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DIABETIC FOOT MANAGEMENT IN PATIENTS: CDA HOSPITAL, ISLAMABAD

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Abstract

Background: Diabetes can cause damage to the nerves and also can cause poor flow of blood. It can lead to serious problems with the foot.

Aim of the Study: This research aimed to collect data on the prevalence of diabetic foot ulcers, analyze current management strategies and impact, identify primary risk factors, design a comprehensive care model, and assess the cost-effectiveness of diabetic foot management strategies.

Methodology: It was an observational cross-sectional study. This study was conducted from October 2023 to March 2024. 250 participants with confirmed diagnosis of diabetic foot were included in the study according to inclusion criteria. Medical history and demographic information, monitoring of blood glucose levels, and patient education about foot care, foot care techniques, outcomes, and complications will be included in the data set.

Results: The study involved 250 individuals with an average age of 58.4 years. On average, the participants had been living with diabetes for 12.5 years. A significant proportion of the group had other health conditions such as hypertension (HTN) 52%, hyperlipidemia 36%, and neuropathy 64%. The average fasting blood glucose level was 142.6 mg/dL. Foot ulcers were significantly lower among educated patients 13.3% compared to uneducated patients 40%. Wound healing time was also shorter for educated patients, averaging 7.5 weeks compared to 10.1 weeks for uneducated patients with a $p<0.001$

Conclusion: This study concluded that males are more affected by diabetic foot than females, and many patients had comorbidities like hypertension, hyperlipidemia, and neuropathy. High blood glucose level is associated with health challenges and complications.

Keywords: Diabetic Foot, Neuropathy, Hyperlipidemia

Introduction

Diabetic foot is defined as a chronic complication of diabetes considered as cultured tissue injuries related to neurological conditions and having a lower limb with peripheral vascular disorder in it (1). Developing wounds and foot infections can lead to significant pain, and decreased physical and mental well-being (2) after ten years of diabetic history, the probability of life-threatening for diabetic patients suffering from ulcers is twice that of patients, without the ulcer of the foot (3).

The universal impact of diabetic mellitus and the extended average lifespan of patients suffering from diabetes has increased the incidence of diabetic foot (4). Every half a minute, a patient loses a limb due to diabetic mellitus (DM). Most of the amputations occur in patients suffering from diabetes which leads to ulcers of the foot that worsen into severe gangrene and infection (5).

The effectiveness of a comprehensive approach has been shown to reduce amputations associated with diabetic foot ulcers (6,7).

Approximately 15 percent of diabetic patients will suffer from foot ulcers (8). Peripheral nephropathy appeared as the leading cause of these ulcers, impacting as much as 6 percent of individuals with diabetic mellitus (DM) (9). There is an around 2 percent annual occurrence of diabetic foot ulcers (10), with a worldwide prevalence of about 6.3 percent (11) Research shows that a significant 84 percent of amputations in patients of diabetes stem from ulcers as the primary cause (12).

Diabetic foot is recognized as a condition influenced by various factors such as neuropathy, neuro-ischemia, and infection, all contributing to either the healing or deterioration of the lesion(13).

Diabetic foot ulcers remain a major challenge for healthcare professionals despite extensive research,. It is now recognized that efforts to promote healing and managing these complex wounds, thereby averting the severe outcomes of amputation and death. The path to healing a patient's DFU typically involves a comprehensive approach, including consistent offloading of insensate areas, control of endocrine and metabolic factors, and improved circulation (14). This research aims to collect data on the prevalence of diabetic foot ulcers, analyze current management strategies and impact, identify primary risk factors, design a comprehensive care model, and assess the cost-effectiveness of diabetic foot management strategies.

