



A COMPARATIVE REVIEW ANALYSIS OF DIABETIC FOOT ULCERS IN THE INDIA AND UNITED STATES

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Abstract

Diabetic foot ulcers (DFUs) are one of the most serious consequences of diabetes mellitus, contributing significantly to infection, hospitalization, lower-limb amputation, decreased quality of life, and healthcare expenses. The burden of DFUs in India and the US between 2020 and 2025 is compared in this review, with an emphasis on prevalence, incidence, risk factors, clinical features, sequelae, and economic effects. The prevalence of DFUs is estimated to be around 6.3% worldwide, with the United States reporting a greater frequency (around 13%) than the pooled estimate for India (6.2%). India's vast population of diabetics results in a significant absolute burden, with significant regional and healthcare setting variations, notwithstanding the country's reported lower frequency. While neuro-ischemic ulcers are more commonly described in Western populations, DFUs in India are primarily neuropathic. Longer duration of diabetes, peripheral neuropathy, peripheral vascular disease, advanced age, male sex, infection, and poor foot care are important risk factors. In both countries, DFUs often lead to amputation, delayed recovery, recurrence, and substantial financial burden. However, direct comparisons are limited by variations in demographic characteristics, study methodologies, diagnostic techniques, and healthcare availability. Early screening, patient education, appropriate foot care, pressure offloading, infection control, vascular evaluation, and multidisciplinary care are all necessary for effective prevention. To produce accurate estimates and improve DFU prevention and clinical outcomes in India and the US, community-based surveillance must be strengthened and prospective studies must be carried out.

Keywords: Diabetes mellitus, diabetes foot ulcers, Plantar pressure distribution, Plantar peak stress, Computational modeling, Three-dimensional foot model,

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1. INTRODUCTION

One of the most dangerous long-term effects of diabetes mellitus is diabetic foot, which is characterized by severe tissue damage to the lower limbs brought on by peripheral neuropathy and peripheral artery disease [1,2]. Because diabetes is becoming more common and those who have it have longer life expectancies, its incidence has increased globally [3,4]. Globally, a lower limb amputation due to diabetes is thought to happen every 30 seconds [5]. With an average yearly treatment cost of \$8,659 per patient, the illness also has a significant financial impact. The estimated yearly healthcare costs associated with diabetic foot disorders in the United States range from \$9 billion to \$13 billion [6,7], underscoring the need for increased awareness, efficient prevention, early diagnosis, and prompt intervention to lessen its clinical,

social, and economic impact. Both countries experience roughly a 50% 5-year mortality rate post-ulceration- a mortality rate higher than many common cancers, primarily caused by underlying cardiovascular complications. Every year, 1.6 million people in the US and 18.6 million people globally get diabetic foot ulcers [5,8]. Neurological, vascular, and biomechanical problems all have a role in the development of diabetic foot ulcers [2,9,10]. Additionally, 50% to 60% of these ulcers develop an infection [9,11], greatly raising the risk of serious consequences and amputation of the lower leg. International Working Group on the Diabetic Foot (IWGDF) and the American Diabetes Association (ADA) have established guidelines for the management of diabetic foot ulcers (DFUs) in 2026 [1,9,12]. These guidelines emphasize early risk assessment, pressure offloading, infection control,

vascular evaluation, and multidisciplinary care [1,9,12]. All diabetic patients should have regular foot screenings for loss of protective sensation using a 10-g monofilament and evaluation of peripheral arterial disease every one to three months for high-risk patients with prior ulcers, amputations, or end-stage renal disease [1,9,12]. The focus of diabetic foot ulcer management is pressure offloading using non-removable knee-high devices, especially total contact casts for plantar ulcers [9]. Systemic antibiotics and antimicrobial dressings are only for clinically infected ulcers, routine sharp debridement and moisture-balancing dressings promote healing. While severe infections require intravenous antibiotics, imaging (X-ray/MRI), and surgical evaluation, mild infections often require 7 to 10 days of targeted antibiotics. Vascular evaluation utilizing the ankle-brachial index (ABI) and toe-brachial index (TBI) is advised for non-healing ulcers, and revascularization if healing fails after 4 to 6 weeks. A $>2.2^{\circ}\text{C}$ (4.0°F) temperature difference between similar foot areas on 2 consecutive days in high-risk individuals is indicative of early inflammation and calls for immediate clinical examination to lower the risk of amputation [9,10].

