

Frequency Of Diabetes Mellitus Associated With Diabetic Foot Ulcer among People Presented To Lady Reading Hospital, Peshawar

Hazrat Ali

Primary Health Care Technician (MP), District Health Office, Peshawar

Abid Ali

EPI Technician (MP), Directorate General Health, Peshawar

Sami Ullah

Emergency Care Technologist , Wazir Muhammad Institute of Allied Health Sciences, Gandhara University, Peshawar

Zabih Ullah (Corresponding Author)

Sr. Lecturer Emergency and Intensive Care, Wazir Muhammad Institute of Allied Health Sciences, Gandhara University, Peshawar Email: zabijan790@gmail.com

Abstract

Background: Diabetic foot ulcer (DFU) is a severe complication associated with diabetes mellitus, posing significant challenges to patients' well-being and healthcare systems. The aim of this study was to determine the risk factors causing DFU development and to investigate the gender-specific prevalence of DFU among diabetes mellitus patients. Comorbidities related to DFU were also investigated to better understand and treat this illness. **Methods:** This cross-sectional study was carried out at LRH and included 100 people with DFU and diabetes mellitus. The study included participants from a range of age categories, divided into three groups: Group 1 (age 30-45 years, n = 31, 29.24%), Group 2 (age 46-62 years, n = 35, 33.02%), and Group 3 (age 63-85 years, n = 40, 37.74%). The participants' gender distribution was evaluated, with 58 female individuals (54.72%) and 48 male subjects (45.28%) included. **Results:** The data

showed that older people with diabetes mellitus had a higher incidence of DFU, and that this incidence increased with age. When compared to their male counterparts, persons with diabetes mellitus who were female had a considerably higher risk of acquiring DFU. Risk factor analysis revealed several factors that affected how individuals developed DFU. The primary contributing causes were determined to be improper foot care behaviors, which included ignoring foot hygiene (27.35%), wearing uncomfortable footwear (51.88%), walking barefoot (33.96%), and failing to adequately dry feet (29.24%). An unbalanced diet (24.52%) and non-adherence to recommended diabetes drugs (12.26%) were also linked to the development of DFU. Additionally, comorbidity study of people with diabetes mellitus and DFU showed a considerable burden of other medical disorders. The most common comorbidities

Author Details

Keywords: DFU Development, Diabetes Mellitus, Preventive Strategies, Foot Ulcer

Received on 24 Nov 2025

Accepted on 23 Dec 2025

Published on 30 Dec 2025

Corresponding E-mail & Author*:

Zabih Ullah

Sr. Lecturer, Wazir Muhammad Institute of Allied Health Sciences, Gandhara University, Peshawar

Email: zabijan790@gmail.com

were gangrene (56.60%), hypertension (54.71%), smoking addiction (28.30%), obesity (45.28%), and vascular disease (36.79%). **Conclusion:** This study emphasizes the significance of considering a patient's age and gender when estimating their risk of developing DFU if they have diabetes mellitus. It emphasizes the necessity of specialized programs to encourage good foot hygiene habits and adherence to diabetic medications. A comprehensive approach to patient management that addresses both diabetes control and other related health issues is required given the correlation of DFU with comorbidities. These results offer useful information for healthcare professionals to improve preventive strategies and improve the management of DFU in diabetic patients.

Introduction

Diabetes mellitus (DM) is a chronic metabolic disorder characterized by hyperglycemia due to insufficient insulin production or action, leading to widespread complications affecting multiple organ systems. Among these, the vasculature plays a critical role, contributing to both microvascular and macrovascular issues, with chronic hyperglycemia causing long-term damage primarily to the heart, eyes, kidneys, and nerves. Diabetic foot ulcer (DFU) emerges as a severe complication, arising from a combination of peripheral sensory neuropathy, peripheral vascular disease, and foot abnormalities, which can result in ulcers requiring multimodal treatment including wound care, off-loading, revascularization, and glycemic control. DFU is prevalent in 4-10% of diabetics, with higher risks in older individuals, and it significantly increases the likelihood of lower limb amputation, making it a debilitating and costly condition globally (1,2).