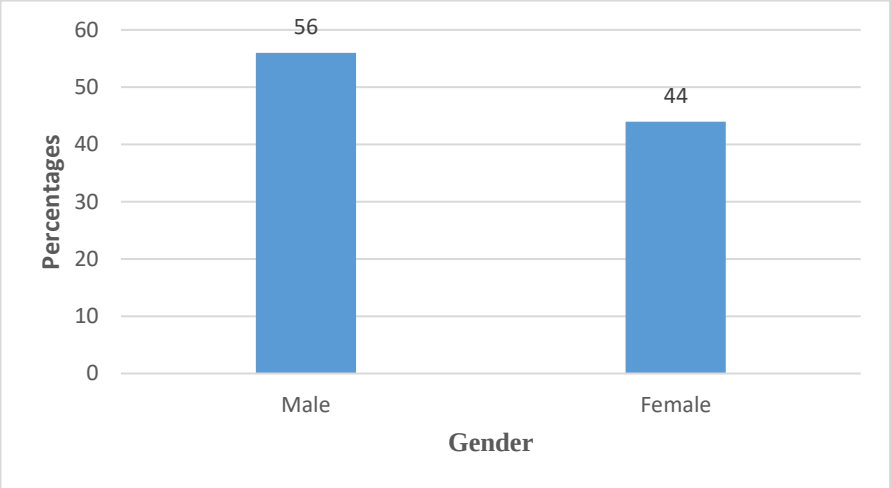
Methodology

The study was conducted from October 2023 to March 2024 in CDA Hospital, Islamabad after approval from the Institutional Review Board of CDA Hospital. A cross-sectional observational study was conducted with a sample size of 250 participants, and selection depended on the criteria of inclusion and exclusion. Inclusion criteria included adults (aged 18-75) with a confirmed diagnosis of diabetic foot. Exclusion criteria involved individuals with a history of pregnancy or any other conditions that may affect glucose metabolism and non-diabetic foot ulcers. The sample size was calculated according to the WHO sample size calculator. Medical history and demographic information, monitoring of blood glucose levels, and patient education about foot care, foot care techniques, outcomes, and complications will be included in the data set. Statistical analysis for quantitative data and thematic analysis for qualitative data was done. Quantitative data was summarized as demographic and clinical characteristics. Thematic analysis was performed on patient education and foot care techniques data to identify common themes and insights.

Results

The study involved 250 individuals with a mean age of 58.4 years. The gender distribution was 56 % male and 44 % female. (Figure 1)

Figure 1 Gender



The participants had been living with diabetes for 12.5 years, with a mean HbA1C even of 8.1 % with a standard deviation of 1.9. A significant proportion of the group had other health conditions such as hypertension (HTN) 52%, hyperlipidemia 36%, and neuropathy 64%. These demographic and clinical characteristics highlight the impact of diabetes and its complications within this study group. (Table 1)

Table 1 Demographics and Clinical Features of Participants (N=250)

Demographics and Clinical Features	Mean (Standard Deviation) or N (Percentage)
Age of the Participants in years	58.4
Gender	
• Male	140 (56%)
• Female	110 (44%)
Duration of Diabetes (years)	12.5 (7.3)
HbA1c (%)	8.1 (1.9)
Comorbidities	
• Hypertension	130 (52%)
• Hyperlipidemia	90 (36%)
• Neuropathy	160 (64%)

The average fasting blood glucose level was 142.6 mg/dL with a standard deviation of 35.4, and the average postprandial glucose level was 185.3 mg/dL. The findings of average wound healing resulted in 8.2 weeks. Seventy-five individuals (30%) experienced infections, 20 underwent amputations, and 45 (18%) required hospitalization. These results highlight the significant health challenges and complications associated with blood glucose levels and their impact on patient outcomes. (Table 3)

Table 2 Blood Monitoring and Outcomes

Variable	Mean (SD) or n (%)
Fasting Blood Glucose (mg/dL)	142.6 (35.4)
Postprandial Glucose (mg/dL)	185.3 (42.7)
Wound Healing (Weeks)	8.2 (4.5)
Infections	75 (30%)
Amputations	20 (8%)
Hospitalization	45 (18%)