2. CLASSIFICATION

The Wagner–Meggitt Classification [9,13], which rates ulcer severity according to depth, infection, and gangrene, is frequently used to categorize diabetic foot ulcers. A high-risk foot with intact skin is classified as Grade 0, a superficial ulcer is classified as Grade 1, and a deep ulcer affecting tendons or joint capsules without bone infection is classified as Grade 2. Grade 4 denotes localized gangrene, Grade 5 widespread gangrene necessitating significant amputation, while Grade 3 ulcers contain abscesses or osteomyelitis. This classification is frequently used to determine the severity of ulcers, direct treatment choices, and forecast the likelihood of amputation and recovery. The University of Texas (UT) Classification offers a more thorough assessment for prognosis and treatment planning by evaluating ulcer depth (Grades 0 to III) as well as the existence of infection and ischemia (Stages A to D). For standardized evaluation in clinical practice and research, the PEDIS (Perfusion, Extent, Depth, Infection, Sensation) and SINBAD (Site, Ischemia, Neuropathy, Bacterial infection, Area, Depth) systems are also advised [9,13]. One of the most significant side effects of diabetes mellitus is diabetic foot ulcers (DFUs), which are linked to extended morbidity, infection, hospitalization, lower-extremity amputation, decreased mobility, lower quality of life, and higher healthcare costs. Peripheral neuropathy, peripheral arterial disease (PAD), repetitive mechanical stress, foot deformity, delayed tissue healing, and infection all combine to cause DFUs, which are typically multifactorial. Standardized classification systems are crucial for characterizing ulcer severity, promoting communication among medical professionals, supporting treatment planning, and allowing comparison between clinical studies

because DFUs vary greatly in depth, tissue involvement, ischemic status, and anatomical status [1,2].

One of the oldest and most well-known methods for rating DFUs is the Meggitt–Wagner classification, sometimes known as the Wagner classification. It is mostly dependent on the depth of the ulcer and the degree of tissue loss, or gangrene, and was first described by Meggitt and then spread by Wagner.[3] There are six grades in the system, ranging from 0 to 5. A foot at risk with a grade of 0 has undamaged skin but may have a deformity or other risk factors. A superficial ulcer affecting the epidermis or subcutaneous tissue without affecting deeper structures is classified as grade 1. A deeper, full-thickness ulcer without osteomyelitis or abscess that extends to a tendon, ligament, joint capsule, or other structure that referred to as grade 2. A deep ulcer with an abscess, osteomyelitis, or joint infection is classified as grade 3. Whereas Grade 5 denotes widespread or whole-foot necrosis, Grade 4 denotes localized gangrene, typically affecting a portion of the forefoot or toes [3,4]. This system has been widely used historically due to its simplicity, which has also made it possible to compare it to earlier DFU investigations. However, the contributions of infection, ischemia, neuropathy, and other patient-related variables are not sufficiently distinguished by the Wagner classification. As a result, the clinical risks and care needs of ulcers with the same Wagner grade may differ significantly [2,5].

In order to give a more thorough description of DFUs, the University of Texas (UT) Unlike the Wagner method, the UT classification considers both ulcer depth and the presence of infection or ischemia. The system uses a 4 x 4 matrix with Grades 0-3 and Stages A-D. Grade 0 refers to a pre- or post-ulcerative lesion with intact skin, Grade 1 to a superficial wound that does not involve tendon, capsule, or bone, Grade 2 to penetration to tendon or capsule, and Grade 3 to penetration to bone or joint. Stage A denotes the lack of infection and ischemia, while Stage B represents infection, Stage C depicts ischemia, and Stage D indicates the presence of both infection and ischemia. This multidimensional structure gives more clinical information than the Wagner system and has been related with improved outcomes. Nonetheless, the UT system is largely a descriptive classification that requires an accurate assessment of infection and vascular state [5,6], stratification of healing and amputation risk.

