

Original Research Article

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Clinical presentation and outcome in diabetic foot cases: a prospective study in a tertiary care teaching hospital of Uttarakhand, India

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ABSTRACT

Background: Aim of study was to investigate the clinical presentation, management of soft tissue infection and their outcome in diabetic foot patients in a tertiary care teaching hospital.

Methods: A total of 106 patients with diabetic foot presented to General Surgery department of SGRRIMHS, Dehradun, were included in the present study. Grading of ulcers was done by using Wagener grading. Peripheral neuropathy was confirmed or ruled out using tuning fork (128 hz). The diagnosis of vascular insufficiency was made by palpating pedal pulses of the involved foot and/or by colour Doppler.

Results: Out of 106 patients, 87(82.7%) were male and 19 (17.92%) were female. Mean age of the patients was 56.04 ± 10.31 years, 40 (37.73%) were smoker, 62 (58.49%) were anaemic, 80 (75.47%) patients had poorly controlled diabetes and mean duration of diabetes was 8.2 years. The majority of ulcers belonged to grade 3 and grade 4, i.e. 50 (47.17%) and 30 (28.30%) respectively. 80 (75.47%) patients had peripheral neuropathy and 67 (63.20%) had arteriopathy. 17 (16.03%) patients required only dressings, while 89(83.97%) needed surgical interventions.

Conclusions: In the present study, most of the patients presented with diabetic foot were treated by surgical intervention.

Keywords: Diabetic foot, Management, Outcome, Soft tissue infection

INTRODUCTION

The prevalence of diabetes worldwide was estimated to be 2.8% in 2000 and is projected 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 Approximately 42 million cases are reported in India and India is ranked first in the list of the ten nations most affected with diabetes.^{2,3} Among diabetes mellitus related complications; approximately 15% of diabetic patients during their life time are affected by foot ulceration (one of the most common complication of diabetes).³ Among non-traumatic lower extremity amputations, diabetic foot (DF) is the main cause, and precedes 85% of the cases.^{4,5} The development of a foot

ulcer is the cumulation of a combination of peripheral vascular disease, peripheral neuropathy and infection.⁶ Aim of this study was to know the clinical presentation of soft tissue infections, their management and outcomes in diabetic foot.

METHODS

The present study was conducted in the Department of General Surgery, Shri Guru Ram Rai Institute of Medical and Health Sciences, Dehradun over a period of 12 months and a total of 106 patients, having diabetic foot were included in the study. Patients with chronic foot ulcers due to disorder other than Diabetes mellitus were excluded.

Patients, presenting with diabetic foot; the surrounding tissue were examined for presence of blisters, cellulitis, erythema, abscess, gangrene, sinuses. After admission a detailed clinical history of the patient was recorded including their age, gender, history of smoking, duration and type of diabetes, with a special emphasis on ulcer and its characteristics.

Ulcers were inspected for slough, any discharge, foul smell, bullae. Grading of ulcers was done using Wagener grading. Peripheral neuropathy was confirmed or ruled out using tuning fork (128 hz). The diagnosis of vascular insufficiency was made if both, weak or absent pedal pulses of the involved foot and/or colour Doppler suggestive of vascular insufficiency. Patients with hemoglobin <12gm/dl (WHO recommended) is considered as anemic. American Diabetes Association (ADA) criteria for diagnosing good/bad diabetes control was used (glycosylated Hb <7.0% considered as cut-off levels for good glycemic control).

RESULTS

The present study had a total of 106 patients, 87(82.7%) were male and 19(17.92%) were female. Maximum number of patients 41(38.73%) belongs to 51-60 years of age group, with mean age of 56.04 ± 10.31 years. Mean duration of diabetes was 8.2 years. 40(37.74%) patients were smoker and 66(62.26%) were non-smoker, 62(58.49%) patients were found to be anemic and 80(75.47%) patients had poorly controlled diabetes (Table 1).

Table1: Base line characteristics.

Parameter	Number (%)
Mean age (in years \pm SDEV)	56.04 ± 10.31
Male:female	87:19(4.58:1)
Smoker:non-smoker	40:66(1:1.65)
Average duration of diabetes (in years)	8.2
Poorly controlled diabetes	80(75.47%)
Anemia	62(58.49%)
Extent of infection	Up to the mid-thigh Up to the leg Only in foot
	8(7.55%) 7(6.60%) 91(85.85%)

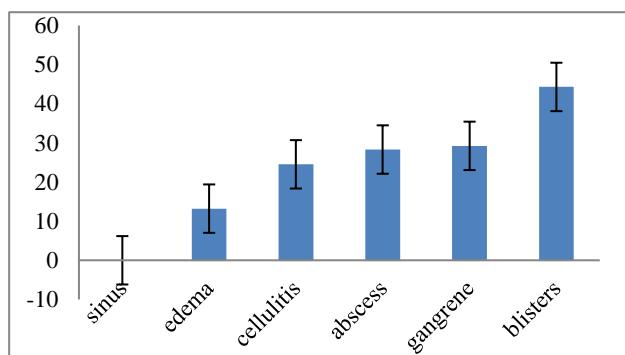


Figure 1: Clinical features at presentation.

