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A Study of Clinicopathological Status and Various Modalities of Treatment for Diabetic Foot

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Abstract:
Background*:-The purpose of this study is to assess the diverse presentations of diabetic foot, to evaluate the role of various surgical interventions like debridement, minor/major amputation and to advocate prophylactic measures for prevention of diabetic foot.*
METHOD*- Study and data analysis were conducted over the period of 1 year from August 2020 to August 2021. All diabetics presenting to the Department of Surgery in our institute with complains of lesions in foot were included in the study.*
RESULTS- *In our study, the minimum age was 40 years and the maximum age was 80 years with mean age and standard deviation being 58.02 ± 10.84 years with males more prone to develop diabetic foot than females. Most of the patients in the study presented with history of trauma (minor trauma like shoe bite, self-treatment of corn) with Grade II lesion (according to Wegner's classification) most prevalent and majority of them were treated surgically with debridement and I & D (incision & drainage) than amputation.*
CONCLUSION*- We concluded by our observation that diabetic foot mainly manifests in patients with age more than 50 years with male preponderance. Patient mortality and morbidity can be reduced by prophylactic foot care, sugar control, proper surgical treatment, regular follow- up of high risk patient, suitable administration of antibiotics.*
Key Word*: Diabetic Foot, debridement, random blood sugar, necrosis, amputation*

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I. Introduction

Diabetes Mellitus is one such common condition with a varied clinical spectrum of presentation to physicians and surgeons alike. Many of the patients in India still today are admitted in the hospitals with the life threatening complications of diabetes because of ignorance regarding disease and still lacking health facilities. Prevalence of diabetes in India is around 8% (according to WHO, 2010). [1] Diabetic foot is one of the most common causes of ulcers which if proper prevention is taken could be avoided. According to the World Health Organization and the International Working Group on Diabetic Foot, diabetic foot is defined as the foot of diabetic patients with ulceration, infection and/or destruction of the deep tissues, associated with neurological abnormalities and various degrees of peripheral vascular disease in the lower limb. [2] It is the most common complication of diabetic patients and with positive approach , morbidity and mortality due to diabetic foot problems can definitely be reduced. The aims of the our study were to assess the diverse presentations of diabetic foot like ulceration, resistant deep infections, severe ischemia leading to gangrene, to evaluate the role of various surgical interventions like debridement, minor/major amputations in the management of diabetic foot and to promote prophylactic measures for prevention of diabetic foot by educating patients about diabetic foot.

II. Material And Methods

The descriptive observational study was conducted in the department of general surgery, GMERS-Patan over the period of 1 year from August 2020 to August 2021 after ethical clearance from institution's ethical committee and data were collected using predesigned Performa. Total 30 diabetic patients presenting to the Department of Surgery in our institute with complains of lesions in foot were included in the study.

Patients included in our study were patients with Diabetes mellitus with lesions of foot i.e. ulcer, blister, cellulites, abscess and gangrene presenting to the department of Surgery at our institute, patients aged more than 40 years with diabetic foot ulcer, all patients who gave consent for the undertaken study.

Patients excluded from our study were patients with chronic foot ulcers due to cause other than DM such as traumatic, arterial, venous, trophic, TB, syphilitic, malignant ulcer, patients with severe medical illness, too old and the patients unfit for surgery, congenital skin disorder which affects keratinocytes, elastin, or collagen. At risk of keloid or hypertrophic scar formation, patients receiving corticosteroids, immunosuppressive agents, radiation or chemotherapy are also excluded, X-ray showing osteomyelitis, doppler showing gross Atherosclerotic arterial changes and venous abnormalities like varicosities.

Study Design: Prospective open label observational study
Study Location: This was a tertiary care teaching hospital based study done in Department of General surgery, at gmers, dharpur-patan, Gujarat.

Study Duration: August 2020 to August 2021.
Sample size: 30 patients.
Sample size calculation: The sample size was estimated on the basis of a single proportion design. The target population from which we randomly selected our sample was considered 2000. We assumed that the confidence interval of 10% and confidencelevel of 95%.

Inclusion criteria:
1. Diabetic patients (fasting blood glucose ≥ 126 mg/dL [7.0mmol/L])
2. Either sex
3. Aged between 40 to 80 years.
4. Patients with Diabetes mellitus with lesions of foot i.e. ulcer, blister, cellulites, abscess and gangrene
5. Patients ready to give conscent to take part in study.

Exclusion criteria:
1. Pregnant women;
2. Patients with genetic disorders
3. Patients on other concurrent lipid lowering agents such as bile acid sequest
4. rants (cholestyramine, colesevelam), niacin, ezetimibe, fenofibrate and/or omega 3.
5. Patients with previous history of angina, severe vascular disease, or other life threatening disease.
6. Patients with nephropathy and/or hypothyroidism, active liver disease, bile duct problems, or ALT > 3 × ULN.
7. Patients with creatine kinase levels > 10 × ULN.
8. Patients taking concurrent corticosteroids, ciclosporin, and/or hormone replacement therapy.
9. Patients who are physically inactive.
10. Patients with a history of drug or alcohol abuse.

