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Original Research Article

A Comparative Study of Foot Infections in Diabetic and Non-Diabetic Patients with Reference to Incidence, Clinical Features, Etiopathogenesis, Outcomes

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Abstract:

Background: Foot infections are an important cause of morbidity among patients with diabetes and may result in prolonged hospitalisation, repeated surgical procedures, and limb loss. Peripheral neuropathy, peripheral vascular disease, impaired immunity, and delayed wound healing contribute to the increased severity of diabetic foot infections. However, foot infections also occur in non-diabetic individuals, and comparative data regarding their clinical presentation, etiopathogenesis, management, and outcomes are limited. The present study was undertaken to compare foot infections in diabetic and non-diabetic patients.

Aim: To compare the incidence, clinical features, etiopathogenesis, management, and outcomes of foot infections among diabetic and non-diabetic patients.

Materials and Methods: A prospective comparative observational study was conducted from June 2024 to July 2025 in the Department of General Surgery at Narayana Medical College and Hospital, Nellore. A total of 100 adult patients with foot infections were included, comprising 50 diabetic and 50 non-diabetic patients. Detailed clinical history and examination were performed, including assessment of trauma, site and severity of infection, peripheral neuropathy, and peripheral vascular disease. Microbiological investigations and appropriate surgical management were undertaken according to the clinical condition. Outcomes including amputation, healing, and duration of hospital stay were assessed. Categorical variables were compared using Fisher's exact test and continuous variables using the independent sample t-test.

Results: The mean age was significantly higher among diabetic patients than non-diabetic patients (58.84 ± 8.25 vs. 47.84 ± 8.30 years; $p < 0.001$). Cellulitis was the most common presentation in both groups (36% vs. 38%), while gangrene was more frequent among diabetic patients (20% vs. 8%). Peripheral vascular disease was significantly more common in diabetic patients (42% vs. 8%; $p < 0.001$), as was peripheral neuropathy (80% vs. 10%; $p < 0.001$). E. coli was the most frequently isolated organism among diabetic patients, whereas Klebsiella spp. predominated among non-diabetic patients. Major amputation was required in 26% of diabetic patients compared with none of the non-diabetic patients. Overall amputation was significantly higher among diabetic patients (50% vs. 20%; $p = 0.002$). The mean hospital stay was also significantly longer in diabetic patients (47.68 ± 8.76 vs. 28.06 ± 5.12 days; $p < 0.001$).

Conclusion: Foot infections in diabetic patients were associated with older age, significantly higher prevalence of peripheral neuropathy and peripheral vascular disease, greater severity of infection, increased requirement for major surgical intervention, higher amputation rates, and prolonged hospitalisation compared with non-diabetic patients. Early recognition, regular foot assessment, appropriate glycaemic control, patient education, timely antimicrobial therapy, and prompt surgical management are essential to improve outcomes and reduce limb loss in diabetic patients.

Keywords: Diabetic foot infection; Non-diabetic foot infection; Peripheral neuropathy; Peripheral vascular disease; Amputation.

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Introduction

Diabetes mellitus is a chronic metabolic disorder with an increasing global prevalence and is associated with multiple long-term complications affecting various organ systems. Among these complications, foot infections constitute one of the most serious and disabling conditions, leading to prolonged hospitalisation, repeated surgical interventions, and lower limb amputations. Diabetic foot ulcers arise as a consequence of impaired wound healing, neuropathy, vascular insufficiency, and superimposed infection, making them difficult to treat and prone to recurrence. [1]

It has been estimated that approximately 15–25% of patients with diabetes develop a foot ulcer during their lifetime, and a significant proportion of these ulcers become infected. [1,5] Once infection sets in, the risk of complications such as deep tissue infection, osteomyelitis, gangrene, and limb loss increases considerably. Diabetic foot infections therefore represent a major cause of morbidity and a leading reason for diabetes-related hospital admissions. [1,2,3]