Another notable system is PEDIS, which was created by the International Working Group on the Diabetic Foot (IWGDF) and includes five domains: perfusion, extent/size, depth/tissue loss, infection, and sensation.[7] The approach was specifically created to provide a consistent foundation for characterizing DFUs in clinical research and practice. Perfusion assessment focuses on the circulatory supply to the affected limb, whereas extent and depth describe the ulcer's size and structural involvement. Infection is

graded based on clinical severity, and feeling indicates the presence or lack of protective sensation. PEDIS has proven effective in clinical trials because it allows for an organized examination of numerous parameters that influence ulcer outcomes rather than depending just on depth [7,8].

The SINBAD classification is another popular technique for providing a clear, consistent description of DFUs. The acronym stands for Site, Ischemia, Neuropathy, Bacterial Infection, Area, and Depth. Each component is assessed, resulting in a total score ranging from 0 to 6.[9]The site determines whether the ulcer affects the forefoot, midfoot, or hindfoot; ischemia evaluates pedal blood flow; neuropathy evaluates loss of protective sensation; bacterial infection records clinical evidence of infection; area distinguishes smaller from larger ulcers; and depth distinguishes superficial ulcers from those that extend to muscle, tendon, or deeper structures.[9,10] SINBAD has the advantage of being relatively simple, making it suited for normal clinical documentation, communication among healthcare practitioners, and population-level audits. It has also been validated in various geographic and healthcare situations [9,10].

The 2023 IWGDF recommendation on classification of diabetic foot ulcers emphasizes the necessity of systematic classification. Following a review of multiple classification systems and available evidence, the IWGDF recommends SINBAD as the first option for communication among healthcare professionals, with the WIfI system considered as an alternative when appropriate vascular assessment facilities and expertise exist.[11] It is important to note that the IWGDF does not propose relying solely on a categorization score to predict the prognosis of a single ulcer. Instead, the individual classification components should be documented, as a total score may obscure clinically significant variations between infection, ischemia, neuropathy, depth, and anatomical site.[11,12] The IWGDF/IDSA infection classification is indicated for infected ulcers, whereas WIfI can be used to assess wound severity, ischemia, infection, healing likelihood, and risk of amputation in appropriate vascular situations [11].

Comparative studies have shown that commonly used classification systems have good inter-rater reliability, albeit with different strengths. In a research comparing the Meggitt-Wagner, UT, SINBAD, and PEDIS systems, all four showed satisfactory agreement among doctors, with particularly strong agreement observed for the Meggitt-Wagner and SINBAD systems [13]. However, reliability does not necessarily mean that a classification system can accurately predict the outcome of an individual patient. The IWGDF systematic review concluded that evidence supporting individual prognostic prediction remains limited, reinforcing the importance of combining classification with clinical assessment, vascular evaluation, infection assessment, neurological examination, and patient-specific risk factors [11,12].

Overall, the classification and epidemiology of DFUs highlight the value of standardized and multidimensional examination. The Wagner system is still valuable for describing ulcer depth and tissue degradation, as well as comparing it to historical literature, although the UT method provides more information about infection and ischemia. PEDIS provides a structured multidomain framework, whereas SINBAD is a useful method for standardized communication and population-level assessment. The current IWGDF recommendations prefer SINBAD for routine communication while acknowledging that no single categorization method can accurately predict the fate of an individual ulcer [11,12]. As a result, DFU assessment should include standardized classification as well as clinical examination, vascular evaluation, infection assessment, neurological testing, wound measurement, and risk factor evaluation for the patient. Early detection of ischemia, infection, neuropathy, and increased tissue depth is critical for prompt care and may help prevent the progression to severe infection, gangrene, amputation, and other negative outcomes [11,15,17].

