



## Survey of Foot Complications among Patients Attending Diabetic Foot Clinic in A Tertiary Care Center

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### Abstract

**Introduction:** *The prevalence of diabetes is increasing worldwide resulting in foot complications, which leads to poor quality of life and increased cost of living.*

**Aim:** *The aim of this study was to understand the spectrum of various foot complications in patients presenting to diabetic foot clinic.*

**Methodology:** *A cross sectional study was carried out among diabetic patients visiting foot clinic of a tertiary care centre.*

**Result:** *A total of 107 patients (63 - males & 44 - females), type 1(31) and type 2 (76) with diabetic foot complications were analyzed. The commonest foot complications among the study population are diabetic foot ulcers (DFU) in 67, Diabetic peripheral neuropathy (DPN) in 73, Amputations in 42, peripheral arterial disease (PAD) in 37. Other complications noted were osteomyelitis in 12; foot deformities - Charcot foot in 5, Hallux valgus in 26 and Hammer toe in 13.*

**Conclusion:** *Foot complications in diabetic patients are very common as observed in our study which leads to significant morbidity and disability.*

**Keywords:** *Diabetes, foot, Ulcers, Amputation, Complications.*

### Introduction

Diabetic foot problems are common occurrence throughout the world, resulting in major economic consequences for patients, their families and society<sup>[1]</sup>. India has more people living with diabetes than any other country; foot problems and amputations are very common<sup>[1]</sup>. India is home to around 69.1 million individuals with diabetes with overall prevalence of 9.3%, 2.4% in rural and 12-17% in urban population<sup>[1],[2]</sup>.

Diabetes is associated with microvascular and macrovascular complications in patients with inadequately controlled blood sugar levels. Foot complications in patients with diabetes mellitus are one of the significant medical problems and an economic burden<sup>[3]</sup>.

Common diabetic foot complications are foot ulcers, diabetic neuropathy, amputations, infections like paronychia, cellulitis, osteomyelitis, onychomycosis and abscess, Charcot

foot, foot deformities (hammer toe, hallux valgus, hallux varus, hallux rigidus, clawing of toes, bunion).<sup>[2]- [4]</sup> Foot complications including ulcers, infections and amputations are major causes of morbidity and disability in persons with diabetes mellitus. The risk of ulceration and amputation among diabetic patients increases by two to four folds with the progression of age and duration of diabetes regardless of the type of diabetes<sup>[4]</sup>. We designed this survey to evaluate the prevalence of foot complications among patients attending our clinic.

**Aim**

The aim of this study was to understand the spectrum of various foot complications in patients presenting to diabetic foot clinic in a tertiary care center.

**Methodology**

A cross sectional study was carried out among diabetic patients visiting foot clinic of a tertiary care center (January 2016 to December 2017). All previously diagnosed diabetics visiting foot clinic were evaluated using a study proforma for diabetic foot related complications. Wagner’s Scale was used to document DFUs, Neuropathy was diagnosed in patients presenting with one of these symptoms (burning pain, numbness, pins and needles, extreme sensitive to touch, muscle weakness, lack of coordination or inability to sense 5.07/10 g Semmes Weinstein monofilament. PAD in those with vascular changes on Doppler study. Lower limb amputations were tabulated according to level of amputation.