Foot infections not only affect the quality of life of patients but also impose a substantial economic burden on healthcare systems. Recurrent hospital admissions, long duration of treatment, and need for surgical procedures such as debridement and amputation contribute significantly to healthcare costs. The chronic and recurrent nature of diabetic foot disease further emphasises the need for early detection, appropriate management, and preventive strategies. [4,5]

The epidemiological burden of diabetic foot disease has been rising steadily worldwide, particularly in low- and middle-income countries where access to healthcare facilities and preventive foot care is limited. Studies have demonstrated that diabetic foot infections are among the leading causes of non-traumatic lower limb amputations globally. [9,10] The prevalence of diabetes itself is increasing rapidly, thereby contributing to a parallel rise in foot-related complications.

In India, diabetic foot infections constitute a significant proportion of surgical admissions.

Several studies have reported a high prevalence of foot ulcers and infections among diabetic patients, attributed to barefoot walking, delayed presentation, poor glycaemic control, and lack of patient education regarding foot care. [6,7,8]

Socioeconomic factors, limited awareness, and inadequate access to specialised foot care further worsen outcomes in this population.

In addition to diabetic patients, non-diabetic individuals also present with foot infections due to trauma, poor hygiene, and delayed medical attention. However, the disease course, severity, and outcomes of foot infections differ between diabetic and non-diabetic patients. Understanding these epidemiological differences is important for planning preventive measures, allocating healthcare resources, and improving patient outcomes. [11,12]

The pathogenesis of foot infections in diabetic patients is complex and multifactorial. Peripheral neuropathy leads to loss of protective sensation, resulting in unrecognised trauma and repeated pressure injuries.15 Autonomic neuropathy causes dry skin and fissuring, providing a portal of entry for microorganisms. Motor neuropathy results in foot deformities, leading to abnormal pressure points and ulcer formation.

Peripheral vascular disease further compromises tissue perfusion, impairing oxygen delivery and wound healing, thereby increasing susceptibility to infection and gangrene. [13] Minor trauma has been identified as the initiating event in the majority of diabetic foot ulcers, which subsequently progress to infection if left untreated. [8] Infection superimposed on neuropathic and ischemic tissue accelerates tissue destruction and significantly increases the risk of limb loss. [14]

While diabetic foot infections have been widely studied, non-diabetic foot infections also contribute substantially to surgical morbidity. Non-diabetic patients may present with cellulitis, abscesses, or traumatic wounds, but generally have better healing potential and outcomes. However, comparative studies evaluating differences in incidence, clinical features, etiopathogenesis, and outcomes between diabetic and non-diabetic foot infections remain limited, especially in the Indian population.

Understanding the differences between diabetic and non-diabetic foot infections is essential for early diagnosis, appropriate management, and prevention of complications. Available literature suggests that diabetic patients tend to present with more severe infections, higher prevalence of neuropathy and peripheral vascular disease, prolonged hospital stay, and increased amputation rates compared to non-diabetic patients. [19] The availability of adequate patient load, diagnostic facilities, and surgical expertise at the study centre provides an opportunity to conduct a comparative analysis of foot infections in diabetic and non-diabetic patients. Hence, the present study has been undertaken to compare the incidence, clinical features, etiopathogenesis, and outcomes of foot infections in diabetic and non-diabetic patients, with the aim of improving patient care and reducing morbidity and limb loss.

Aim: To compare foot infections between diabetic and non-diabetic patients, focusing on incidence rates, clinical features, etiopathogenesis, and outcomes, to inform precision treatment strategies, preventive measures, and resource allocation in healthcare.

Objectives: Determine incidence rates of foot infections in diabetic and non-diabetic patients. Compare clinical features between diabetic and non-diabetic foot infections. Investigate underlying causes (etiopathogenesis) in both groups. Assess outcomes including healing time, amputation rates, and complications. Identify risk factors for adverse outcomes in both populations. Evaluate current management strategies. Propose preventive measures to reduce foot infections. Contribute to knowledge on foot care and infection management.

