ISSN 2664-3987 (Print) & ISSN 2664-6722 (Online)
South Asian Research Journal of Medical Sciences
Abbreviated Key Title: South Asian Res J Med Sci

| Volume-7 | Issue-6 | Nov-Dec -2025 | **DOI: https://doi.org/10.36346/sarjms.2025.v07i06.003**

Review Article

An Updated Review on Diabetic Foot Ulcers: Epidemiology and Risk Factors

Elham F. Hamzah[1]*

[1]Department of Clinical Biochemistry, Hammurabi College of Medicine, University of Babylon, 51002 Hillah, Babylon, Iraq

***Corresponding Author:** Elham F. Hamzah
Department of Clinical Biochemistry, Hammurabi College of Medicine, University of Babylon, 51002 Hillah, Babylon, Iraq

Article History
Received: 20.10.2025
Accepted: 08.12.2025
Published: 11.12.2025

Abstract: Diabetic foot ulcer (DFU) remains one of the most severe and costly complications of diabetes mellitus, and contributes to infection, amputation, and mortality on a large scale globally. This review performs an update reviewing the literature about epidemiology and principal risk factors for development of DFU. Recent global data indicate that the DFU affects ~6% of those who have diabetes, while prevalence in different areas of the world is quite variable because of disparities in access to care, social conditions and impediments to preventive care. DFU is a multifactorial disease that stems from the interactions among peripheral neuropathy, PAD, biomechanical abnormalities, metabolic disorder and wound healing defects. In the extant literature, multiple risk factors for DFU are once again described, including duration of diabetes, male sex, age older than 45-50 years, poor glycemic control, hypertension or metabolic syndrome abnormality [1], obesity overweight [3], and central fat accumulation with elevated waist: hip-ratio anorexia nervosa defined as related to a BMI less than 17.5 but also as a low volume intake such us reaching an initial idea more important rectal bleeding and syndromes following cerebrovascular accident Structural foot deformities history of ulceration or amputation current diabetic foot ulcer (DFU) unsatisfactory footwear inappropriate podiatric care. Behavioral and environmental factors such as wearing unsuitable shoes, low health literacy, and living in rural areas further add to vulnerability in several populations. Awareness of these common trends and predictors is essential to trigger improved preventive measures, help in risk stratification, and guide evidence-based clinical decisions. In the context of summarizing new evidence, this article reinforces the ongoing requirement for early screening, organized foot programs, and select interventions to diminish the devastating effects of DFU and its sequelae.

Keywords: Diabetes, Diabetic Foot Ulcer (DFU), Epidemiology, Risk factors.

INTRODUCTION

Diabetes mellitus (DM) is recognized as one of the most prevalent persistent diseases globally, with the incidence gradually increasing internationally. According to the latest estimates, millions of people globally suffer from diabetes, a problem that is increasing due to demographic changes, lifestyle changes and the aging of the population. As the incidence of diabetes increases, so do its complications. Among them, foot headache, especially in diabetic foot ulcer (DFU), is the most serious and costly in terms of morbidity, mortality and health resources. DFU is often a silent but devastating consequence of lengthy-status diabetes, combining neuropathic, vascular, biomechanical, and metabolic elements to supply skin breakdown, negative recovery, infection, and possibly limb-threatening complications. Because of its complicated and multifactorial pathophysiology, DFU remains a major public fitness assignment mainly in settings wherein sources for preventive care, training, shoes, and multidisciplinary control are constrained.

Given the global burden and evolving demographic and clinical profiles of people with diabetes, an updated overview of DFU epidemiology and danger elements is well timed and vital. The want to synthesize recent facts, pick out nearby differences, and clarify excessive-chance populations can tell both scientific practice and public-fitness techniques

aimed at prevention and early detection [7]. The goal of this evaluate is to offer a comprehensive, updated synthesis of the epidemiological patterns of DFU (occurrence, prevalence, demographic and geographic version) and to summarize the main danger elements related to ulcer development. In doing so, we hope to focus on gaps in current information, guide destiny studies, and guide interventions tailor-made to lessen the burden of DFU globally.

1. Pathophysiology of DFU

Diabetic foot ulcers develop as a result of diabetic sensory, motor and autonomic neuropathies. Sensory neuropathy causes loss of protective sensation; Motor neuropathies cause foot deformities and biomechanical abnormalities, while autonomic neuropathies lead to viscoelastic changes in the skin, such as dry skin [6]. Callus formation is often a result of these changes. Minor trauma and inflammation from repetitive impact of the foot during weight bearing can cause bleeding under the callus that manifests as a full-thickness ulcer (ie, damage extends below the epidermis and into the subcutaneous tissue) upon callus removal. Other mechanisms for the development of diabetic foot ulcers include sustained low pressure, such as from tight shoes causing tissue necrosis, or extremely high pressure, such as from direct mechanical injury from a sharp object [7]. Causal chain leading to ulceration is shown in figure 1.