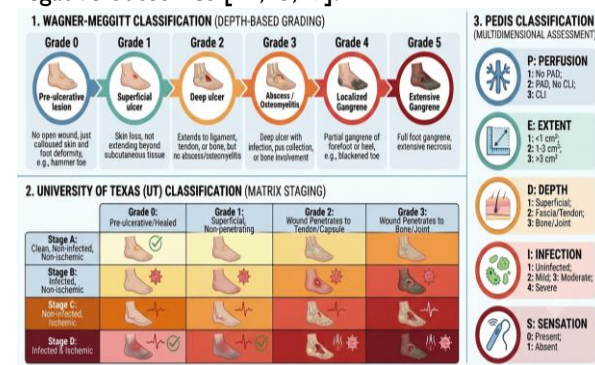


Figure 01: Synoptic Overview of Foot Ulcer Classification Systems

DFU imposes a significant epidemiological cost globally. According to a systematic study and meta-analysis, the global prevalence of diabetes is at 6.3% (95% CI: 5.4-7.3%) [14]. Individuals with type 2 diabetes were found to have a higher prevalence of 6.4% (95% CI: 4.6-8.1%), compared to 5.5% (95% CI: 3.2-7.7%) among those with type 1 diabetes. The same analysis found a prevalence of 4.5% (95% CI: 3.7-5.2%) in males and 3.5% (95% CI: 2.8-4.2%) in females.[14] These findings show that DFU is not limited to a single diabetes type or demographic group, though the distribution varies depending on population characteristics, diabetes duration, vascular disease, neuropathy, healthcare access, and methodological differences between studies.

North America had the highest regional prevalence in the cited meta-analysis, at 13.0% (95% CI: 10.0-15.9%), while Oceania had the lowest regional estimate, at 3.0% (95% CI: 0.9-5.0%). The prevalence estimates for Asia, Europe, and Africa were 5.5% (95% CI: 4.6-6.4%), 5.1% (95% CI: 4.1-6.0%), and 7.2% (95% CI: 5.1-9.3%), respectively [14]. Belgium recorded a prevalence of 16.6% (95% CI: 10.7-22.4%), followed by Canada at 14.8% (95% CI: 9.4-20.1%) and the United States at

13.0% (95% CI: 8.3-17.7%). In contrast, Australia had the lowest reported country-specific prevalence, at 1.5% (95% confidence interval: 0.7-2.4%) [14]. These disparities should be viewed with caution, since they may be influenced by differences in study populations, healthcare systems, DFU classifications, screening methodologies, disease duration, and availability of specialized diabetic-foot services. DFUs have serious effects for people and healthcare systems, in addition to their high occurrence. According to recent evaluations, DFU is a significant cause of unnecessary morbidity, with outcomes ranging from functional impairment and infection to hospitalization, amputation, and death [15]. The lifetime chance of getting a foot ulcer among diabetics has been estimated to be between 19 to 34%, although the actual risk varies depending on population characteristics and the presence of risk factors such as neuropathy, PAD, previous ulceration, deformity, and renal illness [15]. Once an ulcer forms, recurrence is typical, stressing that healing does not always prevent future danger. DFU's chronic condition necessitates ongoing preventive foot care even after complete epithelialization.

Infection is another key factor influencing clinical outcome. Approximately 50% of DFUs may become infected, and moderate-to-severe infections can lead to hospitalization, osteomyelitis, gangrene, and lower-limb amputation [16]. The presence of infection and ischemia significantly increases clinical complexity, emphasizing the importance of classification methods that include more than wound depth in order to provide extra treatment planning information. Instead of depending on a single grading parameter, clinical assessment should include an examination of wound depth, tissue involvement, infection indicators, vascular state, neuropathy, and ulcer dimensions [11,16]. The long-term implications of DFU go beyond the affected foot. A systematic review and meta-analysis of more than 124,000 people from 16 countries found that survival following DFU was about 86.9% at one year, 66.9% at three years, 50.9% at five years, and 23.1% at ten years [17]. Cardiovascular disease and infection were among the most frequently reported reasons of death. These findings highlight the fact that DFU can be used to indicate a significant systemic disease load rather than just a local wound concern [15,17].

prevalence of diabetic foot ulcers was reported to be 6.3% (95%CI: 5.4–7.3%) worldwide. [8] The prevalence was higher in type 2 diabetes patients (6.4%, 95%CI: 4.6–8.1%) than in type 1 diabetics (5.5%, 95%CI: 3.2–7.7%) and in males (4.5%, 95%CI: 3.7–5.2%) than in females (3.5%, 95%CI: 2.8–4.2%). [8] The prevalence was highest in North America (13.0%, 95%CI: 10.0–15.9%), lowest in Oceania (3.0%, 95%CI: 0.9–5.0%), and 5.5% (95%CI: 4.6–6.4%), 5.1% (95%CI: 4.1–6.0%), and 7.2% (95%CI: 5.1–9.3%). [8] Belgium has the highest prevalence (16.6%, 95%CI: 10.7–22.4%),

followed by Canada (14.8%, 95%CI: 9.4–20.1%) and the United States (13.0%, 95%CI: 8.3–17.7%) [8]. Australia has the lowest prevalence (1.5%, 95%CI: 0.7–2.4%).

