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Original Article

Clinical and microbiological profile of diabetic foot ulcer patients in a tertiary care hospital

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ABSTRACT

Aim: To evaluate the clinical and microbiological profile of diabetic foot ulcer patients admitted to a tertiary care hospital.
Methodology: This study recruited 120 diabetic foot ulcer patients of all grade. Their medical records were evaluated retrospectively.
Results: We found that median age of patient was 60(52, 67.75) years. 68.3% of patients were males. Median duration of diabetes mellitus was 15(10, 20) years. Mean HbA1C and fasting glucose was 10.3 ± 2.3 and 167.6 ± 52.42 respectively. Neuropathy (35%) and peripheral vascular disease (23.3%) was major micro vascular and macro vascular complication associated. Different locations of ulcers were toe (23.3%), sole (20%), dorsum (18.3%), shin (16.6%), heel (13.3%), and ankle (8.3%). Bacterial infection was seen in 81.66% patients out of which 23.3% had poly microbial infection.
Conclusion: Diabetic foot ulcer patient had poor blood glucose control with elevated HbA1C and fasting blood glucose level. Neuropathy and peripheral vascular disease, hypertension were major complications. *Staphylococcus aureus*, *Pseudomonas aeruginosa* were common infecting bacteria.

1. Introduction

The incidence of diabetes mellitus is increasing at an alarming rate along with the complications associated with it. The WHO has estimated that the global prevalence of diabetes has increased from 4.75% in 1980 to 8.5% in 2014 [1]. Diabetes mellitus is associated with several complications. Diabetic foot ulcer is one such complication which has a significant impact on the quality of life of the patient and on the associated health care burden. It is one of the common causes of morbidity, hospital admission and amputation among diabetics. In the clinical population of India, prevalence of diabetic foot ulcer is found to be 3.6% [2]. The approximate lifetime risk of a diabetic patient developing an ulcer is 25% [3,4]. As reported in a south Indian study, patients with diabetes spend 9.3% of their total income towards treatment whereas patients with diabetes and foot ulcer spent 32.3% of their total income towards treatment [5]. Hence diabetic foot ulcer can be considered as an economic and medical threat in health care system.

The treatment of diabetic foot ulcer includes multiple approaches. Hence studying about the profile of patients who develop foot ulcers, extent of the disease and the complications associated with it will help health care providers to plan better prevention programs and treatment strategies. Also clinical profile of a disease varies in different geographical area. Hence studying clinical profile of local population will help in better prevention and treatment of a disease. With the above background the present study was undertaken to evaluate the clinical and microbiological profile of diabetic foot ulcer patients.

2. Materials and methods

Institutional ethics committee permission was obtained for conduct of the study. Medical records of 120 diabetic patients with foot ulcer were retrieved and reviewed. Patients' demographic data, associated micro vascular and macro vascular complications,

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laboratory values like fasting blood glucose level, glycosylated hemoglobin level, duration of diabetes mellitus, location of ulcer and microbial infection details were noted down.

3. Results

Table 1 shows patient's demographic data, duration diabetes and laboratory values.

Graph 1 shows number of patients affected with micro vascular complications like neuropathy, nephropathy and retinopathy. All three micro vascular complication was present in 15%(18) patients.

Graph 2 shows the number of patients associated with macro vascular complications like coronary artery disease, cerebrovascular disease and peripheral vascular disease.

Hypertension, dementia, dyslipidemia and congestive heart failure were other important complications associated. Table 2 shows the no of patients affected with these complications.

Aerobic bacterial infection was seen in 81.66%(98) patients out of which 28.5%(28) patients had poly microbial infection. Table 3 shows different bacteria isolated from diabetic foot ulcer.

Graph 3 shows location of ulcer in patient's foot.

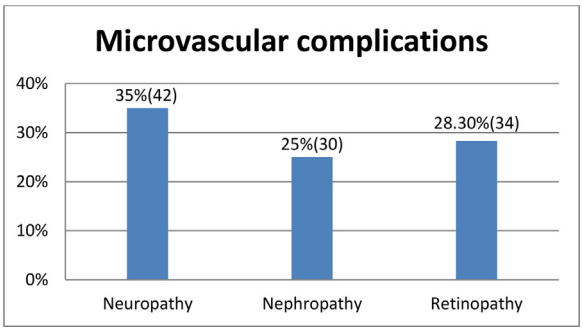
4. Discussion

Diabetic foot is one of the most common devastating complications among other chronic complications of diabetes mellitus. It is the leading cause of non traumatic amputation throughout the world [6]. There are multiple factors which lead to development of foot ulcer in diabetic patients which may even result in amputation if not treated.

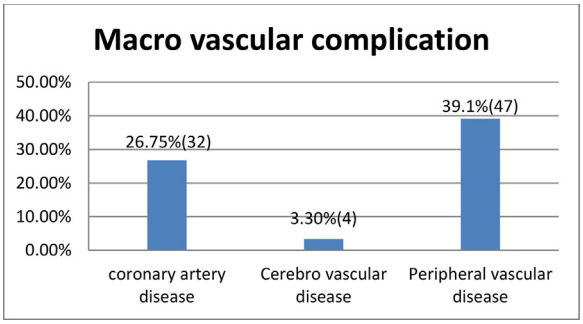
In our study we found that median age of patients was 60(52, 67.75). The proportion of diabetic foot ulcer varied between 1.7 and 3.3% in younger patients and 5 and 10% among older patients, which is similar to previous studies. Old age was considered one of the independent risk factors for the development of diabetic foot ulcer. Risk of ulceration increases two to four fold with age in diabetes [7,8].

Most of the earlier studies have shown a higher rate of diabetic foot among males. Similarly in our study more number of male patients (68%) had diabetic foot ulcer compared to females (32%). This may be because females have less severe neuropathy, increased joint mobility, low foot pressure and better propensity towards self-care compared to men. In addition males are more likely to be exposed to trauma and wear improper foot wear especially in the Indian scenario [9,10].

Another important common risk factor identified for the development of foot ulcer in diabetic patients is longer duration of diabetes mellitus and uncontrolled blood sugar level. In our study median duration of diabetes was 15 years (10, 17) and mean HbA1c and FBS was 10.3 ± 2.3% and 167.6 ± 52.42 mg/dl respectively. Longer the duration of diabetes, more is the micro and macro vascular complications associated with it which in turn



Graph 1. Micro vascular complications associated.



Graph 2. Macro vascular complications associated.

Table 2
Other important complications associated.

Complication	Percentage (N)
Hypertension	58.3%(70)
Dyslipidemia	15%(12)
Congestive heart failure	11.7%(14)
Dementia	5%(6)

Table 3
Bacteria Isolated.

Bacteria	Percentage (N)
Staphylococcus aureus	40.81%(40)
E. coli	34.69%(34)
Pseudomonas aeruginosa	30.61%(30)
Klebsiella species	12.63%(12)
Proteus species	5.10%(5)
Enterococcus species	5.10%(5)
Streptococcus	1.02%(1)

Table 1
Patients' demographic and other details.

Parameter	Value			
Median age (IQR) in years	60(52,67.75)			
Gender ratio% (n = 120)	Male		Female	
	68% (82)		32%(38)	
Median Duration of diabetes mellitus in years (IQR)	15(10,17)			
Mean $HbA_{1C} \pm SD$ (%)	10.3 ± 2.3			
Mean Fasting blood glucose ± SD(mg/dl)	167.6 ± 52.42			
Ulcer grade	Grade 1	Grade 2	Grade 3	Grade 4
	43.3%(52)	46.6%(56)	10%(12)	0

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