Materials and Methods: This was a Prospective Comparative Observational Study done from June 2024 to July 2025 in 100 Patients diagnosed with foot infections and admitted to the surgical wards of Narayana Medical College and Hospital, Nellore.

Inclusion criteria: Adults (≥18 years) with Foot infection diagnosis (cellulitis, abscesses, ulcers, etc.) in both diabetic and non-diabetic patients. Exclusion criteria: Patients with clean, non-infected foot ulcers, Foot lesions due to malignancy, Traumatic amputations

Methodology: A detailed clinical history was obtained from all patients, including duration of symptoms, history of trauma, duration of diabetes (if present), previous treatment, and associated comorbidities. General physical examination and systemic examination were carried out in all patients. Local examination of the affected foot was performed to assess the site, extent, and severity of infection, presence of discharge, necrosis, gangrene, and involvement of deeper structures. Peripheral neuropathy was assessed clinically, and peripheral vascular status was evaluated by palpation of peripheral pulses and relevant investigations.

Surgical Procedure: Surgical intervention was undertaken in patients with moderate to severe foot infections based on clinical severity and extent of disease. The surgical procedures performed included incision and drainage for abscesses, surgical debridement of necrotic and infected tissue, excision of infected bone in cases of osteomyelitis, and minor or major amputations where limb salvage was not feasible. The type and extent of surgical procedure were decided based on the severity of infection, vascular status, and viability of tissues. All surgical procedures were performed in conjunction with appropriate antibiotic therapy and supportive care.

Statistical Analysis: Data were entered into Microsoft Excel and analysed using appropriate statistical methods. Categorical variables were expressed as frequencies and percentages, while continuous variables were expressed as mean and standard deviation. Fisher's exact test was used to compare categorical variables between diabetic and non-diabetic groups. Independent sample t-test was used to compare the mean hospital stay between the two groups. A p value of <0.05 was considered statistically significant.

Results

Table 1: Gender Distribution among Diabetic and Non-Diabetic Patients

Variable	Diabetic (n=50)	Non-Diabetic (n=50)	Total (n=100)	Test value	P value
Female	23 (46.0%)	27 (54.0%)	50 (50.0%)	0.64	0.274 (NS)
Male	27 (54.0%)	23 (46.0%)	50 (50.0%)		
Age (Mean ± SD)	58.84 ± 8.25	47.84 ± 8.30	-	6.643	<0.001*

Table 2: Comparison of Mode of Presentation

Mode of Presentation	Diabetic (n=50)	Non-Diabetic (n=50)	Total (n=100)	Test Value	P Value
Abscess	8 (16.0%)	11 (22.0%)	19 (19.0%)	3.20	0.36 (NS)
Cellulitis	18 (36.0%)	19 (38.0%)	37 (37.0%)		
Gangrene	10 (20.0%)	4 (8.0%)	14 (14.0%)		
Ulcer	14 (28.0%)	16 (32.0%)	30 (30.0%)		

Table 3: Comparison of Site of Occurrence, H/O of Trauma, Wagner's Grading

Site	Diabetic (n=50)	Non-Diabetic (n=50)	Total (n=100)	Test Value	P Value
Dorsum	16 (32.0%)	18 (36.0%)	34 (34.0%)	0.437	0.80 (NS)
Sole	17 (34.0%)	18 (36.0%)	35 (35.0%)		
Toes	17 (34.0%)	14 (28.0%)	31 (31.0%)		
History of Trauma					
No	24 (48.0%)	31 (62.0%)	55 (55.0%)	0.437	0.80 (NS)
Yes	26 (52.0%)	19 (38.0%)	45 (45.0%)		
Wagner's Grade					
Grade 2	15 (30.0%)	26 (52.0%)	41 (41.0%)	6.476	0.09 (NS)
Grade 3	22 (44.0%)	15 (30.0%)	37 (37.0%)		
Grade 4	11 (22.0%)	9 (18.0%)	20 (20.0%)		
Grade 5	2 (4.0%)	0 (0.0%)	2 (2.0%)		