3. COMPARATIVE STUDY

Incidence & Prevalence of Diabetic Foot Ulcers (DFU) - India vs USA | 2020-2025

3.1 Global Context: One of the most dangerous side effects of diabetes mellitus is diabetic foot ulcers (DFUs), which are mostly linked to peripheral neuropathy, peripheral vascular disease, recurrent mechanical stress, foot deformity, and poor wound healing. According to studies from around the world, 6.3% of diabetics have a DFU, and the lifetime chance of getting one has been estimated to be between 19 and 34%. DFUs are linked to lower-extremity amputation, infection, hospitalization, decreased quality of life, and higher death. Every year, an estimated 18.6 million people worldwide—including about 1.6 million in the US—are thought to develop a DFU. After healing, recurrence is still frequent; reported recurrence rates are close to 40% after a year and roughly 65% within five.

3.2 India's Diabetic Foot Ulcers, 2020–2025:

3.2.1 Prevalence: The systematic review and meta-analysis by Sahu et al., which searched articles published until December 2023 and included 18 research including 55,988 persons with diabetes, is the most immediately pertinent current Indian evidence. The pooled prevalence of DFUs in India was 6.2% (95% CI: 4.0–9.4%) using a random-effects model. Estimates for regional subgroups were 5.6% in Northern India, 7.4% in Southern India, and 9.5% in Eastern India. The prevalence was much greater in hospital-based research (7.5%) than in community-based studies (2.5%), suggesting a significant impact of case ascertainment and the healthcare setting.

Although this difference was not statistically significant ($p=0.17$), the same meta-analysis revealed a greater pooled prevalence among males (14.5%) compared to girls (7.7%). The occurrence of DFU was found to be significantly correlated with male sex, older age, longer duration of diabetes, comorbidities, and unhealthy lifestyle variables. The 6.2% estimate should be interpreted as a pooled prevalence from studies found through December 2023, not as the prevalence for the year 2025. This is an important methodological note. Nevertheless, for your 2020–2025 assessment period, it is the most helpful recent national pooled estimate...

3.2.2 Incidence: The data for the yearly incidence of DFU in India between 2020 and 2025 is far less reliable than the evidence for prevalence. Sahu et al.'s Indian meta-analysis should not be used to provide a national pooled incidence rate since it was intended to quantify prevalence and risk factors.

According to a community-based Indian study carried out in Mumbai, the average annual incidence of DFU is roughly 66 cases per 10,000 individuals with diabetes (0.66%). During the study period, 15.29% of patients with DFU experienced amputation, and the development of DFU was linked to older age and poor

glycemic control. However, rather than being offered as a straight 2020–2025 incidence estimate, this study should be presented as supportive background information because it spanned 2016–2018. Therefore, it is more methodologically appropriate to claim that new Indian evidence does not offer a nationally representative yearly incidence rate for 2020–2025; rather, it provides a pooled prevalence estimate.

3.2.3 Risk Factors and Clinical Features: According to Indian data, DFUs are closely linked to male sex, comorbidities, aging, longer-term diabetes, and unfavorable lifestyle variables. The formation of ulcers is mostly caused by peripheral neuropathy and peripheral arterial disease. The literature on DFUs in India also shows a significant infectious burden, with bacterial infections causing amputation, hospitalization, and delayed recovery. The significance of proper clinical assessment and microbiological investigation in infected ulcers was highlighted by a study of Indian DFU microbiology that found significant variance in bacterial profiles and antibiotic resistance among studies.

3.2.4 Clinical Financial and Economic Medical Costs: In India, DFUs significantly increase the morbidity and amputation of lower extremities. According to the literature currently available in India, ulceration often occurs prior to lower-extremity amputation, and the clinical burden may be increased by delayed presentation and disparities in access to specialized diabetic foot services. Hospital estimates may also overrepresent patients with more advanced disease, as evidenced by the higher prevalence found in hospital-based populations (7.5%) compared to community populations (2.5%).