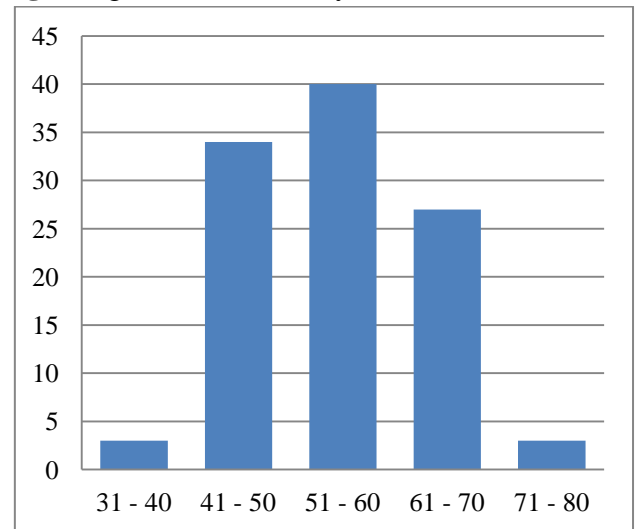
**Statistical Analysis**

Data was entered in Microsoft Excel & statistical analysis was done, using SPSS version 21.0. Descriptive analysis was done for continuous variables, frequency distribution, mean, standard deviation and their percentages were calculated.

**Results**

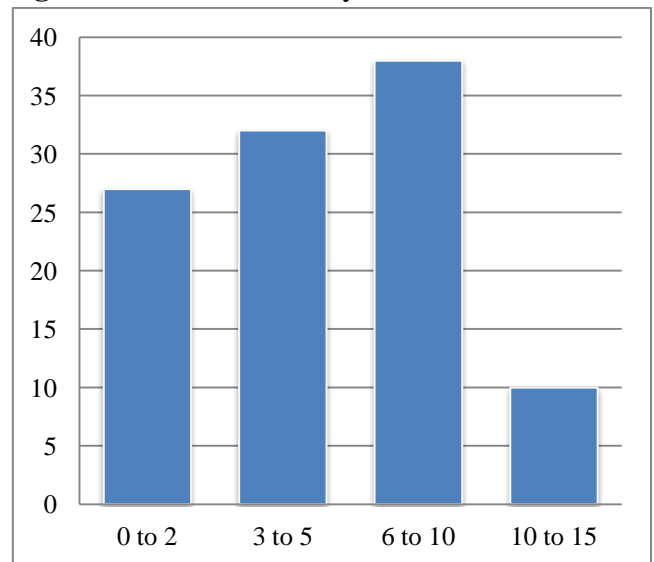
A total of 107 patients, type 1 (31) and type 2 (76) with diabetic foot complications were analyzed; out of which, 63 (59%) were males and 44(41%) were females. The age range was between 36 and 74 and the mean (SD) age was  $55.3 \pm 8.22$  years as shown in Fig 1

**Fig 1:** Age distribution in years



90% of study population had duration of diabetes <10 years and the mean duration (SD) was  $54.8 \pm 26.2$  months as shown in Fig - 2.

**Fig 2:** Duration of DM in years



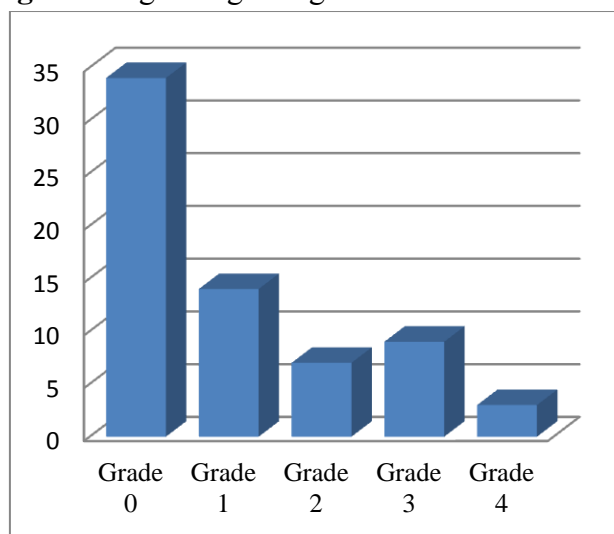
40 patients were found to have HBA1c > 7 and HBA1c < 7 in 67 patients as shown in Table - 1.

