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A clinical study of diabetic foot to determine its common clinical presentations

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Abstract
Background and Objectives: The Diabetic foot is one of the most feared complications of diabetes, with prolonged duration of hospitalization, high expenses and eventuality of amputation of the limb, with high morbidity. Foot disorders are a major cause of morbidity leading to a very prolonged, expensive treatment to the patient and hence in places like India where we have very limited options for treatment of diabetic foot and most of the them lead to eventual amputation of the foot in various degrees leaving the patient in a very depressive, helpless state of disability. Hence I have decided to undertake this study to determine the various clinical aspects of diabetic foot as it has numerous ways of presentation and evaluation of various treatment protocols employed to treat diabetic foot as in a country like India where treatment options like amputation does not look very feasible due to the functional prosthesis being not available or very high priced also the prosthesis are most of the times very uncomfortable to patients.
Methods: A total of 50 subjects were enrolled in the study as per the inclusion and exclusion criteria. A written and informed consent of the patient was obtained and followed by detailed history and examination including the signs, symptoms and complications of the disease and also evaluation of outcome of various treatments was done. At the end counseling related to prevention of development or retarding the progression of the disease was done to all the patients.
Results: To summarize, the diabetic foot in my study has presented as the clinical profile as most patients being males; age at presentation between 50-60 yrs.; Most common presenting as an ulcer; most common on the dorsal aspect of the foot; Most common secondary to some trauma; most patients were already suffering from diabetes for 1-5 yrs.; Most common causative organism isolated from the culture swab was Staphylococcus Aureus; average HbA1c was less than 7 (6.7); Average stay of the patients in the hospital was 20 days; Most of the patients did not have any complications of diabetes like Osteomyelitis, peripheral neuropathy and peripheral vascular disease; for most of the patients the treatment protocol used for the management was surgical debridement followed by sterile dressings.

Keywords: Diabetic foot, complications, diabetes

Introduction
Foot disorders are a major source of morbidity and a leading cause of hospitalization for persons with diabetes. Ulceration, infection, gangrene, and amputation are significant complications of the disease, estimated to cost millions of rupees each year. Although not all diabetic foot disorders can be prevented, it is possible to effect dramatic reductions in their incidence and morbidity through appropriate prevention and management protocols.
Hence this study has been undertaken to evaluate the various modes of clinical presentation of diabetic foot ulcer and to evaluate the outcome of various treatment strategies, aiming to save the affected foot and provide the patient a functional walkable foot, as amputation does not appear to practical solution for management of diabetic foot in a country like India, where good prosthetic facilities are either not available or not affordable.

Materials and Methods
The study was initiated after obtaining permission from the Institutional Ethics Committee

- **Study design:** Prospective type of observational Study of 50 patients with various modes of clinical presentation of diabetic foot and their management.
- **Study Site:** This study was conducted in the Department of Surgery at Dr. DY Patil School of Medicine, Hospital and Research Centre, Nerul, Navi Mumbai.

- **Study Population:** In India as per study of National Urban Diabetes, diabetes mellitus prevalence is 16% and diabetic foot prevalence is 15%.
- **Study duration:** The study was conducted over a period of 3 years from 2016 to 2019.
- **Sample size:** 50 patients were enrolled in the study.

Study Selection Criteria

Inclusion Criteria

1. Patient aged 18 years and above.
2. Any known diabetic patient with chronic foot and leg ulcers.
3. Any known diabetic patient with Cellulites, Osteomyelitis, blisters, gangrene of lower limb.
4. Patients with all the above clinical presentations diagnosed as diabetic, after admission.
5. (Fasting blood sugar more than 140 mg/dl, 2 hr Postprandial more than 200 mg/dl, HbA1c- more than 6.5).

Exclusion Criteria

1. Patient aged below 18 years.
2. Patients with chronic foot and leg ulcers due to cause which are other than diabetes.
3. Cellulites, Osteomyelitis, blisters, gangrene of lower limb due to causes other than diabetes.
4. Patients suffering from severe systemic medical illnesses.