III. Result

Foot infections are the most common problems in persons with diabetes. These individuals are predisposed to foot infections because of a compromised vascular supply secondary to diabetes. Local trauma and/or pressure (often in association with lack of sensation because of neuropathy), in addition to microvascular disease, may result in various diabetic foot infections that run the spectrum from simple, superficial cellulitis to chronic osteomyelitis.[3,4,5]

The prevalence of diabetic foot ulcers amongst diabetic patients at tertiary care hospital of North Gujarat was 3.9% which is comparable to studies in Kenya and South Africa. Studies in Netherlands and Iran found high prevalence of 20.0% and 20.4% respectively.[6,7] These differences in prevalence may be a reflection of regional variations in prevalence of diabetes mellitus and the local operating risk factors of diabetic foot ulcer disease. High prevalence of DFUs in developing countries like Tanzania is due to illiteracy, poor socioeconomic status, bare-foot walking and inadequate facilities for diabetes care.[7]

The observational study comprised of 30 cases of diabetic foot lesion admitted to the surgical wards of our institute.

Table no.1: Age Distribution

Age Groups (years)	**percentage**	**Tanzanian diabetic foot study (2011)**
20-30	0.00%	--
30-40	5.0%	1.5%
40-50	13.3%	36.8%
50-60	36.7%	44.1%

60-70	30%	8.3%
.>70	15%	9.3%

In our study, the minimum age was 40 years and the maximum age was 80 years with mean age and standard deviation being 58.02 ± 10.84 years. The above table shows that in our study maximum number the of patients were in 50-69 years age group comparable to Tanzanian foot study affected patients age group was 40-59 years.

Table no.2: Gender wise Distribution

Gender	Percentage	Tanzanian Diabetic Foot study (2011)	Arun Anand et al (2016)
Male	73.3%	54.4%	78%
Female	26.7%	45.6%	22%

As per the observation of our study, male are more prone to develop diabetic foot same as was observed in Tanzanian study and Arun Anand *et al* study.

Most of the patients in the present study (21 patients 70%) presented with history of trauma (minor trauma like shoe bite/self- treatment of corn) and this is comparable with the study conducted by Arun Anand et al from india, where trauma was the main precipitating factor accounting 62%.

The reason for this male predominance and trauma in Indian subcontinent, is the habit of bare foot walking and predominantly rural background may contribute to trauma leading to ulcers. Indians also sit with legs crossed for long hours of work or worship leading to repetitive, prolonged pressure over lateral malleolar areas, leading to bursae and dark hypertrophied skin, which can ulcerate and cause infection.

Table no.3:comparision of grading of wound

Grade of wound	Percentage	Tanzanian Diabetic Foot study (2011)	Arun Anand et al (2016)
Ⅰ	3.3%	4.4%	16%
Ⅱ	71.7%	20.6%	14%
Ⅲ	10%	22.2%	48%
Ⅳ	10%	29.4%	14%
Ⅴ	5%	23.5%	8.0%

According to Wegner's classification, Grade II lesion was most prevalent i e. 71.67%. Patients with gangrenous diabetic foot (Grade ≥ IV) were approximately 15.00% while in Tanzanian study, most of the patients presented to surgical department with advanced disease (Grade IV or V). This may be because of early detection and medical care of the diabetic foot in our study than in the patients of the Tanzanian study. In a study of Arun Anand et al, most of the patients(48%) presented with grade III disease while only 22% presented with advanced disease (Grade IV or V).

Most of the patients in our study were treated surgically (debridement and I&D) approximately (40%). In Tanzanian study, rate of lower limb amputation was higher i.e. 56.7%. This is attributed to the late presentation and severity of the disease on presentation (Grade ≥ IV). This may be attributed to the larger number of patients with Grade II lesions in our study which were treated surgically and there was low rate of amputation because of easy availability of health facilities and better knowledge about diabetic foot care.

IV. Conclusion

We concluded that patients having longer duration of DM , aged > 50 years , with no formal education presented with either grade III or IV lesions , responded better to early surgical interventions like amputation/ debridement followed by skin grafting while patients <50 years of age with primary education and a shorter / newly diagnosed DM presented early due to awareness about foot care with grade II lesions and were managed conservatively with betadine / placental extract / eusol solutions with shorter duration of hospital stay. Patient mortality and morbidity can be reduced by prophylactic foot care, sugar control, proper surgical treatment, regular follow-up of high risk patient, suitable administration of antibiotics (according to culture and sensitivity).

Education is an important factor for the diabetic patients. Education is usually seen as the key to better health as it facilitates an individual to better utilize health information and treatment. Larger number of patients with Grade II lesions in our study which were treated surgically and there was low rate of amputation because of easy availability of health facilities and better knowledge about diabetic foot care.

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