The pathogenesis of DFU involves multifactorial elements, with diabetic neuropathy affecting motor, sensory, and autonomic nerves, leading to muscle atrophy, loss of protective sensations, and skin integrity issues that predispose to infections. Peripheral arterial disease, occurring 2-8 times more frequently in diabetics, exacerbates ischemia, particularly in areas below the knee, and acts as an independent predictor for ulcers and cardiovascular events. Additional risk factors include structural foot deformities like hallux valgus or Charcot neuroarthropathy, prior ulceration or amputation history, poor glycemic control, smoking, and male gender predominance. Assessment of DFU requires thorough examination of dermatological, vascular, neurological, and musculoskeletal systems, including pulse palpation and Doppler measurements to detect arterial stiffness and occlusive disease (3,4).

Globally, DFU imposes substantial socioeconomic burdens, with prevalence rates of 3-10% and lifetime risks up to 25%, contributing to 12% of total health expenditure on diabetes. Annually, 9.1-26.1 million people develop foot ulcers, and complications like infection or osteomyelitis can lead to amputation, with a 2.5-fold higher 5-year mortality risk. Treatment focuses on debridement, off-loading (e.g., total contact casts or removable walkers), infection control with antibiotics, and advanced dressings or growth factors like becalming. Despite these, challenges persist in classification, prevention, and standardized care, necessitating better understanding of risk factors and outcomes to reduce the rising incidence amid increasing diabetes prevalence projected to reach 700 million by 2045 (5,6).

A clinical trial conducted in the United States recruited 93 participants with diabetic foot ulcers, of whom 7 were screen failures due to not meeting inclusion criteria, leaving 86 patients randomized into two groups: 39 receiving standard care and 47 receiving AM therapy. Most participants had type 2 diabetes and were obese (BMI ≥ 30), with no significant differences in demographics, ulcer location (primarily on the foot), or pre-treatment characteristics like ulcer history and size. Glycosylated hemoglobin levels remained stable throughout the study, indicating preserved

metabolic control, and no statistically significant differences were observed between groups at any point. This study highlights the feasibility of maintaining glycemic stability in DFU management, suggesting that interventions like AM therapy could be evaluated without compromising diabetes control, though outcomes on ulcer healing were not detailed in the provided summary (7).

A European survey-based study collected 600 responses from general practitioners (GPs) across France, the UK, Spain, and Germany, documenting 1,188 DFU patient cases (295 in France, 298 in the UK and Spain combined, and 297 in Germany). GPs' awareness and perceptions of DFU referrals varied: all UK and Spanish GPs agreed on the need for multidisciplinary approaches, while only 59% in Germany and 50% in France fully concurred. Only 6% of UK GPs believed DFU management should be solely their responsibility, compared to about 33% in the other countries. The study emphasized referral patterns to specialist diabetic foot centers and potential barriers, underscoring the importance of GP education and access to specialized care to improve outcomes in DFU management across European primary care settings (8,9).

Conducting research on diabetic foot ulcers offers significant benefits by enhancing prevention strategies and treatment protocols, potentially reducing the global burden of amputations and healthcare costs. By identifying key risk factors such as neuropathy, vascular disease, and structural deformities, this study can inform targeted interventions like improved glycemic control and early screening, leading to better patient outcomes and quality of life. Furthermore, it promotes multidisciplinary collaboration among healthcare providers, fostering standardized classifications and care pathways that could lower incidence rates and mortality, especially in high-risk populations like older adults and males, ultimately contributing to more efficient resource allocation in diabetes management worldwide (10).