The impact of patient education on foot care among educated (n=150) and uneducated (n=100) patients was presented. The results reveal that educated patients had significantly better outcomes. 86.7 percent of educated patients conducted regular foot inspections compared to 50 percent of uneducated patients with a significant probability ($p<0.001$), and 93.3 percent of educated patients

used proper footwear compared to 55 percent with a significant probability ($p<0.001$). Foot ulcers were significantly lower among educated patients 13.3% compared to uneducated patients 40% with a significant p-value of less than 0.001. Wound healing time was also shorter for educated patients, averaging 7.5 weeks compared to 10.1 weeks for uneducated patients with a p-value less than 0.001. These results underscore the importance of literacy in ineffective foot care management. (Table 3)

Table 3. The outcome of Patient Education on Foot Care

Variable	Educated (n=150)	Uneducated (n=100)	p-value
Regular Foot Inspections	130 (86.7%)	50 (50%)	<0.001
Proper Footwear Usage	140 (93.3%)	55 (55%)	<0.001
Foot Ulcer Incidence	20 (13.3%)	40 (40%)	<0.001
Wound Healing Time (Weeks)	7.5 (3.8)	10.1 (4.7)	<0.001
Infection Rates	30 (20%)	45 (45%)	<0.001

Discussion

A study conducted by Ur. Rehman et al (15), revealed that diabetic foot ulcer disease involves vasculopathy and infection. It emphasizes the importance of diagnosing and treating the main cause for optimal healing and preventing limb amputation. It also stresses the importance of preventing peripheral artery disease in diabetic patients and educating patients about self-care and prevention of foot complications. In a study, 86.7% of educated patients were aware of regular foot inspection compared to 50% of uneducated patients.

A study by E. Yetzer et al (16) concluded that Diabetic foot screening aims to identify foot problems, assess risk and management, and educate patients with diabetes and their families on proper foot care. This helps patients reduce the risk of ulcers and amputation. A study conducted by F. Syed et al (17) 400 participants participated, with 238 females and 162 males. The average mean age was 52.7111.84 years. Out of the total participants, 228 were unaware of foot care. In our study, we included 250 participants, out of which 150 received education regarding diabetic foot. According to S. Fahad Shah (18), the average duration of diabetes among the participants was 11.4 years. 369 participants, which is 35.04% underwent amputation. In our study, the average duration of diabetes among participants was 12.5 years, with a standard deviation of 7.3. The mean HbA1C level was 8.1 percent, with a standard deviation of 1.9. The study conducted by J.D. Hodges et al (19) explained peripheral neuropathy and peripheral vascular disease can cause diabetic foot. First step is to conduct thorough physical examinations to check for infection and use Doppler analysis to assess perfusion. It's important to trace the ulceration to monitor healing and to wear well-fitted shoes for preventive care. Shoe modification using moldable plastics and metatarsal bars is an option. Patient and family education are also key parts of managing the condition.

According to our study, 93.3% of participants had education regarding proper footwear usage. 13.3 % of participants had education of foot ulcer incidence. Wound healing time was shorter for educated patients, averaging 7.5 weeks compared to 10.1 weeks for uneducated patients with a p-value less than 0.001.

Conclusion

This study concluded that males were affected more by diabetic foot compared to females. A significant proportion of patients had comorbidities like hypertension, hyperlipidemia, and neuropathy. Mostly had neuropathy. High blood glucose levels are associated with health challenges and complications and their impact on health outcomes. The occurrence of foot ulcers is significantly lesser among educated patients compared to uneducated. Wound healing time was also shorter among educated patients compared to uneducated.