**Table 1:** Demographic profile

❖ n = 107 patients
❖ Type 1DM - 31
❖ Type 2DM - 76
❖ Males - 63
❖ Females - 44
❖ Mean (SD) age - 55.3 ± 8.22 years
❖ Mean duration (SD) of diabetes - 54.8 ± 26.2 months
❖ Deranged HbA1c - 40
❖ Complications
- Ulcer - 67
- DPN - 73
- Charcoat Foot - 5
- Hallux valgus - 26
- Hammer toe - 13
- Amputation - 42
- PAD - 37
- Osteomyelitis - 12
- Muscle weakness - 62

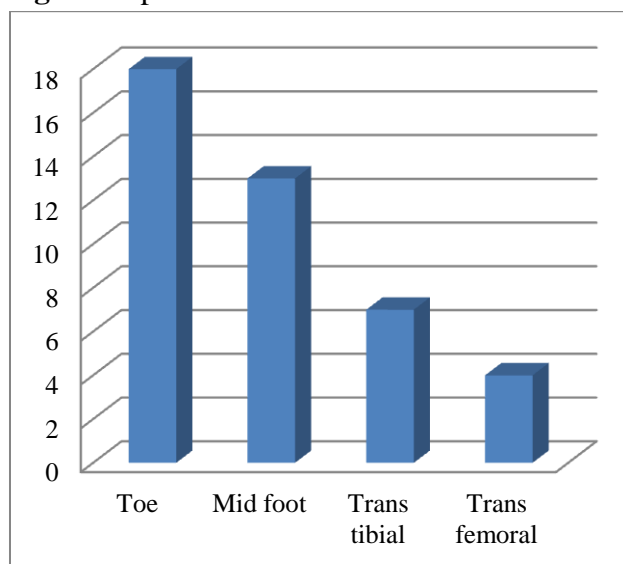
The commonest foot complications found among the study population are diabetic foot ulcers (DFU) in 67 (63%) as shown in Fig - 3

**Fig - 3:** Wagner’s grading of DFU



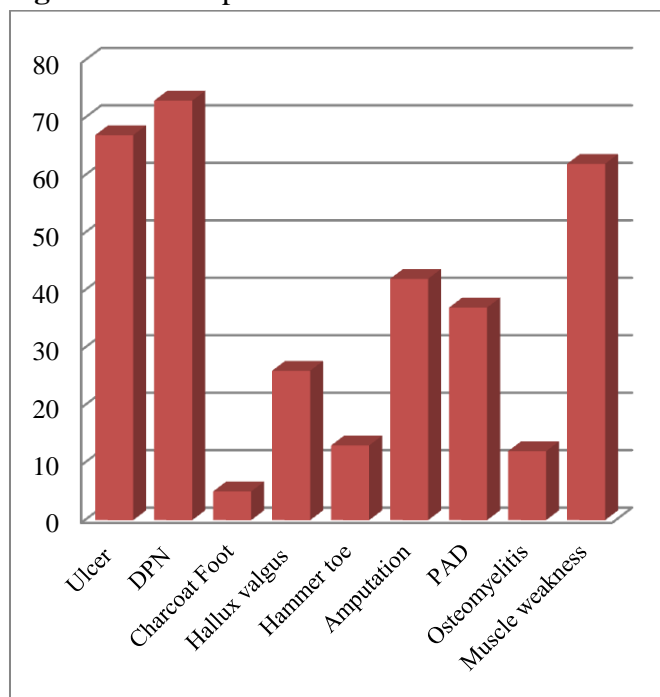
Diabetic peripheral neuropathy (DPN) in 73 (68%), Peripheral arterial disease (PAD) in 37 (35%), lower limb amputation in 42 (39%) (Toe level being the commonest form of amputation) as shown in Fig 4.

**Fig 4:** Amputation Level



Other complications that were observed were osteomyelitis 12 (11%); foot deformities - hallux valgus 26 (24%) being the commonest foot deformity observed, Hammer toe - 13(12%) and Charcot foot – 5 (5%) were the other foot deformities observed as shown in Fig - 5.

**Fig 5:** Foot Complications



## Discussion

Diabetic foot is one of the most devastating complications of diabetes and is defined as a group of syndromes in which neuropathy, ischemia and infection lead to tissue breakdown, resulting in DFUS, gangrene and possible lower limb amputation<sup>[5]</sup>.