Extracting key data from the provided text reveals compelling benefits for advancing DFU research and clinical practice. For instance, prevalence statistics show that 4-10% of diabetics develop DFU, with a lifetime risk of up to 25% and annual global incidence of 9.1-26.1 million cases, highlighting the urgent need for scalable prevention programs to curb the 12% share of diabetes-related health expenditure. Risk factor data indicates that nearly 90% of ulcers stem from neuropathy, while peripheral arterial disease occurs 2-8 times more frequently in diabetics, providing evidence for prioritizing vascular assessments and off-loading techniques like total contact casts (11).

Treatment data underscores the efficacy of interventions such as becalming for non-healing ulcers and antibiotics for polymicrobial infections, with amputation risks mitigated by prompt debridement and revascularization, potentially saving limbs and reducing the 2.5-fold higher 5-year mortality. Demographic insights, like higher male incidence and rising global diabetes cases (463 million in 2019, projected to 700 million by 2045), support gender-specific and population-targeted studies to optimize outcomes and economic impacts, as DFU accounts for 7-20% of diabetes costs in North America and Europe. These extracted metrics demonstrate how data-driven insights can drive evidence-based policies, reducing hospitalizations (15-20% of US diabetics) and annual amputations (over 1 million globally), ultimately benefiting healthcare systems through cost savings and improved survival rates (12).

METHODS AND MATERIALS:

The study was conducted at Lady Reading Hospital (LRH) in Peshawar as a descriptive cross-sectional design over a duration of 6 months. Sampling employed a non-probability convenient technique to select 106 diabetic patients with foot ulcers, calculated using the Rao soft calculator. Inclusion criteria encompassed diabetic patients aged 30 to 80 years presenting with diabetic foot ulcers, while exclusion

criteria omitted diabetic patients without foot ulcers and all non-diabetics. Data was collected via a written questionnaire after obtaining consent from the patients or their attendants. Subsequently, the data was analyzed using SPSS version 27.0 and MS Excel (13).

RESULTS:

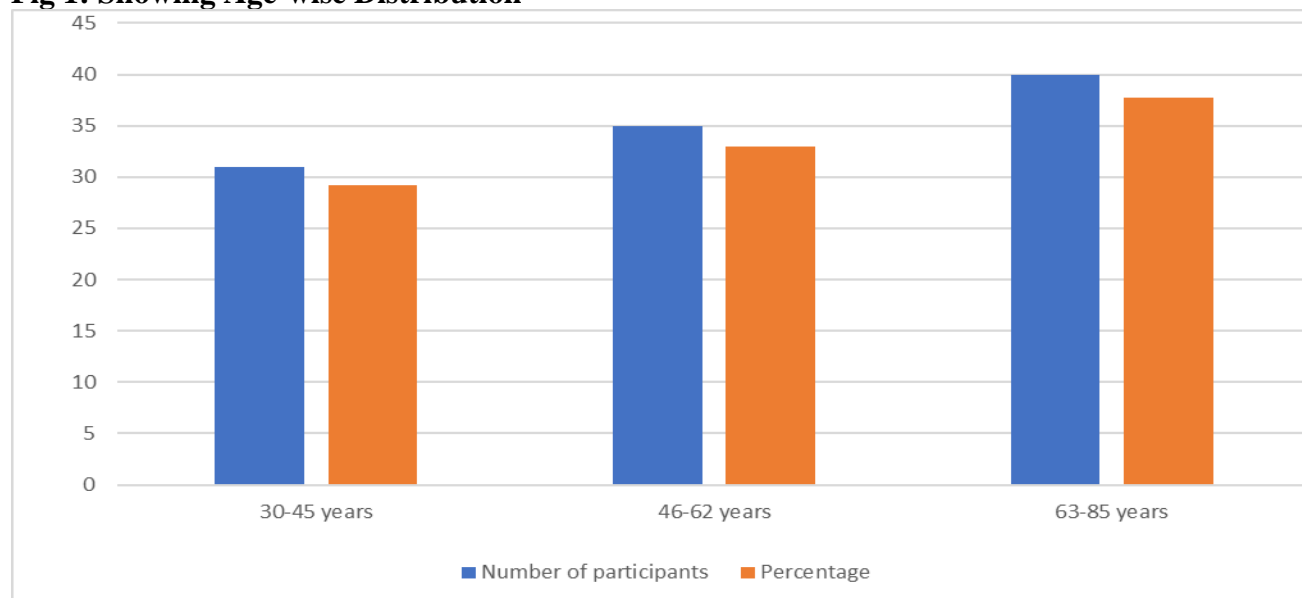
Age-Wise Distribution:

Diabetic foot ulcers were observed in most of the patients visiting Lady Reading Hospital (LRH), Peshawar. A total of 106 subjects participated in the study. Age range was considered the first variable in this study. Study participants of different ages were included. The study participants were categorized into three age groups. The 1st group included a total of 31 (29.24%) participants of the age range 30-45 years. The 2nd group included a total of 35 (33.02%) participants of age range 46-62 years. The 3rd group included a total of 40 (37.74%) participants of the age range 63-85 years. Based on our data, it is clearly shown that diabetic foot ulcer is more commonly to occur in old age subjects (having diabetes mellitus) i.e., chances of occurrence of diabetic foot increases with age.

Table 1: Showing the Age-wise distribution

Age groups	Number of participants	Percentage
30-45 years	31	29.24%
46-62 years	35	33.02%
63-85 years	40	37.74%
Total	106	100%

Fig 1: Showing Age-wise Distribution



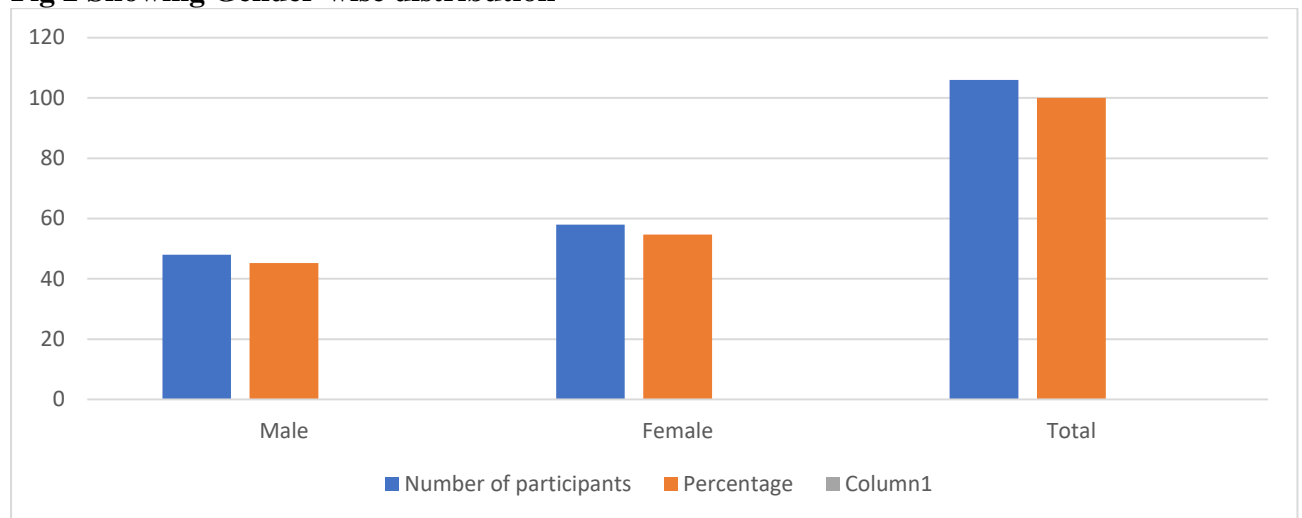
Gender-Wise Distribution:

The second variable of the study was gender. Out of the 106 study participants having diabetes mellitus with diabetic foot ulcer, the male subjects who contributed were 48 (45.28%) and the female subjects who participated were 58 (54.72%). From the data, we can say that female subjects having diabetes mellitus are at greater risk of developing diabetic foot ulcer compared to the male subjects. This distribution is shown in the below table 2 and fig 2.