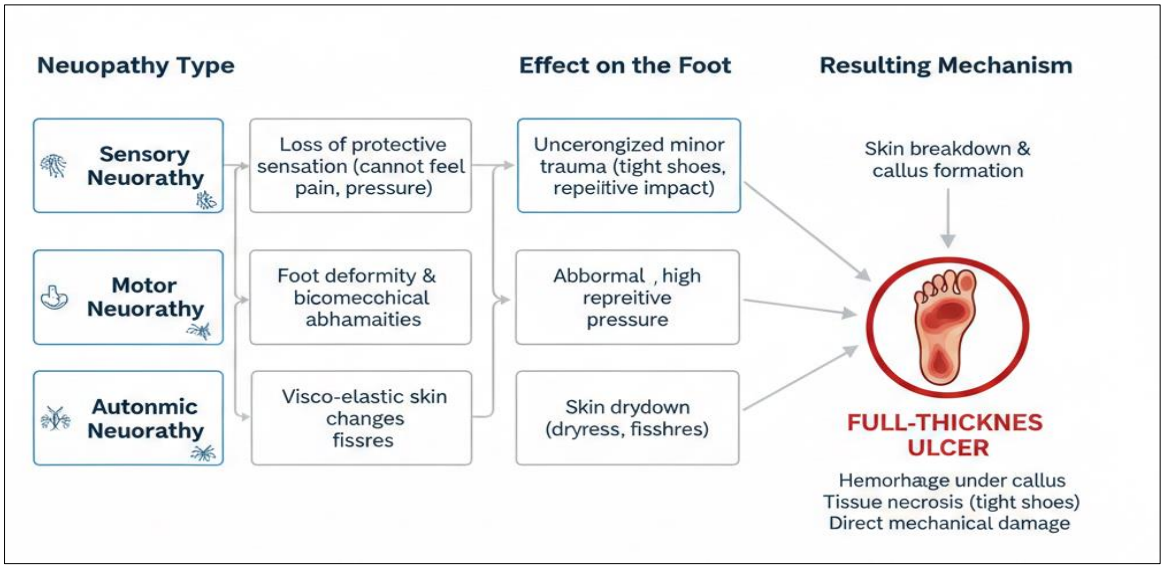

Figure 1: The main causes leading to DFUs (generate by AI)

Repetitive Impact & Callus: Minor trauma and inflammation from repetitive impact on the foot while weight-bearing leads to callus formation. Hemorrhage beneath the callus then results in a full-thickness ulcer when the callus is removed. Constant Low Pressure: Prolonged low pressure, such as from tight shoes, causes localized tissue necrosis. Extremely High Pressure: A sharp object or other severe force causes direct mechanical damage, as shown in figure 2.

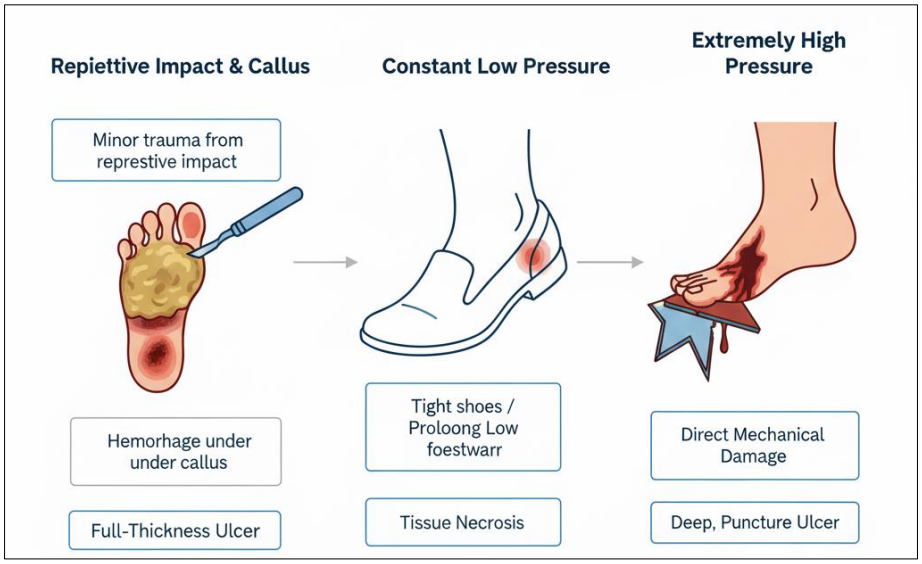

Figure 2: Direct mechanisms of ulcer formation (generated by AI)

2. Background: Why Diabetic Foot Ulcers Matter

Diabetic Foot Ulcer (DFU) is one of the most serious and costly complications of Diabetes Mellitus. It involves breakdown of skin (and often deeper tissues) on the foot, often due to a combination of neuropathy, vascular disease, and mechanical stress [8]. DFU is not only common, but also associated with grave outcomes: many ulcers become infected, a substantial proportion lead to lower-limb amputation, and mortality rates are significantly increased. Given the rising global burden of diabetes, DFU remains a major public health challenge, with important implications for patient quality of life, healthcare costs, and morbidity/mortality [9].