Table 4: Comparison of PVD, Neuropathy among Patients

PVD	Diabetic (n=50)	Non-Diabetic (n=50)	Total (n=100)	Test Value	P Value
Absent	29 (58.0%)	46 (92.0%)	75 (75.0%)	15.41	<0.001*
Present	21 (42.0%)	4 (8.0%)	25 (25.0%)		
Neuropathy				49.495	<0.001*
Absent	10 (20.0%)	45 (90.0%)	55 (55.0%)		
Present	40 (80.0%)	5 (10.0%)	45 (45.0%)		

Table 5: Comparison of Microorganisms Isolated Among Patients

Organism	Diabetic (n=50)	Non-Diabetic (n=50)	Total (n=100)	Test Value	P Value
E. coli	15 (30.0%)	8 (16.0%)	23 (23.0%)	4.46	0.216 (NS)
Klebsiella spp.	10 (20.0%)	18 (36.0%)	28 (28.0%)		
Pseudomonas spp.	11 (22.0%)	10 (20.0%)	21 (21.0%)		
Staphylococcus aureus	14 (28.0%)	14 (28.0%)	28 (28.0%)		

Table 6: Comparison of Management among Patients

Management	Diabetic (n=50)	Non-Diabetic (n=50)	Total (n=100)	Test Value	P Value
Debridement	6 (12.0%)	15 (30.0%)	21 (21.0%)	20.693	<0.001*
Fasciotomy	10 (20.0%)	11 (22.0%)	21 (21.0%)		
Incision & Drainage	3 (6.0%)	8 (16.0%)	11 (11.0%)		
Major Amputation	13 (26.0%)	0 (0.0%)	13 (13.0%)		
Minor Amputation	8 (16.0%)	4 (8.0%)	12 (12.0%)		
Split Skin Grafting	10 (20.0%)	12 (24.0%)	22 (22.0%)		

Table 7: Comparison of Outcome Among Patients

Outcome	Diabetic (n=50)	Non-Diabetic (n=50)	Total (n=100)	Test Value	P Value
Amputated	25 (50.0%)	10 (20.0%)	35 (35.0%)	9.89	0.002*
Healed	25 (50.0%)	40 (80.0%)	65 (65.0%)		

Table 8: Comparison of Among Diabetic and Non-Diabetic Patients

Group	Mean (Days)	Standard Deviation	t Value	P Value
Diabetic (n=50)	47.68	8.76	13.66	<0.001*
Non-Diabetic (n=50)	28.06	5.12		

Discussion:

Diabetes Mellitus is associated with several pathological changes including peripheral neuropathy, peripheral vascular disease, impaired immune response, and delayed wound healing. These factors collectively increase the susceptibility of diabetic patients to severe infections and complications such as gangrene, osteomyelitis, and limb loss. Loss of protective sensation due to peripheral neuropathy often results in repeated unnoticed trauma to the foot, while peripheral vascular disease compromises blood supply and delays tissue healing. In addition, hyperglycaemia impairs leukocyte function and host immune response, thereby reducing the ability of the body to control infection. As a result, even minor injuries or skin breaches in diabetic patients can progress rapidly to serious infections involving deeper tissues and bone.

Age Distribution: In the present study, the mean age of diabetic patients was 58.84 ± 8.25 years, whereas the mean age of non-diabetic patients was 47.84 ± 8.30 years. The difference between the two groups was statistically significant ($p < 0.001$). This indicates that foot infections tend to occur at a relatively older age in diabetic patients compared to non-diabetic individuals. Similar findings were reported by Venkata Reddy et al., [3] who observed that diabetic patients with foot infections were generally older compared to non-diabetic patients. The authors suggested that prolonged duration of diabetes increases the risk of neuropathy, peripheral vascular disease, and impaired wound healing.