3.3 American Diabetic Foot Ulcers, 2020–2025

3.3.1 Prevalence: Compared to the commonly mentioned historical 13% North American prevalence, recent longitudinal claims-based research for the United States offers more relevant 2020–2025 statistics. DFU trends from 2016 to 2023 were investigated in a major U.S. study involving 5,292,512 persons with type 2 diabetes. The prevalence of DFU was 5.434% in 2020, 5.469% in 2021, 5.923% in 2022, and 6.238% in 2023, or roughly 5,434, 5,469, 5,923, and 6,238 cases per 100,000 persons with type 2 diabetes, respectively.

With rates of 5.434% in 2020 and 5.469% in 2021, the study showed that prevalence stayed comparatively steady over the COVID-19 period before rising to 5.923% in 2022 and 6.238% in 2023. The annual percentage change between 2021 and 2023 was roughly 6.89% (95% CI 3.50–9.75; $p < 0.001$).

3.3.2 Incidence: The lack of continuously published nationally representative yearly incidence DFU rates for each year from 2020 to 2025 is a limitation of the current U.S. research. Medicare fee-for-service beneficiaries with diabetes had an annual DFU incidence of about 6.0%, according to historical Medicare claims data; patients with peripheral artery disease and diabetes had an incidence of more than 13%.

As a result, the 6% estimate should not be given as a precise national incidence rate for 2020–2025. Alternatively, the more recent 2020–2023 prevalence estimates can be utilized as the primary current U.S. data to support Medicare-based epidemiological evidence.

3.3.3 Demographic and Clinical Features: Significant demographic heterogeneity in DFU prevalence is shown by recent U.S. statistics. Males were more likely than females to have DFUs in the 2016–2023 analysis, and the proportion of males in the DFU cohort was higher than that of the total type 2 diabetes population. Additionally, the study found significant racial and ethnic disparities in the frequency of DFU.

The clinical load is more noticeable in older folks and those who have several comorbid conditions. Peripheral vascular disease, cardiovascular disease, and renal disease are frequently present in patients with DFUs, according to Medicare statistics. Peripheral vascular disease was present in 47.3% of a Medicare cohort of 78,716 beneficiaries with DFU at the start of the first episode and 64.1% at the conclusion of the episode. There was significant cardiovascular and renal comorbidity in the same population. The clinical effects of diabetic foot infection were further illustrated by a nationally representative review of emergency department visits from 2012 to 2021. Approximately 526,948 diabetic foot infections were linked to diabetes-related emergency visits in 2020–2021, and 43.7% of these visits resulted in hospitalization. When compared to diabetes without foot issues, DFIs were linked to around three times higher adjusted chances of hospital admission and a 55% longer hospital stay.

3.4 Indian and USA comparative summary of 2020 to 2025: Due to differences in the underlying demographics, study designs, case definitions, healthcare settings, and observation periods, it is not appropriate to consider the latest U.S. estimates of around 5.4–6.2% and the Indian pooled estimate of 6.2% as directly similar data. While the U.S. data are longitudinal claims-based prevalence estimates among people with type 2 diabetes, the Indian estimate is a random-effects pooled prevalence from eighteen heterogeneous reports.

Parameter	India	United States
Most relevant recent evidence	Sahu et al., systematic review/meta-analysis	U.S. longitudinal claims-based analysis
Study population	55,988 people with diabetes	5,292,512 adults with type 2 diabetes
Recent pooled/observed prevalence	6.2% (95% CI 4.0–9.4%)	5.434% in 2010; 5.469% in 2021; 5.923% in 2022; 6.238% in 2023
Regional variation	East 9.5%; South 7.4%; North 5.6%	Variation reported across demographic/racial groups
Hospital/community difference	Hospital: 7.5%; community: 2.5%	Claims-based estimates predominantly represent healthcare-utilizing populations
Recent annual incidence estimate	No nationally pooled 2020–2025 estimate identified	No single nationally representative 2020–2025 annual incidence series identified
Supporting incidence evidence	Mumbai community study: 66/10,000/year (0.66%), 2016–2018	Medicare historical annual incidence approximately 6%
Major risk factors	Longer diabetes duration, older age, male sex, comorbidities, unhealthy lifestyle	Older age, male sex, peripheral vascular disease, renal disease and multiple comorbidities
Clinical pattern	Strong contribution from neuropathy, infection and delayed presentation	High burden of neuropathy (PAD), infection, vascular disease and multimorbidity
Infection burden	Substantial bacterial infection reported in Indian DFU studies	DFUs frequently result in ED visits and hospitalization
Amputation burden	Significant; amputation frequently follows ulceration	DFUs are a major contributor to lower-extremity amputation
Main evidence limitation	Heterogeneous regional and healthcare-setting data	Claims-based estimates may not represent the entire diabetic population