References

1. Brocco E, Ninkovic S, Marin M, Whisstock C, Bruseghin M, Boschetti G, et al. Diabetic foot

management: Multidisciplinary approach for advanced lesion rescue. J Cardiovasc Surg (Torino). 2018;59(5):670–84.
2. Raspovic KM, Wukich DK. Self-reported quality of life and diabetic foot infections. J Foot Ankle Surg [Internet]. 2014;53(6):716–9. Available from: http://dx.doi.org/10.1053/j.jfas.2014.06.011
3. Iversen MM, Tell GS, Riise T, Hanestad BR, Østbye T, Graue M, et al. History of foot ulcer increases mortality among individuals with diabetes: Ten-year follow-up of the Nord-Trøndelag health study, Norway. Diabetes Care. 2009;32(12):2193–9.
4. Boulton AJ, Vileikyte L, Ragnarson-Tennvall G, Apelqvist J. The global burden of diabetic foot disease. Lancet [Internet]. 2005 Nov 12 [cited 2024 Jun 3];366(9498):1719–24. Available from: http://www.thelancet.com/article/S0140673605676982/fulltext
5. Lepäntalo M, Apelqvist J, Setacci C, Ricco JB, De Donato G, Becker F, et al. Chapter V: Diabetic foot. Eur J Vasc Endovasc Surg. 2011;42(SUPPL. 2):60–74.
6. Holstein P, Ellitsgaard N, Bornefeldt Olsen B, Ellitsgaard V. Decreasing incidence of major amputations in people with diabetes. Vasa - J Vasc Dis. 2001;30(SUPPL. 58):28–31.
7. Rasmussen A, Almdal T, Anker Nielsen A, Nielsen KE, Jørgensen ME, Hangaard S, et al. Decreasing incidence of foot ulcer among patients with type 1 and type 2 diabetes in the period 2001–2014. Diabetes Res Clin Pract [Internet]. 2017 Aug 1 [cited 2024 Jun 3];130:221–8. Available from: http://www.diabetesresearchclinicalpractice.com/article/S0168822717300785/fulltext
8. Reiber GE, Lipsky BA, Gibbons GW. The burden of diabetic foot ulcers. Am J Surg. 1998;176(2 A):5S-10S.
9. Kärvestedt L, Mårtensson E, Grill V, Elofsson S, Von Wendt G, Hamsten A, et al. The prevalence of peripheral neuropathy in a population-based study of patients with type 2 diabetes in Sweden. J Diabetes Complications. 2011 Mar 1;25(2):97–106.
10. Ramsey SD, Newton K, Blough D, McCulloch DK, Sandhu N, Reiber GE, et al. Incidence, outcomes, and cost of foot ulcers in patients with diabetes. Diabetes Care. 1999;22(3):382–7.
11. Zhang P, Lu J, Jing Y, Tang S, Zhu D, Bi Y. Global epidemiology of diabetic foot ulceration: a systematic review and meta-analysis†. Ann Med. 2017;49(2):106–16.
12. Pecoraro RE, Reiber GE, Burgess EM. Pathways to Diabetic Limb Amputation Basis for Prevention An identifiable and potentially preventable pivotal event, in most cases an episode involving minor. Diabetes Care [Internet]. 1990;13(513):21. Available from: http://care.diabetesjournals.org/content/diacare/13/5/513.full.pdf
13. Landau Z, Schattner A. Progress in care of the diabetic foot [7]. Lancet. 1999;354(9184):1125–6.
14. Bolton L. Managing Patients With Diabetic Foot Ulcers. Wounds [Internet]. 2018 Dec 1 [cited 2024 Jun 3];30(12). Available from: https://www.hmpgloballearningnetwork.com/site/wounds/evidence-corner/managing-patients-diabetic-foot-ulcers
15. Ur Rehman Z, Khan J, Noordin S. Diabetic foot ulcers: Contemporary assessment and management. J Pak Med Assoc. 2023;73(7):1480–7.
16. Yetzer EA. Incorporating foot care education into diabetic foot screening. Rehabil Nurs. 2004;29(3):80–4.
17. Syed F, Arif MA, Afzal M, Niazi R, Ramzan A, Hashmi UEL. Foot-care behaviour amongst diabetic patients attending a federal care hospital in Pakistan. J Pak Med Assoc. 2019;69(1):58–63.
18. Fahd Shah Ann Pak S, Fahd Shah S, Hameed S, Khawaja Z, Abdullah T, Waqar SH, et al. Evaluation and Management of Diabetic Foot: A Multicenter study… Evaluation and Management of Diabetic Foot: A Multicenter study conducted at Rawalpindi, Islamabad. Inst Med Sci. 2011;7(4):233–7.
19. D Hodges, V N Kumar JBR. Management of the diabetic foot - PubMed [Internet]. Am Fam Physician. 1986 [cited 2024 Jun 4]. Available from: https://pubmed.ncbi.nlm.nih.gov/3706096/