Results

Table 1: Age Distribution of Patients

Age (years)	No. of Cases	Percentage (%)
30-40	5	10
41-50	6	12
51-60	20	40
61-70	14	28
71-80	5	10
Total	50	100

Table 2: Sex Distribution of Patients

Sex	Patients	Percentage
Male	37	74%
Female	13	26%

Table 3: Mode of Clinical Presentation of Diabetic Foot

Mode of Clinical presentation	No. of cases	Percentage
Ulcer	22	44
Cellulites	13	26
Gangrene	7	14
Cellulites with ulcer	8	16

Table 4: History of Trauma in Diabetic Foot Patients

History of trauma	No. of Patients	Percentage
Present	32	64
Absent	18	36
Total	50	100

Table 5: Site of Lesion in Diabetic Foot Patients

Site of lesion	No. of patients	Percentage
Dorsum of foot	19	38
Toes	14	28
Sole of foot	5	10
Lateral aspect of foot	7	14
Medial aspect of foot	5	10
Total	50	100

Table 6: Duration of Diabetes Mellitus in Patients

Duration of diabetes mellitus	No. of patients	Percentage
On admission	9	18
Less than 1 year	10	20
1-5 years	19	38
6-10 years	10	20
11-15 years	2	4
Total	50	100

Table 7: Presence of Osteomyelitis in Diabetic Foot Patients

	No. of patients	Percentage
Osteomyelitis	6	12
Normal	44	88
Total	50	100

Table 8: Peripheral Neuropathy in Diabetic Foot Patients

Peripheral neuropathy	No. of patients	Percentage
Present	22	44
Absent	28	56
Total	50	100

Table 9: Peripheral Vascular Disease in Diabetic Foot Patients

Peripheral vascular disease	No. of patients	Percentage
Present	5	10
Absent	45	90
Total	50	100

Table 10: Causative Organisms in Diabetic Foot Infections

Causative organisms	No. of patients	Percentage
Staph. aureus	28	56
Pseudomonas	6	12
Proteus	5	10
Klebsiella	4	8
E. coli	3	6
No growth	4	8
Total	50	100

Table 11: Surgical Treatments Used for Diabetic Foot

Surgical treatment	No. of patients	Percentage
Only dressing	4	8
Debridement	32	64
Debridement with Skin grafting	6	12
Disarticulation of toe (s)	3	6
Amputation	5	10
Total	50	100

Table 12: Glycosylated Hemoglobin Levels (HbA1c) in Patients

Glycosylated Hb	No. of patients	Percentage
Less than 7 mg %	33	66
More than 7 mg %	17	34
Total	50	100

Table 13: Hospital Stay Duration of Diabetic Foot Patients

Hospital Stay (days)	No. of patients	Percentage
1-20	30	60
21-40	15	30
41-60	5	10
Total	50	100

To summarize, the diabetic foot in my study has presented as the clinical profile (taking most common of all the studied aspect) as:

Table 14: Summary of Most Common Clinical Profile of Diabetic Foot Patients

Age	**50-60 Yrs**
Sex	Male
Mode of Clinical Presentation	Ulcer
History of Trauma	Present
Site of Lesion	Dorsum Of Foot
Duration of Diabetes mellitus	1-5 yrs.
Osteomyelitis	Absent
Peripheral Neuropathy	Absent
Peripheral	Absent
Causative Organism	Staphylococcus Aureus
Surgical Treatment	Debridement
Hba1c	Less Than 7 (6.7) Mg %
Duration of Stay	20 Days

Discussion

The study was very useful in studying the changing trends in the presentation of the diabetic foot and also which all treatment protocols were necessary to manage the condition.

The patients with diabetes mellitus are often likely to face complications such as ulceration, cellulitis, infection, gangrene, and lower extremity amputations. These complications oftenly result in extensive morbidity, repeated hospitalizations and mortality.

They take a tremendous toll on the patient's mental and physical well-being as well as impose a enormous economic burden, placing a financial drain on the health care system by frequently removing the patient from the workforce.

Diabetic foot ulcers are more common in Neuropathy, infections and ischaemia. The commonest organism isolated from foot ulcers culture swabs is Staphylococcus aureus.

The male agriculturists are more common in developing ulcers in Diabetic foot. The patients are most common of middle aged group. Most commonly presention is as ulcers over dorsum of foot. Mostly Trauma is the precipitating factor.

Thorough surgical debridement is useful followed by sterile dressings with povidone iodine solution, hydrogen peroxide, normal saline, hydrocolloid gels and VAC dressings ensures good results.

All diabetic foot complications can’t be prevented, but it is not impossible to dramatically reduce their incidence with appropriate management and prevention strategies. Such prevention strategies can reduce the incidence of foot ulceration through modification of self-care practices, formulation of treatment protocols aimed at early intervention, appropriate evaluation of risk factors, limb preservation, and prevention of development new lesions.

Conclusion

This study underscores the significant morbidity linked to diabetic foot complications, particularly in Indian patients. Most cases involved middle-aged males with ulcers from trauma, primarily managed through surgical debridement. With a favorable average HbA1c, the low incidence of severe complications suggests effective treatment outcomes. Enhanced patient education and structured prevention strategies are crucial for reducing the incidence of foot complications, improving quality of life, and alleviating the economic burden on healthcare systems. While complete prevention may be unattainable, timely management can save limbs and improve patient outcomes.

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