

**A Case Series of Diabetic Foot to Assess the Various Risk Factors Associated With Amputation**

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**Abstract**

**Aim:** Most cases of diabetic foot in our nation present to the hospital at a very late stage and at a stage where salvage of toes, or even the limb is not feasible. Many factors like low socioeconomic status, social stigma and pathophysiological factors like neurological deficit, vascular compromise may be the cause for this neglect in managing diabetic foot.

**Method:** All cases of diabetic foot patient who present to the department of general surgery, who require major wound debridement and or toe, foot, below knee or above knee amputation are included in this study. Various factors leading to this neglected state is analyzed both as questionnaire and by investigating for neurovascular deficit, and other physiological factors. Questionnaire includes - Socioeconomic status – kuppasamy scale - Rural or urban population - awareness about diabetic complications including amputation/ raw area/ death. Pathophysiological conditions like - neurological deficit through nerve stimulation studies/ general examination of sensory motor functions of the lower limb - vascular compromise – venous and arterial doppler of both lower limbs - uncontrolled diabetes – diabetic status.

**Sample size** 200 cases were studied over 6 months period and the above parameters were analysed

**Conclusion: Based** on the data collected, we have observed that the incidence of elevated RBS at the time of admission and the number of patients with associated vascular compromise was statistically significant. Hence based on this study we can propose for a better control of diabetic and screening for vascular disease as a preventive step in treating diabetic foot without amputations

**Keywords:** diabetic foot, wound, amputation, neglected wound, peripheral vascular disease.

**Introduction**

The prevalence of diabetes worldwide is predicted to be 4.4% in the year 2030, with the total number of people with diabetes expected to rise from 171 million in 2000 to 366 million in 2030.[1] Studies show that 2.5% of diabetic patients develop diabetic foot (DF) ulcers each year and 15% develop DF ulcers during their lifetime.[2] The incidence of amputation in these cases are 10-30 times more than the normal patient.

DF is the main cause of nontraumatic lower extremity amputations [3] and precedes 85% of the cases.[4] DF lesions are a cause of significant mortality and morbidity

to the patient with significant social stigma attached to it. Hence a significant strain on the Socioeconomic burden of the patient and the healthcare [5,6]

The development of a foot ulcer is traditionally considered to result from a combination of peripheral vascular disease, peripheral neuropathy and infection.[7] More recently, some factors have been identified that are believed to increase the risk of amputation in these patients.

Early recognition and management of risk factors for foot complications may prevent amputations, especially of the major type and prevent other adverse outcomes.

In the West, various reports are available on the risk factors for complications of diabetes; the aim of identifying these risk factors being to develop strategies for avoiding the severely reduced quality of life following amputation.[9–13] In Iran, however, little data are available on the risk factors for amputation in DF.

The present study was undertaken to identify and quantify the risk factors for lower extremity amputation (toe or foot) in diabetic patients in Chennai, India

### **Study Methodology and Materials**

Study was conducted in the department of General Surgery, Stanley Medical College for a period of 6 months from April 2017 to September 2017. 200 cases of diabetic foot patients admitted who required major wound debridement and or amputation were included.

### **Inclusion Criteria**

- 1) Age criteria – 15 to 75 yrs of age
- 2) Gender – both male and female cases
- 3) Patients admitted with complains of Diabetic foot requiring amputation – toe amputation, ray amputation, forefoot amputation, below knee, through knee, above knee amputation.

- 4) Patients admitted with complains of Diabetic foot requiring wound debridement of atleast 5 cm<sup>2</sup> area or more.
- 5) The patient with the following co morbidities were also included –Diabetes mellitus, chronic kidney disease, peripheral vascular disease, coronary artery disease, previous history of cerebrovascular accidents, hyper cholesterolemia, hypertension, anemia.

### **Exclusion Criteria**

- 1) Patient with severe co morbidities unrelated to the diabetic foot like gastrointestinal pathologies, malignancies, fever of unknown origin, severe respiratory pathologies, associated collagen vascular disease.
- 2) Extremes of age <15 or >75 yrs of age.
- 3) Diabetic foot ulcers that did not require major amputation or wound debridement (of size less than 5 cm<sup>2</sup>), those that can be managed conservatively were not included.

**Type Of Study :** Prospective Observational Study

**Sample Size:** 200 cases (48 females and 152 males)

### **Study Method**

Various factors leading to this neglected state is analyzed both as questionnaire and by investigating for neurovascular deficit, and other physiological factors.

Questionnaire includes - Socioeconomic status – kuppusamy scale - Rural or urban population - awareness about diabetic complications including amputation/ raw area/ death. Awareness was assessed with standard questions as follows and scoring done out of 10.

Diabetes mellitus causes diabetic foot, causes ulcer, amputation, causes death. About treatment options for DM - drugs/ injection available. Regular checkup atleast once in a month. It Aggravates cva/ cad/ pvd. Does it require sugar/ carbohydrate restriction. Does he/she do

regular exercise for maintaining sugar levels. Private clinic/hospital attendance before admission to stanley. Seen a patient of diabetic foot/ ulcer.