Likewise, Pendsey SP reported that diabetic foot infections are most commonly seen in patients above 50 years of age in the Indian population. Increasing age is associated with multiple comorbidities, reduced immunity, and delayed wound healing, which contribute to the development and progression of foot infections.

Gender Distribution: In the present study, males constituted 54% of the diabetic group, whereas females constituted 54% of the non-diabetic group. The difference in gender distribution between the two groups was not statistically significant ($p = 0.274$). Similar observations were reported by Pendsey, [6] who studied diabetic foot infections in the Indian population and found that although male patients were slightly more common, the difference was not significant. Mode of Presentation: The clinical presentation of foot infections varies depending on the severity of infection, duration of symptoms, and underlying risk factors. In the present study, cellulitis was the most common mode of presentation, observed in 36% of diabetic patients

and 38% of non-diabetic patients. This was followed by ulcer, abscess, and gangrene.

Cellulitis represents an early stage of infection involving the skin and subcutaneous tissue. It is characterized by erythema, swelling, warmth, and tenderness. If not treated promptly, cellulitis may progress to deeper infections such as abscess formation or necrotizing infections.

The predominance of cellulitis in both groups indicates that most patients presented during the early stages of infection. However, the presence of gangrene was more common among diabetic patients, suggesting that diabetic individuals are more likely to develop severe infections due to compromised blood supply and impaired immunity.

Similar findings were reported by Lipsky et al., [2] who observed that cellulitis and infected ulcers were the most common presentations in patients with foot infections.

Site of Infection: The anatomical site of infection provides important insights into the underlying pathogenesis of foot infections. In the present study, the sole and toes were the most commonly affected sites in diabetic patients, whereas the dorsum and sole were more commonly involved in non-diabetic patients. The predominance of plantar involvement in diabetic patients can be explained by the presence of peripheral neuropathy. Loss of protective sensation leads to repeated pressure and trauma at weight-bearing areas of the foot, particularly the sole. Over time, this results in ulcer formation and subsequent infection. Motor neuropathy may also lead to foot deformities, which cause abnormal pressure distribution and increase the risk of plantar ulcers. These ulcers often serve as entry points for microorganisms, resulting in infection. Similar observations were reported by Boulton et al., [9] who described plantar ulcers as the most common type of ulcer in diabetic patients.

History of Trauma: In the present study, 52% of diabetic patients had a history of trauma, compared to 38% of non-diabetic patients. Although the difference was not statistically significant, trauma appeared to play an important role in the initiation of foot infections. Minor trauma is often the initiating factor in diabetic foot lesions. Because of neuropathy, diabetic patients may not perceive pain or discomfort following injury, which leads to delayed recognition and treatment. Common causes of trauma include barefoot walking, ill-fitting footwear, burns, and minor cuts. These injuries may initially appear trivial but can rapidly progress to severe infections in diabetic individuals. This observation is consistent with the findings of Reiber et al., [8] who reported that minor trauma is the initiating event in the majority of diabetic foot ulcers.

Wagner's Classification: Wagner's classification is widely used to assess the severity of foot ulcers. In the present study, Grade 3 ulcers were more common among diabetic patients, whereas Grade 2 ulcers were more common among non-diabetic patients. Higher Wagner grades indicate deeper tissue involvement and more severe infection. Diabetic patients tend to present with advanced disease because neuropathy reduces pain perception, allowing ulcers to progress unnoticed. Similar findings were reported by Venkata Reddy et al. [3], who observed that diabetic patients frequently present with higher Wagner grades compared to non-diabetic patients.

Peripheral Vascular Disease (PVD): Peripheral vascular disease was significantly more common in diabetic patients (42%) compared to non-diabetic patients (8%). This difference was statistically significant. Peripheral vascular disease leads to reduced blood flow to the affected tissues, resulting in tissue ischemia and impaired wound healing. Ischemic tissues are more susceptible to infection and less responsive to antibiotic therapy. Similar findings were reported by Prompers et al., [12] who identified ischemia as a major predictor of poor outcomes in diabetic foot infections.