Table 2: Showing the Gender-wise distribution

Gender	Number	Percentage
Male	48	45.28%
Female	58	54.72%
Total	106	100%

Fig 2 Showing Gender-wise distribution



Risk Factors for Developing Diabetic Foot in Diabetes Mellitus:

Improper foot care and ill-fitting footwear:

According to our data and information collected from the patients (study participants) via questionnaire with their consent, most of the subjects didn't take proper care of their feet. About 27.35% of the participants didn't take good care of their feet, 51.88% of the participants used to wear ill-fitting footwear, 24.52% of the participants didn't wash their feet on daily basis, 33.96% of the participants used to walk barefoot inside or outside their houses (majority females were involved) and 29.24% of the participants used to not dry their feet after washing them. All these are the contributing factors in the development of diabetic foot ulcer.

Non-adherence to diabetic medication:

According to our study, diabetic patients who had diabetic foot ulcer didn't take the diabetic medications as prescribed (12.26%). This phenomenon has added consequences to the patients in the form of diabetic foot ulcer.

Imbalanced diet:

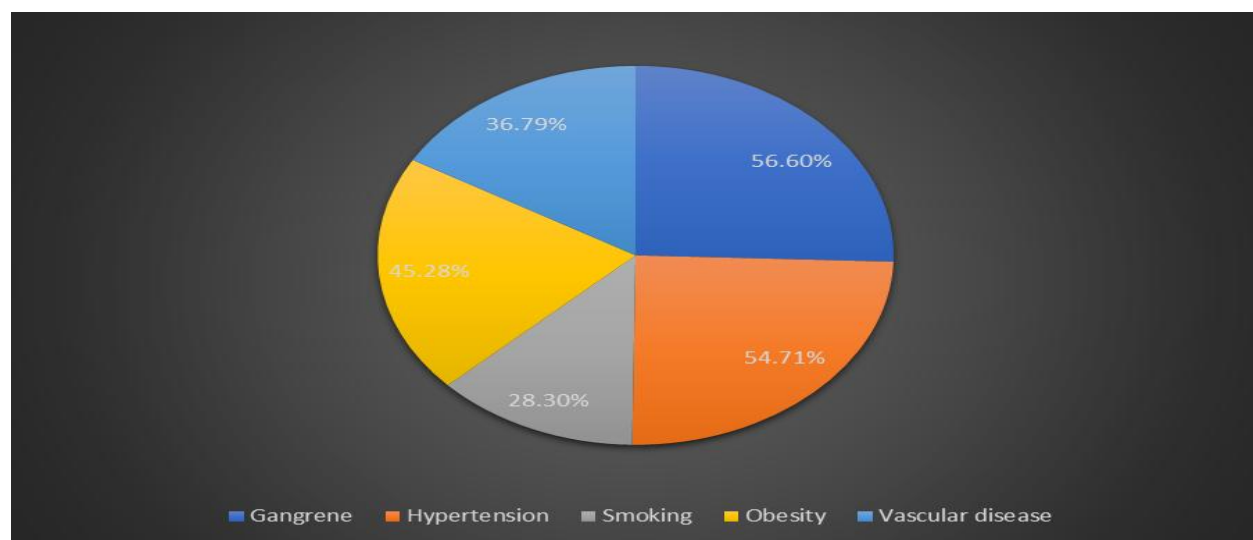
A portion (24.52%) of diabetic patients didn't follow the required balanced diet routine for controlling their sugar levels which ultimately led to the developing of diabetic foot ulcer.