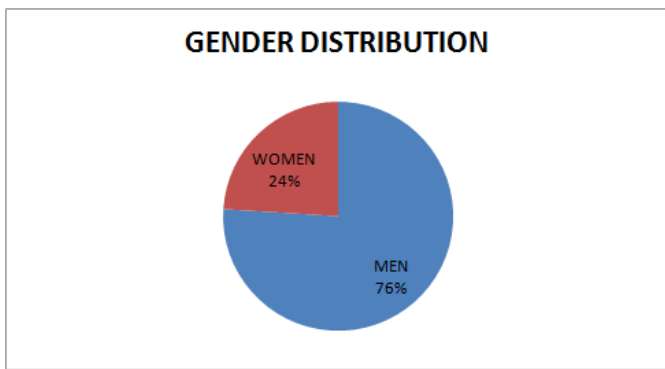
Pathphysiological changes in the patient due to diabetes like peripheral vasculopathies diagnosed with venous and arterial Doppler of the involved limb. Testing the sensory and motor functions of the limb. The diabetic status of the patient at the time of admission, the onset of the disease process and the time of presentation to the healthcare setup after the onset of the inciting incident.

**Results**

Based on the observational study the following results were obtained.

1. Gender – 24 % were females and 76 % were males

Figure 1- gender distribution.



2. Age distribution based on gender  
Males – 50 % more than 50 yrs of age

Figure 2 – age distribution in male

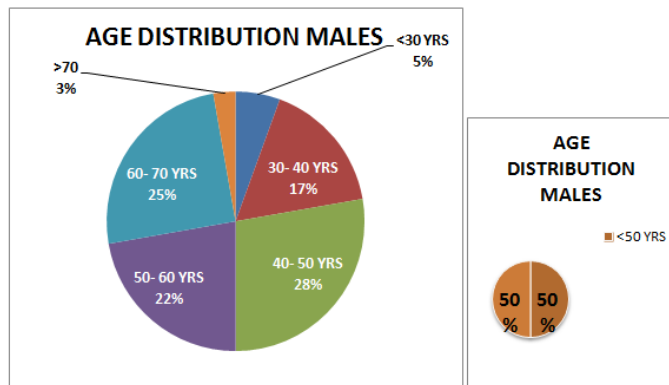
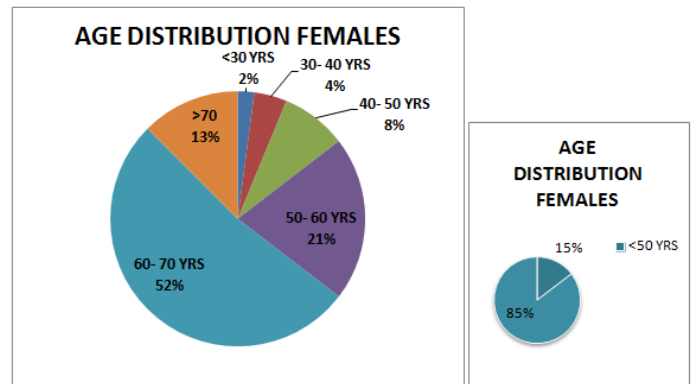
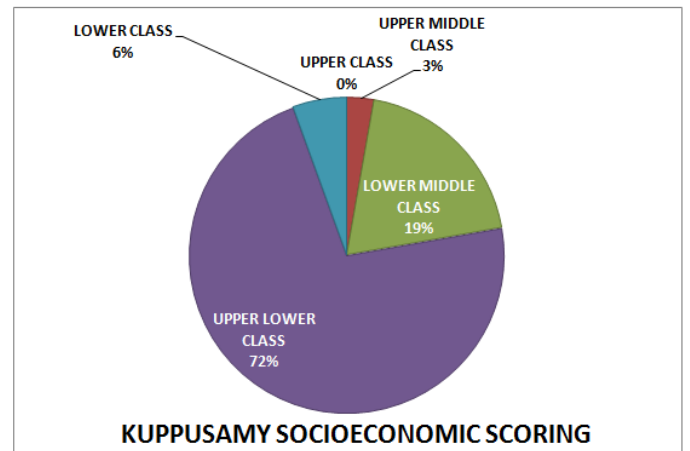


Figure 3 – age distribution in females.