KEY TAKEAWAYS

- India shows a lower pooled prevalence (6.2%) than the U.S. (5.434–6.238%), but a large absolute burden due to 77 million diabetics and ~100,000 amputations/year.
- India: predominantly neuropathic DFUs, linked to delayed care and barefoot walking.
- U.S.: more neuro-ischemic DFUs, driven by PAD and aging.
- Both countries have significant risk factors, infection burden and high amputation rates, with evidence limitations related to data heterogeneity and claims-based estimates.

Figure 02: India-USA Comparative Summary, 2020–2025

3.5. Key Observations from 2020–2025: The available information reveals that the reported prevalence of DFUs in the United States and North America is higher than in India, with estimates of 13% and 6.2%, respectively [8,15]. However, India has a much greater absolute population of diabetics, estimated at around 77 million [22], resulting in a significant overall disease burden. Differences in ulcer features are also noticeable. Indian DFUs are primarily neuropathic, whereas Western populations have a higher neuro-ischemic component, which may affect wound healing, infection, and amputation results [14,15,20].

3.6. Current Evidence and Limitations, 2020–2025: Even though research on diabetic foot ulcers (DFUs) increased between 2020 and 2025, there are still significant gaps in the data that is currently accessible from both India and the US. There are still few prospective, population-based, nationally representative studies in India, and a large amount of the information that is now available comes from hospital-based or tertiary-care populations, which may lead to selection bias and decreased generalizability [15,17]. Significant geographic heterogeneity in reported DFU prevalence may also be caused by regional variations in healthcare access, socioeconomic situations, diabetes duration, footwear practices, health literacy, and referral patterns. Large U.S. administrative and Medicare datasets, on the other hand, offer a wealth of population-level data; however, claims-based estimates are still reliant on the accuracy of diagnostic and procedure coding and may not accurately capture clinical characteristics like ulcer size, depth, location, duration, infection severity, healing status, or the presence of multiple concurrent ulcers [19]. Additionally, prior Medicare-based research has found underdiagnosis, limited clinical context, coding-related errors, and limited

generalizability in populations that are primarily older [19].

The methodological variation among studies is another significant drawback. Direct comparisons between India and the US are challenging due to differences in DFU definitions, diagnostic criteria, study populations, sampling techniques, and the distinction between acute and recurrent ulcers [8,15]. Since diabetes-related foot ulcers sometimes reoccur after healing, recurrence is especially significant. However, many epidemiological datasets do not reliably differentiate between initial episodes and recurring illness [8]. Furthermore, when comparing crude prevalence or incidence estimates between Indian and U.S. Medicare populations, disparities in age distribution, diabetes duration, peripheral arterial disease, comorbidity burden, insurance coverage, and healthcare utilization may introduce significant confounding.

Another temporal confounder for research spanning 2020–2022 is the COVID-19 pandemic. Patterns of presentation and treatment were changed by healthcare limitations and decreased access to regular diabetic foot therapy. Although the longer-term implications are yet unknown, a recent scoping analysis found that during the pandemic, there were fewer DFU presentations along with an increase in urgent hospitalizations and amputations [20]. There is substantial evidence linking longer delays to poor healing, increased hospitalization, amputation, mortality, and healthcare expenses [21]. Delays in seeking care and referrals may also have an impact on observed disease severity and outcomes. Estimates from the pandemic period should therefore be interpreted differently from those from years of traditional healthcare.