Table 3: Showing the risk factors for developing Diabetic foot ulcer

Risk factors	Number of participants	Percentage
Improper foot care	29	27.35%
Wearing ill-fitting footwear	55	51.88%
Not washing feet daily	26	24.52%
Walking barefoot	36	33.01%
Not drying feet after washing them	31	29.24%
Non-adherence to diabetic medication	13	12.26%
Imbalanced diet	26	24.52%

Fig 3 Showing other diseases with diabetic mellitus in patients having diabetic foot ulcer

According to our data, subjects having diabetes mellitus with diabetic foot ulcer had many other diseases. About 56.60% of subjects had gangrene, 54.71% subjects had hypertension, 28.30% subjects were addicted to smoking, 45.28% subjects were obese, and 36.79% subjects had vascular disease.



DISCUSSION:

The current study sought to determine how frequently patients at Peshawar's HMC hospital had diabetes mellitus and diabetic foot ulcers. The findings made several important observations that provided insight into the patterns and risk factors for diabetic foot ulcers in the research population (14).

Analysis by gender revealed that females were more likely than males to develop diabetic foot ulcers. The disparity in gender may be caused by a variety of variables, including variations in foot care habits, hormonal impacts, and footwear preferences. To learn more about the underlying causes of this difference in the prevalence of diabetic foot ulcers by gender, more research is necessary (15).

An examination of patients by age showed that diabetic foot ulcers primarily impacted older patients. This is consistent with the evidence that shows people with diabetes are more likely to experience foot issues as they age. Reduced blood circulation and weakened sensory perception are two physiological changes that might damage foot health and hinder wound healing that are frequently associated with aging. The results may reflect the demographics of the hospital's patient group because the study's participants were from the HMC hospital, which may treat a lot of older patients (16,17).

However, when applying preventative measures and therapies for diabetic foot ulcers, it is crucial to take age-related factors into account. Another similar study was conducted in Eastern Indonesia in 2006 to find the prevalence of Diabetic Foot Ulcer risk factors and Diabetic Foot Ulcer among type 2 diabetes mellitus (T2DM) patients. The prevalence of DFU risk factors was 55.4%. Based on a logistic model, age and daily foot examination were predictors for DFU risk factors. From this it can be concluded that proper foot care especially in old age period is essential to prevent Diabetic foot ulcer (18,19).

Numerous risk variables were found in the study population, which is in line with earlier studies. Some individuals admitted to not taking good care of their feet, and this turned out to be a frequent problem. This emphasizes the importance of educating patients about proper foot care, which includes regular foot washing, drying, and moisturizing. Additionally, individuals are deprived of early identification and preventive treatments when they do not consult healthcare specialists for routine foot inspections (20,21).

Another substantial risk factor discovered in the study was wearing uncomfortable footwear. Poorly fitting shoes can put too much pressure, friction, and trauma on the feet, which increases the risk of foot ulcers, especially in people with poor foot feelings. To lower the incidence of foot ulcers, patient education should emphasize the value of wearing cozy, well-fitting shoes that offer sufficient support and cushioning (22,23).

The study participants had a high prevalence of obesity and hypertension, which were found to be significant risk factors for diabetic foot ulcers. Obesity can contribute to worsened wound healing, decreased blood flow, and increased pressure on the foot. In a similar manner, high blood pressure can impair blood flow and the healing of wounds. To lower the prevalence of diabetic foot ulcers, weight management techniques and blood pressure management should take precedence in the care of diabetic patients. About similar results (Improper foot care, obesity, and hypertension) were observed in another study conducted in Northwest Ethiopia in 2006 (24,25).

In that study 13.6% of people with diabetes had foot ulcers. Rural living, type II diabetes mellitus, obesity, overweight, poor foot self-care, and neuropathy were all risk factors for diabetic foot ulcers. [Mariam TG, Alemayehu A, Tesfaye E, Mequannt W, Temesgen K, Yetwale F, Limenih MA. Prevalence of diabetic foot ulcer and associated factors among adult diabetic patients who attend the diabetic follow-up clinic at the University of Gondar Referral Hospital, Northwest Ethiopia, 2016: institutional-based cross-sectional study. *Journal of diabetes research* (26,27).