**3. Socioeconomic Status**

Figure 4 – kuppusamy scoring scale distribution



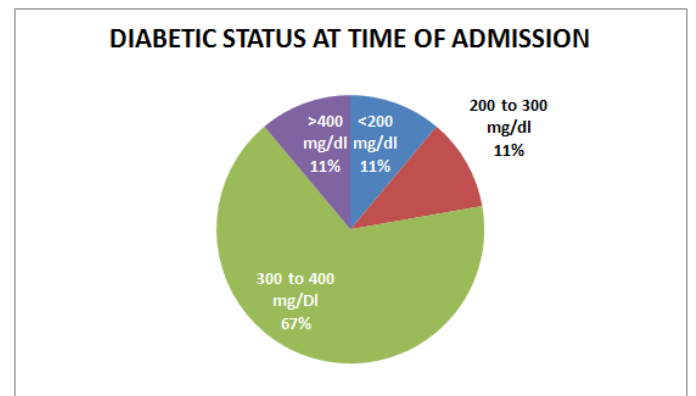
**4. Diabetic Status At The Time Of Admission**

11% of patients had RBS >400mg/dl

11% of patients had RBS>200mg/dl

67% had RBS>300mg/dl

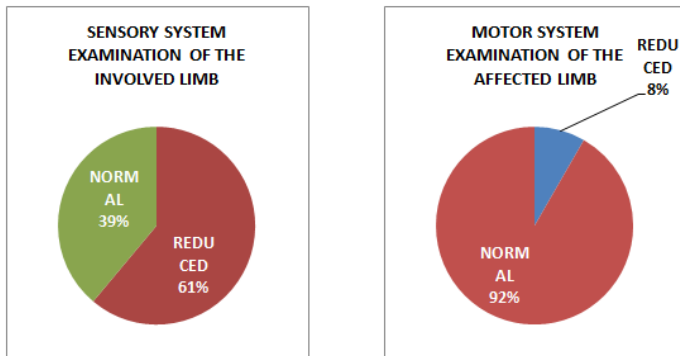
Figure 5 – diabetic status at the time of admission



### 5. Sensory and Motor status of the limb

Sensory modalities were reduced in 61% of the cases as opposed to 8 % of motor deficiencies in these patients

Figure 6 – sensory status      Figure 7 – motor status.

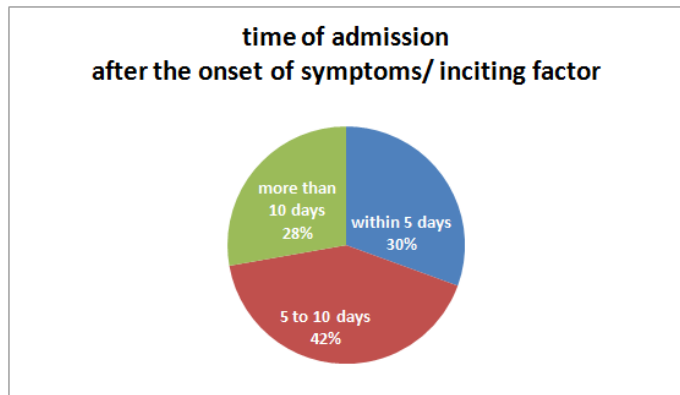


### 6. Time Of Admission After Onset Of Inciting Event:

It was observed that about 70 % of the patients came to the hospital seeking treatment only after 5 days of the event leading to diabetic foot.

Most common cause of DF (Diabetic Foot) was trivial trauma

Figure 8 – time duration after the inciting event leading to diabetic foot ulcer.



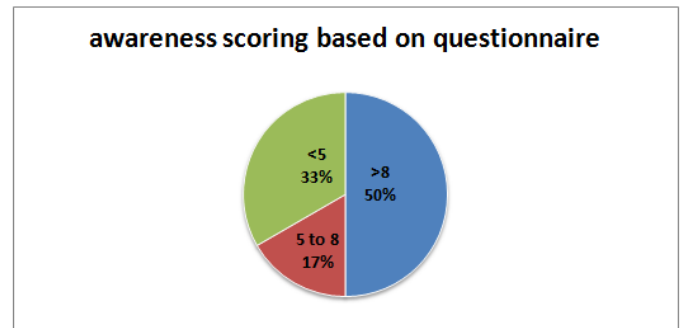
### 7. Arterial Pathology

It was observed that upto 63.88 % of the patients had complaints of arterial insufficiency as evidenced from arterial Doppler studies. Most common disease was diffuse atheromatous plaques in the tibioperoneal vessels.

All the affected patients had diffuse atheromatous changes with altered ABI, normal or more than 1.1

### 8. Diabetes Awareness Status

Figure 9 – Questionnaire to assess the awareness of the patient regarding diabetes and its complication.



### Discussion

As observed in other studies the above findings were confirmed in our hospital setup. Some interesting points to be noted includes

The higher incidence of diabetic foot in men. The females counterparts were generally older than the males. Most patients were from urban population and belonged to the upper lower class as per kuppusamy scoring. And their knowledge about diabetes and its complications were fair, yet most of the patients (70%) presented to the hospital only later than 5 days after onset of the disease which was mostly following trivial injury that was not attended to. The diabetic status of the patient at the time of admission was found to be more than 300mg/dl in 78% of the patients.

Based on these findings we can prevent the risk of amputation and major mutilating surgeries by maintaining strict glycemc control, early treatment for any injuries and proper foot care. And watch for arterial and venous diseases in all diabetic patients.

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