Prospective, community-based, and longitudinal studies with similar diagnostic criteria and defined definitions should be the main focus of future research in both nations. In addition to methodically documenting neuropathy, peripheral vascular disease, ulcer severity, infection, healing time, recurrence, hospitalization, amputation, death, and medical costs, studies should differentiate between incident and recurrent DFUs. Comparability between populations might be enhanced by harmonizing these factors using globally accepted frameworks, such as the IWGDF classification and preventative recommendations [8,22]. Increased participation of underprivileged and rural communities is especially crucial in India, and studies conducted in the United States should include populations other than those covered by Medicare. The incidence, prevalence, recurrence, clinical outcomes, and economic impact of DFUs would all be more accurately estimated by such standardized longitudinal studies, which would also improve future comparisons between the USA and India.

4. PREVENTION

Diabetic foot ulcers (DFUs) are an expensive and debilitating consequence of diabetes that can worsen quality of life and raise the risk of infection,

hospitalization, and amputation of the lower limb [9,10,12]. Consequently, a thorough, risk-based approach that includes patient education, routine foot exams, suitable footwear, pressure redistribution, early detection of pre-ulcerative lesions, and multidisciplinary follow-up should be used for prevention. Preventive foot care education and routine evaluation for peripheral artery disease (PAD), loss of protective sensation (LOPS), skin anomalies, calluses, deformities, and prior ulceration or amputation should be provided to all diabetics [12, 23]. Visual inspection, neurological evaluation utilizing a 10-g monofilament with an extra neurological test, pedal pulse assessment, and evaluation of foot structure and skin integrity should all be part of an annual foot assessment [12]. Depending on their risk group, people with LOPS, PAD, structural abnormalities, prior ulceration, amputation, or end-stage renal disease need more frequent surveillance [12, 23].

Patients should be advised to wear shoes that fit well, avoid going barefoot, maintain proper hygiene, moisturize dry skin without applying it between the toes, and check their feet every day, including the plantar surface with a mirror if needed [9,12,23]. Additionally, patients should be taught to spot early indicators of tissue damage, such as redness, swelling, blisters, calluses, fissures, discolouration, drainage, or localized elevations in skin temperature, and to seek medical help as soon as abnormalities arise [12,23]. Individualized shoes made to accommodate abnormalities and lessen excessive plantar pressure should be given to patients who are at higher risk. People with LOPS, deformity, callus formation, poor peripheral circulation, prior ulceration, or amputation may find therapeutic footwear especially helpful [12]. Evidence, however, suggests that education might not be enough to prevent ulcers on its own, highlighting the significance of integrating education with pressure management, proper footwear, routine surveillance, and integrated foot care [1,2].

Instead than self-treating with sharp objects or chemical preparations, pre-ulcerative lesions such calluses, corns, fissures, and nail irregularities should be recognized and treated by properly qualified healthcare experts [12]. Plantar skin temperature monitoring at home may offer an extra way to detect localized inflammation or recurrent tissue stress in certain high-risk individuals before ulceration appears [1]. Comprehensive DFU prevention should also include management of glycemia and related cardiovascular risk factors, and quitting smoking is especially crucial for people with PAD or other lower-extremity issues [12]. Patients may need daily foot inspection and care support from family members or caregivers if they have visual impairment, limited mobility, cognitive impairments, or trouble reaching their feet [12]. To help with the early detection and treatment of foot problems, those with high-risk feet should also get lifelong surveillance and integrated multidisciplinary care [12,23]. In general, rather than

depending solely on patient education, prevention of DFUs necessitates ongoing patient involvement, systematic risk classification, proper footwear, early treatment of pre-ulcerative lesions, and prompt professional intervention [1,2,12].

5. CONCLUSION

Diabetic foot ulcers (DFU) will continue to be a problem in India and the United States from 2020 to 2025. With 77 million diabetics and 100,000 amputations each year, India has a bigger absolute burden than the USA, which estimates a higher prevalence of 13% compared to 6.2%. While neuro-ischemic DFU is more common in the USA due to PAD and aging, neuropathic DFU is more common in India (80%), where it is associated with delayed care and barefoot walking. In India, hospital prevalence is three times higher than in community settings, resulting in access gaps and catastrophic expenditures. Each case costs the USA between \$17,500 and \$33,500. Targeted screening, education, vascular treatment, and prevention are necessary in both nations.

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8. AUTHOR CONTRIBUTION

All Authors are contributed equally

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10. CONFLICT OF INTREST

Not Declared

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