The subjects in the study also had a significant prevalence of gangrene, which is a sign of advanced and severe foot ulcers. A dangerous condition called gangrene necessitates rapid medical attention and may call for surgical procedures. To stop the development of gangrene, early detection, regular foot exams, and timely treatment are essential (28).

In conclusion, the study offers insightful information about the patient population at Peshawar's HMC hospital in terms of demographics and risk factors for diabetic foot ulcers. The results highlight the significance of age-related factors and gender-specific

considerations in the management and prevention of diabetic foot ulcers. Comprehensive programs to prevent diabetic foot ulcers should include education, awareness campaigns, best practices for foot care, recommendations for footwear, management of weight, and blood pressure. It is advised to do additional study with larger sample sizes and more diverse populations to confirm these findings and create focused interventions to lessen the prevalence of diabetic foot ulcers in Peshawar and comparable environments (29,30).

CONCLUSION:

The current study aimed to determine how frequently patients at Peshawar's LRH hospital had diabetes mellitus and diabetic foot ulcers. The study involved 106 patients in total. Gender-wise females were most affected while age-wise old subjects were mostly affected. The results show that a sizable number of the participants had no prior history of diabetic foot issues, which points to a lack of public knowledge and preventative measures. Poor foot hygiene habits, disregard for medical advice, wearing uncomfortable footwear, obesity, hypertension, and the existence of gangrene were all noted as risk factors.

REFERENCES:

- American Diabetes Association. Standards of medical care in diabetes–2015: summary of revisions. *Diabetes Care*. 2015;38: S4.
- Hinchliffe R, Andros G, Apelqvist J, Bakker K, Friedrich's S, Lammer J, et al. A systematic review of the effectiveness of revascularization of the ulcerated foot in patients with diabetes and peripheral arterial disease. *J Vasc Surg*. 2012; 28:179-217.
- Cavanagh PR, Lipsky BA, Bradbury AW, Botek G. Treatment for diabetic foot ulcers. *Lancet*. 2005;366(9498):1725-35.
- Martins-Mendes D, Monteiro-Soares M, Boyko EJ, Ribeiro M, Barata P, Lima J, et al. The independent contribution of diabetic foot ulcer on lower extremity amputation and mortality risk. *J Diabetes Complications*. 2014;28(5):632-8.
- Abbott C, Carrington A, Ashe H, Bath S, Every L, Griffiths J, et al. The North-West Diabetes Foot Care Study: incidence of, and risk factors for, new diabetic foot ulceration in a community-based patient cohort. *Diabet Med*. 2002;19(5):377-84.
- Amin N, Dupris J. Diabetic foot disease: from the evaluation of the “foot at risk” to the novel diabetic ulcer treatment modalities. *World J Diabetes*. 2016;7(7):153.
- Kumar S, Ashe H, Parnell L, Fernando D, Tsigos C, Young R, et al. The prevalence of foot ulceration and its correlates in type 2 diabetic patients: a population-based study. *Diabet Med*. 1994;11(5):480-4.
- Brem H, Sheehan P, Boulton AJ. Protocol for treatment of diabetic foot ulcers. *Am J Surg*. 2004;187(5): S1-S10.
- Bowering CK. Diabetic foot ulcers. Pathophysiology, assessment, and therapy. *Can Fam Physician*. 2001;47(5):1007-16.
- Di Paolo P, Napoli A, Anzidei M, Zaccagna F, Brachetti G, Cartocci G, et al. CT-angiography and MR-angiography after endovascular or surgical treatment in patients with peripheral arterial obstructive disease (PAOD): Normal aspects and complications. *European Congress of Radiology-ECR 2010*. 2010.
- Prompers L, Huijberts M, Apelqvist J, Jude E, Piaggese A, Bakker K, et al. High prevalence of ischaemia, infection and serious comorbidity in patients with diabetic foot disease in Europe. Baseline results from the Eurodiale study. *Diabetologia*. 2007; 50:18-25.