3. Global Epidemiology: How Common Are DFUs

Globally, the prevalence of DFU among people with diabetes is estimated to be approximately 6.3%. Prevalence varies by region: for example, in the meta-analysis, North America shows the highest frequency (~13%), while Oceania shows the lowest (~3%) [10]. In other studies, the prevalence in Africa, Asia and Europe has been reported to be 7.2%, 5.5% and 5.1% respectively. However, local studies often report much higher prevalence – for example, DFU prevalence has been shown to exceed 10–15% in some groups, particularly in patients with long diabetes duration or poor disease control [11]. These variations reflect differences in population characteristics (diabetes type, age, duration, comorbidities), access to health services and preventive practices – which underscores the need for population-specific data [12].

4. Pathophysiology: How DFUs Develop — Underlying Mechanisms

The development of DFU is multifactorial. Key contributing mechanisms include:

- Peripheral neuropathy (sensory, motor, autonomic): loss of protective sensation leads to unnoticed trauma; motor neuropathy causes foot deformities or abnormal biomechanics; autonomic neuropathy impairs skin integrity (e.g., dry, cracked skin) [13].
- Peripheral vascular disease / ischemia: impaired blood flow reduces tissue viability, impairs wound healing and immune response, increasing risk of ulceration and poor healing [14].
- Metabolic derangements associated with diabetes (e.g., hyperglycemia): these impair immune function, delay wound healing, and favor chronic tissue damage [15].
- Biomechanical stress / foot deformities (calluses, structural deformities, limited joint mobility, abnormal pressure distribution) — these increase local pressure, skin breakdown, and ulcer formation. Because of this interplay of neuropathy, vascular insufficiency and mechanical factors, ulcers are often described as neuropathic, ischemic, or neuro-ischemic [16].

5. Risk Factors of DFUs

Research and meta-analyses have identified multiple independent risk factors associated with increased likelihood of DFU. In a recent systematic review and meta-analysis (26 studies), significant risk factors included: older age, male sex, longer duration of diabetes, higher BMI, presence of neuropathy, retinopathy, nephropathy, elevated blood pressure, poor glycemic control, elevated inflammatory or coagulation markers, and vascular insufficiency (17]. Other studies also highlight the role of foot-specific factors: previous ulcer or amputation history, structural foot deformities, callus formation, improperly fitted footwear, limited joint mobility, and repeated trauma or pressure [18]. Moreover, poor self-care practices (like inadequate foot hygiene), rural residence (linked to limited access to care), and socioeconomic factors have been implicated in higher DFU risk in certain populations. Overall, the risk factors can be grouped into three broad domains: patient-related (age, diabetes duration, comorbidities), disease-related (neuropathy, vascular disease), and behavioral/environmental (foot care, footwear, access to health services) [19].

CONCLUSION

The diabetic foot ulcers continue to be a major global health challenge, mirroring the growth in diabetes epidemic and the big headaches associated with bad metabolic control, neuropathy and vascular sickness. New data from published research reveal that DFU engenders significant morbidity and mortality as well as financial burden, especially in areas with scant health resources and poor patient education. Epidemiological statistics are influenced by marked regional differences and underscore the importance of population-based monitoring and preventive efforts. The predisposing factors-elderly age, male gender, longstanding diabetes, peripheral neuropathy, peripheral artery disease (PAD), poor glycemic control, foot deformity, previous history of ulceration and unsatisfactory foot care practices were similar amongst heterogeneous cohorts and underscored the multifactorial etiopathogenesis of DFU.

These risk predictors should be identified at an early stage so that the patients who are most prone can be quickly identified and strong preventive actions (such as frequent foot inspection, education of the patient, stress reduction, and aggressive metabolic control) activated. Fairly as important as the increase in health care gadgets will be the enhancement of foot care pros providing for early at and instalment used early on remedy technique. Although the understanding of the pathophysiology and risk profile of DFU continues to grow, its global burden remains significant, necessitating ongoing investigative efforts along with refreshed medical guidelines and multidisciplinary approaches for its prevention and

treatment. If these epidemiological data could be married to targeted interventions, however, significant declines in DFI rates and the resultant sequelae we may at last see improved outcomes with satisfaction of quality of life in individuals afflicted by diabetes.

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