceration with bad granulation tissue, 12(30.8%) patients had osteomyelitis while 10(25.6%) patients of gangrenous patches on pressure areas.² In another study conducted in Nigeria Distribution of diabetic foot ulcer severity by Wagner grading system showed grade 1,2,3, 4 and 5 in 3.9%, 17%, 26.2%, 36.9% and 16.1% patients respectively.¹⁵ Results from various studies indicate that foot abnormalities and a history of amputation were linked to high Wagner's grade.^{16,17} The incidence of diabetic foot amputation could be affected by many factors as mentioned in literature. The results of this study showed a significant association of severity of DFUs with age and duration of disease. A study by Aborajooch E et al also

reported association of DFUs with gender, age and duration of diabetes.¹

This study highlighted the significance of severity of DFUs as graded by Wifl classification that can help in the managing the foot complications of diabetic patients. The strong association of DFUs with age and duration of disease also predict the outcome with better decision making for its management. Single centered with small number of study patients are the limitations that need to be addressed with future suggestion of designing a cohort study of more patients from multi centers.

Conclusion

Diabetic patients commonly presented in this study with grade 2 of DFUs followed by grade 1, while presentation with ischaemia were of grade 1 and a significant association of severity of DFUs with age and duration of disease. Early detection and treatment may help to decrease the chances of amputation. Proper hygiene and foot care education in diabetic patients may be an important way of dealing with this major problem.

References

1. Aborajooch E, Alqaisi TM, Yassin M, Alqpelat E, Abofaraj A, Alrawajih T et al. Diabetic foot ulcer in Southern Jordan: A cross-sectional Study of Clinical and Microbiological Aspects. *Ann Med Surg (Lond)*. 2022; 76: 103552. doi: 10.1016/j.amsu.2022.103552.
2. Ahmad J, Kumar A, Khan ZA, Rahim S, Mohsin M, Khan A. Diabetic Foot: its grades and mode of presentation at a tertiary care hospital of Peshawar, Khyber Pakhtunkhwa, Pakistan. *Journal of Rehman Medical Institute* 2021; 7(2): 03-06. <https://doi.org/10.52442/jrmi.v7i2.299>
3. Abdissa D, Adugna T, Gerema U, Dereje D. Prevalence of Diabetic Foot Ulcer and Associated Factors among Adult Diabetic Patients on Follow-Up Clinic at Jimma Medical Center, Southwest Ethiopia, 2019: An Institutional-Based Cross-Sectional Study. *J*

- Diabetes Res. 2020; 2020: 4106383. <https://doi.org/10.1155/2020/4106383>.
4. Maldonado-Valer T, Pareja-Mujica LF, Corcuera-Ciudad R, Terry-Escalante FA, Chevarría-Arriaga MJ, Vasquez-Hassinger T, et al. Prevalence of diabetic foot at risk of ulcer development and its components stratification according to the international working group on the diabetic foot (IWGDF): A systematic review with metanalysis. *PLoS One* 2023; 18(11): e0284054. <https://doi.org/10.1371/journal.pone.0284054>.
 5. Whisstock C, Volpe A, Ninkovic S, Marin M, Meloni M, Bruseghin M, et al. Multidisciplinary Approach for the Management and Treatment of Diabetic Foot Infections with a Resorbable, Gentamicin-Loaded Bone Graft Substitute. *J Clin Med*. 2020; 9(11): 3586. <https://doi.org/10.3390/jcm9113586>.
 6. Drampalos E, Mohammad HR, Kosmidis C, Balal M, Wong J, Pillai A. Single stage treatment of diabetic calcaneal osteomyelitis with an absorbable gentamicin-loaded calcium sulphate/hydroxyapatite biocomposite: The Silo technique. *Foot (Edinb)*. 2018; 34: 40-44. <https://doi.org/10.1016/j.foot.2017.11.011>.
 7. Aslam R, Usman K, Ghaffar T. Diabetic Foot Ulcers and Their Surgical Management: Our Experience at Hayatabad Medical Complex, Peshawar. *Cureus* 2023; 15(10): e48073. <https://doi.org/10.7759/cureus.48073>.
 8. Akhtar S, Ali A, Ahmad S, Khan MI, Shah S, Hassan F. The prevalence of foot ulcers in diabetic patients in Pakistan: A systematic review and meta-analysis. *Front Public Health*. 2022; 10: 1017201. <https://doi.org/10.3389/fpubh.2022.1017201>.
 9. Mahakalkar CC, Kaple MN, Janardhan J, Jain N, Jaipuria P, Wagh DD. Pattern of diabetic foot-presentation and complications in rural Indian population. *Int J Res Med Sci* 2017; 3(4):948-53.
 10. American Diabetes Association. 11. Microvascular complications and foot care: standards of medical care in diabetes—2019. *Diabetes Care* 2019; 42(Supplement_1): S124-S38. <https://doi.org/10.2337/dc19-S011>.
 11. Choudhry Abid Nazir S, Nawaz R. Severity and outcome of patients presenting with diabetic foot at Tertiary Care Center at Gujrat. *Pakistan Journal of Medical and Health Sciences* 2019; 13(4):1024-6.
 12. Tariq R, Rahman S, Hamid S. Foot Care Practices among Diabetic Patients Visiting Public Hospitals in Rawalpindi. *Journal of Islamic International Medical College* 2021; 16(3):151-5.
 13. Riaz M, Miyani Z, Waris N, Zaidi SI, Tahir B, Fawwad A, et al. Impact of multidisciplinary foot care team on outcome of diabetic foot ulcer in term of lower extremity amputation at a tertiary care unit in Karachi, Pakistan. *Int Wound J* 2019; 16(3): 768-772. <https://doi.org/10.1111/iwj.13095>.
 14. Naseer S, Malkera A, Khan N, Siddiqui AH, Khan SA, Ali S, et al. Prevalence of diabetic complications in urban and rural population of Punjab. *Pakistan Journal of Medical & Health Sciences* 2022;16(03):69-72.
 15. Ugwu E, Adeleye O, Gezawa I, Okpe I, Enamino M, Ezeani I. Burden of diabetic foot ulcer in Nigeria: Current evidence from the multicenter evaluation of diabetic foot ulcer in Nigeria. *World J Diabetes*. 2019; 10(3): 200-211. <https://doi.org/10.4239/wjd.v10.i3.200>.
 16. Francia P, Anichini R, Seghieri G, De Bellis A, Gulisano M. History, Prevalence and Assessment of Limited Joint Mobility, from Stiff Hand Syndrome to Diabetic Foot Ulcer Prevention: A Narrative Review of the Literature. *Curr Diabetes Rev*. 2018; 14(5): 411-426. <https://doi.org/10.2174/1573399813666170816142731>.
 17. Yammine K, Hayek F, Assi C. Is there an association between anemia and diabetic foot ulcers? A systematic review and meta-analysis. *Wound Repair Regen*. 2021; 29(3): 432-442. <https://doi.org/10.1111/wrr.12902>.