- Hoffman AF. Evaluation of arterial blood flow in the lower extremity. *Clin Podiatr Med Surg.* 1992;9(1):19-56.
- Boulton AJ. The diabetic foot—an update. *Foot Ankle Surg.* 2008;14(3):120-4.
- Game F. Classification of diabetic foot ulcers. *Diabet Med.* 2016; 32:186-94.
- Hunt D. Diabetes: foot ulcers and amputations. *BMJ Clin Evid.* 2009;2009.
- Singh N, Armstrong DG, Lipsky BA. Preventing foot ulcers in patients with diabetes. *JAMA.* 2005;293(2):217-28.
- Edmonds M, Manu C, Vas P. The current burden of diabetic foot disease. *J Clin Orthop Trauma.* 2021; 17:88-93.
- Romero Prada M, Roa C, Alfonso P, Acero G, Huérfano L, Vivas-Consuelo D, et al. Cost-effectiveness analysis of the human recombinant epidermal growth factor in the management of patients with diabetic foot ulcers. *Diabetes Metab Syndr.* 2018;9(1):1480249.
- Rehman R, Malik FR, Rehman Z. A comparative study on diabetic foot ulcers leading to amputations. *J Pak Med Inst.* 2018;32(1).
- Andrew J, Gunne R, Jan A. The global burden of diabetes foot disease. *Lancet.* 2005;366(17191724):67698-2.
- Jeffcoate W, Bakker K. World Diabetes Day: footing the bill. *Lancet.* 2005;365(9470):1527.
- Kruse I, Edelman S. Evaluation and treatment of diabetic foot ulcers. *Clin Diabetes.* 2006;24(2):91-3.
- Reyzelman A, Crews RT, Moore JC, Moore L, Mukker JS, Offutt S, et al. Clinical effectiveness of an acellular dermal regenerative tissue matrix compared to standard wound management in healing diabetic foot ulcers: a prospective, randomised, multicentre study. *Int Wound J.* 2009;6(3):196-208.
- Prompers L, Schaper N, Apelqvist J, Edmonds M, Jude E, Mauricio D, et al. Prediction of outcome in individuals with diabetic foot ulcers: focus on the differences between individuals with and without peripheral arterial disease. The EURODIALE Study. *Diabetologia.* 2008; 51:747-55.
- Gebrekiros K, Gebrekiros S, Fantahun A. Prevalence and factors associated with diabetic foot ulcer among adult patients in ayder referral hospital diabetic clinic mekelle, North Ethiopia, 2013. *Diabetes Metab Syndr.* 2015;6(579):2.
- Shahi SK, Kumar A, Kumar S, Singh SK, Gupta SK, Singh T. Prevalence of diabetic foot ulcer and associated risk factors in diabetic patients from North India. *J Diabetes Foot Complications.* 2012;4(3):83-91.
- Yazdanpanah L, Shahbazian H, Nazari I, Hesam S, Ahmadi F, Cheraghian B, et al. Risk factors associated with diabetic foot ulcer-free survival in patients with diabetes. *Diabetes Res Clin Pract.* 2018;12(6):1039-43.
- Hicks CW, Selvarajah S, Mathioudakis N, Sherman RL, Hines KF, Black III JH, et al. Burden of infected diabetic foot ulcers on hospital admissions and costs. *Am J Med.* 2016; 33:149-58.
- Yusuf S, Okuwa M, Irwan M, Rassa S, Laitung B, Thalib A, et al. Prevalence and risk factor of diabetic foot ulcers in a regional hospital, eastern Indonesia. *Int J Diabetes Dev Ctries.* 2016;6(1):1-10.
- Lavery LA, Peters EJ, Armstrong DG. What are the most effective interventions in preventing diabetic foot ulcers? *Int Wound J.* 2008;5(3):425-33.