Peripheral Neuropathy: Peripheral neuropathy was observed in 80% of diabetic patients compared to 10% of non-diabetic patients. This difference was highly significant. Neuropathy leads to loss of protective sensation, which increases the risk of unnoticed trauma and ulcer formation. It is considered one of the most important risk factors for diabetic foot infections. Similar findings were reported by Tesfaye et al., [15] who identified neuropathy as a key contributor to diabetic foot complications.

Microbiological Profile: The most commonly isolated organism in diabetic patients was E. coli, followed by Staphylococcus aureus, Pseudomonas, and Klebsiella. In non-diabetic patients, Klebsiella was the most common organism. Foot infections are often polymicrobial, especially in chronic wounds. Gram-negative organisms are commonly isolated in long-standing infections. Similar findings were reported by Gadepalli et al. [5], who observed a mixed microbial pattern in diabetic foot infections.

Management: The management of foot infections varied depending on severity. In diabetic patients, major amputation and split skin grafting were commonly performed, whereas debridement and split skin grafting were more common in non-diabetic patients. The higher rate of amputation among diabetic patients reflects the severity of infection and poor vascularity. Similar findings were reported by Jeffcoate et al.10, who noted that diabetic patients often require aggressive surgical management.

Outcome: Amputation was required in 50% of diabetic patients compared to 20% of non-diabetic patients. Healing was more common in non-diabetic patients. These findings indicate poorer outcomes among diabetic patients due to delayed healing and severe infection.

Hospital Stay: The mean hospital stay was significantly longer in diabetic patients (47.68 days) compared to non-diabetic patients (28.06 days). Prolonged hospital stay is often associated with severe infection and repeated surgical interventions.

Conclusion:

The present study was conducted to compare the clinical profile, etiopathogenesis, microbiological pattern, management, and outcomes of foot infections in diabetic and non-diabetic patients admitted to Narayana Medical College and Hospital, Nellore. Foot infections represent a significant cause of morbidity and frequently require prolonged hospitalisation and surgical intervention. The findings of this study highlight important differences between diabetic and non-diabetic patients with foot infections. In the present study, diabetic patients were significantly older than non-diabetic patients, indicating that the risk of foot infections increases with advancing age and duration of diabetes. Although gender distribution was comparable between the two groups, diabetic patients tended to present with more severe disease. Cellulitis was the most common mode of presentation in both diabetic and non-diabetic patients, followed by ulcer, abscess, and gangrene. The plantar surface and toes were the most commonly affected sites among diabetic patients, which may be attributed to neuropathy and repeated pressure-related trauma.

The study demonstrated a significantly higher prevalence of peripheral vascular disease and peripheral neuropathy among diabetic patients compared to non-diabetic patients. These two factors play a crucial role in the pathogenesis of diabetic foot infections by impairing tissue perfusion, reducing protective sensation, and delaying wound healing. The microbiological profile of infections showed a mixed pattern of organisms, with both gram-positive and gram-negative bacteria being isolated from infected wounds. Management of foot infections varied depending on the severity of infection and the underlying patient factors. Diabetic patients more frequently required aggressive surgical procedures, including major amputations, whereas non-diabetic patients were more commonly managed with debridement and conservative surgical procedures. The outcome analysis revealed that amputation rates were significantly higher among diabetic patients compared to non-diabetic patients. Furthermore, diabetic patients had a significantly longer duration of hospital stay compared to non-diabetic patients, reflecting the severity of infection, delayed wound healing, and the need for repeated surgical interventions in this group.

In conclusion, foot infections in diabetic patients are associated with more severe disease, higher prevalence of peripheral neuropathy and peripheral vascular disease, increased need for major surgical procedures, higher amputation rates, and longer hospital stay when compared to non-diabetic patients. Early detection of foot lesions, strict glycaemic control, regular foot examination, patient education regarding foot care, and timely medical and surgical management are essential to prevent complications and reduce the risk of limb loss in diabetic patients.