8(7.55%) patients have spreading infection, which was present up to mid-thigh, in 7(6.60%) patients, infection was present up to the leg only and not extending beyond the knee, and the remaining 91(85.85%) patients had infection in foot only. In 39(36.79%) patients dorsum of foot was involved, in 58(54.71%) patients planter surface was involved and in 9(8.49%) patients both surfaces were involved. Clinical features associated to diabetic foot were edema 14(13.20%), cellulitis 26(24.52%), blisters 47(44.33%), abscess 30(28.30%), gangrene 31(29.24%), and sinus was not present in any case (Figure 1).

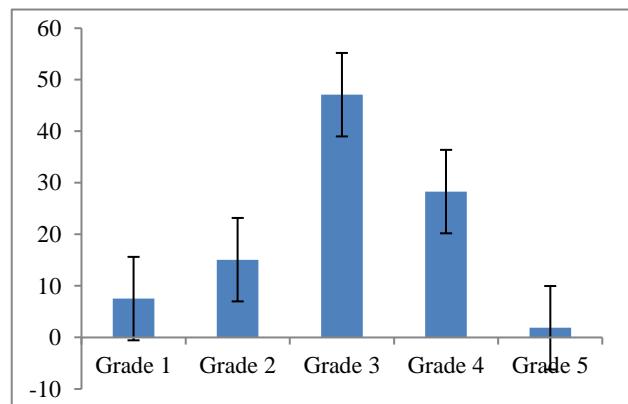


Figure 2: Ulcer grading according to Wagner grade.

The majority of ulcers belonged to grade 3 and grade 4 of Wagener grade, i.e. 50(47.17%) and 30(28.30%) respectively (Figure 2). 58(54.72%) ulcers had slough, 38(35.85%) had foul smelling discharge and 10(9.43%) patients had healthy granulation (Figure 3).

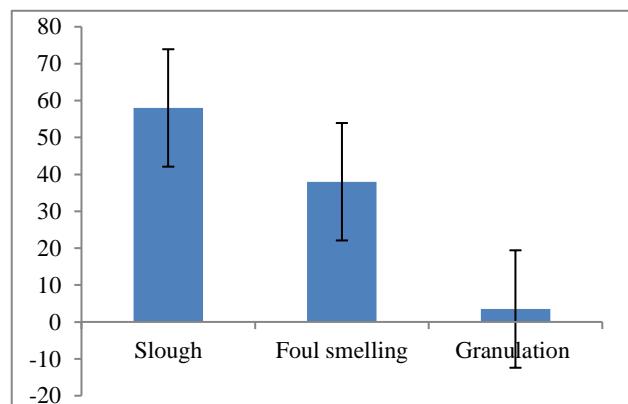


Figure 3: Ulcer characteristics at presentation.

In present study, total 30(28.30%) patients had x-ray findings suggestive of osteomyelitis, 80(75.47%) patients had peripheral neuropathy and 67(63.20%) patients had arteriopathy. 17(16.03%) patients required only dressings, while 89(83.97%) needed surgical interventions in form of; abscess drainage, debridement, bone curettage, amputations, grafting, flap coverage (Figure 4).

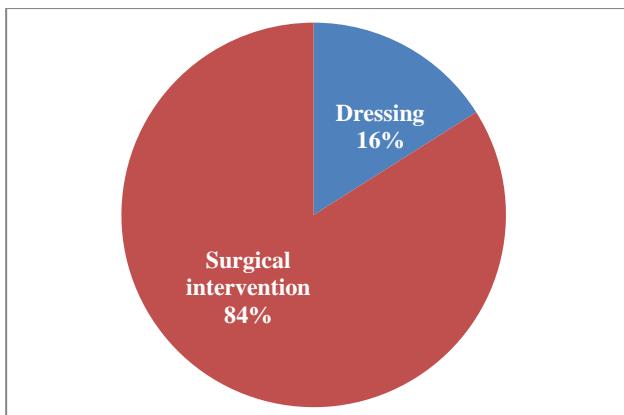


Figure 4: Treatment modalities.