The percentage of type 2 diabetic patients in our study was more among diabetic foot cases and male predominance was observed which are in agreement with similar observations reported in other studies.<sup>[6], [7]</sup>

Diabetes causes acute and chronic neuropathy affecting each level of the peripheral nerve, from the root to the distal axon<sup>[8]</sup>. DPN is a leading cause for disability due to foot ulceration and amputation, gait disturbance and fall-related injury<sup>[9]</sup>. Approximately 20 to 30% of patients with DPN suffer from neuropathic pain, in our study we observed higher percentage of study population (68%) being affected with DPN when compared to other studies<sup>[8] - [10]</sup>.

The presence of diabetes mellitus greatly increases the risk of PAD, as well as accelerates its course, making these patients more susceptible to ischemic events and impaired functional status compared to patients without diabetes<sup>[11]</sup>. The prevalence of PAD in people with DM over 40 years of age has been estimated to be 20%. This prevalence increases to 29% in patients with DM over 50 years of age, while we noted slightly higher prevalence (35%) in our study<sup>[11] - [13]</sup>.

Around 15% of diabetic patients will develop foot ulcers in their life time and this is known to cause amputation in 85% of the cases, in India approximately 45,000 lower limbs are amputated every year due to diabetic foot complications<sup>[14]</sup>.

Prevalence of foot ulcers in Indian diabetic population is 3%, while that in the western world varies between 4-10%. Reasons proposed to explain this difference is the younger age of diabetic population and very recent increase in the incidence in India<sup>[15]</sup>. In our study we observed 67 (63%) of the study population had foot ulcers when compared to 41% in a study by

Jyothylekshmy and associates, the higher percentage of DFU in our study can be attributed to higher prevalence of DPN among our study population when compared to above study<sup>[16]</sup>.

Diabetic patients account for 50% or more of the non traumatic amputations. The classic triad of peripheral arterial disease (PAD), peripheral neuropathy, and infection lead to gangrene and resultant amputation<sup>[17] - [20]</sup>. In our study 39% of study population had underwent some form of lower limb amputations. It has been shown that the level of amputation in diabetic patients is more distal than that of non diabetic patients. Toe amputations (43%) were the commonest amputations seen in our study population which is in agreement with other studies<sup>[21], [22]</sup>.

Deformities occurring in the diabetic patient can range from hammertoes and bunions to the devastating collapse of the foot and ankle as a result of Charcot's neuroarthropathy. In our study we observed 12% of study population had developed hammer toes, 24% had hallux valgus<sup>[23], [24]</sup>.

Charcot's neuroarthropathy results in bone destruction collapse and fracture. It is commonly mistaken for an infectious process. Diabetes is the leading cause<sup>[25]</sup>. Charcot develops as a result of autonomic neuropathy that causes an increase of blood flow to the extremities resulting in a profound osteopenia. Motor neuropathies due to imbalances create abnormal pressures. The presence of sensory loss makes the patient unaware of these pressures and ultimate osseous destruction ensues<sup>[25]</sup>. The incidence of unilateral involvement has been reported to be between 0.08% and 7.7%, with bilateral involvement between 5.9% and 39.3%<sup>[25], [26]</sup>. Similar observation of 5% study population in our study had developed Charcot's neuroarthropathy.

Osteomyelitis occurs after the spread of superficial infection of the soft tissue to the adjacent bone or marrow. Osteomyelitis is a common DFUs infection, being present in 10%-15% of moderate and in 50% of severe infections. In our study 12% of study population had

developed osteomyelitis which is in agreement with other studies <sup>[27], [28]</sup>.

### Conclusion

Foot complications in diabetic patients are very common as observed in our study which leads to significant morbidity and disability. Further studies should be conducted with larger cohort to evaluate correlation between various risk factors. Early detection of risk factors, primary and secondary prevention programs should be implemented to minimize morbidity, limit disability and loss of function.

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