References

1. Armstrong DG, Boulton AJ, Bus SA. Diabetic foot ulcers and their recurrence. New England Journal of Medicine. 2017 Jun 15;376(24):2367-75.
2. Lipsky BA, Berendt AR, Deery HG, Embil JM, Joseph WS, Karchmer AW, LeFrock JL, Lew DP, Mader JT, Norden C, Tan JS. Diagnosis and treatment of diabetic foot infections. Plastic and reconstructive surgery. 2006 Jun 1;117(7S):212S-38S.
3. Reddy V, Inamdar P. A comparative study of foot infections in diabetic and non-diabetic patients with reference to etiopathogenesis, clinical features and outcome. Int Surg J. 2020 Apr 23;7(5):1496-502.
4. Lavery LA, Peters EJ, Armstrong DG, Wendel CS, Murdoch DP, Lipsky BA. Risk factors for developing osteomyelitis in patients with diabetic foot wounds. Diabetes research and clinical practice. 2009 Mar 1;83(3):347-52.
5. Gadepalli R, Dhawan B, Sreenivas V, Kapil A, Ammini AC, Chaudhry R. A clinico-microbiological study of diabetic foot ulcers in an Indian tertiary care hospital. Diabetes care. 2006 Aug 1;29(8):1727-32.
6. Pendsey S. Clinical profile of diabetic foot in India. The international journal of lower extremity wounds. 2010 Dec;9(4):180-4.
7. Viswanathan V, Thomas N, Tandon N, Asirvatham A, Rajasekar S, Ramachandran A, Senthilvasan K, Murugan VS. Profile of diabetic foot complications and its associated complications-a multicentric study from India. JAPI. 2005 Nov;53(10):933-6.
8. Reiber GE, Vileikyte LO, Boyko ED, Del Aguila M, Smith DG, Lavery LA, Boulton AJ. Causal pathways for incident lower-extremity ulcers in patients with diabetes from two settings. Diabetes care. 1999 Jan 1;22(1):157-62.
9. Boulton AJ, Vileikyte L, Ragnarson-Tennvall G, Apelqvist J. The global burden of diabetic foot disease. The Lancet. 2005 Nov 12;366(9498):1719-24.

10. Jeffcoate WJ, Harding KG. Diabetic foot ulcers. The lancet. 2003 May 3;361(9368):1545-51.
11. Edmonds ME, Foster AV. Diabetic foot ulcers. Bmj. 2006 Feb 16;332(7538):407-10.
12. Prompers L, Huijberts M, Apelqvist J, Jude E, Piaggesi A, Bakker K, Edmonds M, Holstein P, Jirkovska A, Mauricio D, Ragnarson Tennvall G. High prevalence of ischaemia, infection and serious comorbidity in patients with diabetic foot disease in Europe. Baseline results from the Eurodiale study. Diabetologia. 2007 Jan;50(1):18-25.
13. Walters DP, Gatling W, Mullee MA, Hill RD. The prevalence, detection, and epidemiological correlates of peripheral vascular disease: a comparison of diabetic and non-diabetic subjects in an English community. Diabetic medicine. 1992 Oct;9(8):710-5.
14. Chaturvedi N, Stevens LK, Fuller JH, Lee ET, Lu M, WHO Multinational Study Group. Risk factors, ethnic differences and mortality associated with lower-extremity gangrene and amputation in diabetes. The WHO Multinational Study of Vascular Disease in Diabetes. Diabetologia. 2001 Sep;44(Suppl 2):S65.
15. Tesfaye S, Boulton AJ, Dyck PJ, Freeman R, Horowitz M, Kempler P, Lauria G, Malik RA, Spallone V, Vinik A, Bernardi L. Diabetic neuropathies: update on definitions, diagnostic criteria, estimation of severity, and treatments. Diabetes care. 2010 Oct;33(10):2285.