DISCUSSION

The present study included 106 patients admitted with diabetic foot. In present study 87(82.07%) patients were male and 19(17.92%) were female. A previous study conducted by Ravisekhar G, shows male predominance (85%), which correlates with present study.⁸ The greater percentage of males in this study may be either due to males selectively presenting to health services or due to males being more exposed to foot trauma in the outdoors. In present study maximum number of patients (38.73%) was in 51-60 years of age group and the mean age was 56.04 ± 10.31 years, which correlates with the previous studies, showed mean age of 53.9 ± 12.1 , 59.3 ± 11.2 and 56 ± 28.2 years respectively.⁸⁻¹¹ This implying that foot infections are more common in elderly. In another study the maximum numbers of patients were in the age group of 60-65 years, which is in contrast with the present study.¹² The reason for this discrepancy could be due to comparatively younger people being involved in manual work in the hills. In present study 37.74% patients were smoker, which is in collaboration with earlier study conducted by Yerat and Rangaswamy et al, in which smokers were 30.76%.¹³ This indicates that a set of population which presented to a tertiary care hospital of Uttarakhand was more habitual smokers. Measurement of glycosylated haemoglobin (HbA1c) is the standard method for assessing long term glycemic control.¹⁴ Patients with satisfactory glycemic control were defined as those having glycosylated hemoglobin of less than 7 at admission. The complications are influenced not only by duration of diabetes but also by the average level of chronic hyperglycemia, which is measured most reliably with the glycosylated hemoglobin assay.^{15,16} In present study 75.47% patients had poorly controlled diabetes i.e., majority of patients had long term uncontrolled hyperglycaemia. This is higher than the earlier studies conducted by Bansal Ekta et al, and Nahid Rouhipour et al, which shows 64% and 62.9% patients had poor glycemic control respectively.^{17,18} The higher percentage of uncontrolled diabetics may due to illiteracy, lack of awareness, poor health services in remote areas and poverty. Anemia is a common accompaniment to diabetes, in present study 58.49% patients were found to

be anemic, our result correlates with the studies conducted by Wright JA et al and Sinha Babu A et al, according to which 59.3% and 55% diabetic patients were classified as anaemic respectively.¹⁹⁻²¹ At the time of admission patients had associated clinical features like cellulitis, erythema, bullae, abscess and gangrene. Clinical features associated to diabetic foot were edema (13.20%), cellulitis (24.52%), blisters (44.33%), abscess (28.30%), gangrene (29.24%), and sinus was not present in any case. In present study majority of ulcers belonged to grade 3 and grade 4 of Wagener grade, i.e. 47.17% and 28.30% respectively. The reason may be the lack of awareness among patients about foot hygiene, injuries and delayed presentation in the hospital. These findings in accordance with study conducted by Bansal Ekta et al, and in contrast to the study by Yerat and Rangaswamy et al, in which majority of patients had grade 4 ulcers.^{13,17}

Diabetic neuropathy is one of the most common complications of diabetes and may be the first presenting feature.¹⁹ In present study 80(75.47%) patients had peripheral neuropathy, which is in accordance with earlier studies conducted by Ekta B et al and Ravisekhar G et al, showed peripheral neuropathy in 76% and 86.2% patients with diabetic foot patients respectively.^{8,17} Diabetic arteriopathy is another complication of chronic uncontrolled diabetes. In present study 67(63.20%) patients had diabetic arteriopathy, in earlier studies by Ekta B et al and Ravisekhar G et al, arteriopathy was present in 57% and 85.2% patients respectively.^{8,17} The discrepancy in the result by Ravisekhar G et al, may be due to longer duration of diabetes i.e. 11.8 years; while in this study mean duration was 8.2 years. In present study; ulcer was examined for presence of necrotic tissue, ulcer discharge and presence of granulation, 54.72% ulcers had slough, 35.85% had foul smelling discharge and only 9.43% patients had healthy granulation. Our findings in contrast with previous study by Ravisekhar G et al, which shows necrotic ulcers in 23.8% cases. The cause may be lack of awareness toward foot care and delayed presentation in the hospital.⁸ In present study, total 30(28.30%) patients had x-ray findings suggestive of osteomyelitis. These finding correlate to a previous study, in which 25.6% foot x-ray had finding of osteomyelitis.²² But in contrast to the study conducted by Oyibo et al, showed only 5.4% patients had osteomyelitis based on x-ray findings.²³ The cause may be that in present study most of the ulcers were in grade 3 and grade 4 and the patients are not aware of the consequences and presented in hospital with complications, which may increase the chances of development of osteomyelitis. Diabetic foot ulcers treatment requires infection and wound management; this can be achieved by dressings, surgical interventions and appropriate antibiotic. In present study 16.03% required only dressing, while 83.97% needed surgical intervention. This is in accordance with the study conducted by Ravisekhar G et al, in which 71.2% patient required surgical interventions.⁸

CONCLUSION

The findings of present study showed that majority of the diabetic foot patients are male, more than 50 years of age with uncontrolled diabetes. According to Wagner's grade maximum numbers of patients are in grade 3 and grade 4. Most of the patients required surgical intervention.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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