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Original Research Article

A Hospital-Based Observational Study Evaluating Clinical Profile and Outcome of Diabetic Foot

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Abstract

Aim: The study aims to find out the clinical profile and outcomes of patients with diabetic foot infections (DFI).

Methods: This prospective observational study was conducted at the Department of Surgery, Darbhanga Medical College and Hospital, Darbhanga, Bihar, India. 100 patients with diabetes attending general surgery ward for diabetic foot ulcer management at Dmch Department of General Surgery, Darbhanga Medical College and Hospital, Darbhanga, Bihar, India were included during the study period for the period of 8 months

Results: 100 patients were diagnosed as diabetic foot. In diabetic foot, the age of patients ranged from 19 to 80 years. 20 (20%) patients were between 21 to 40 years; 42 (42%) patients were between 41 to 60 years and 38 (38%) patients were above 60 years. Out of 100 patients with diabetic foot, 90 patients were treated by debridement, in which 35 patients had deranged lipid profile and 55 had normal lipid profile. Out of 100 patients with diabetic foot, 10 patients were treated by amputation, out of which 8 patients had deranged lipid profile and 2 had normal lipid profile. Patients with deranged lipid profile had increased chances of amputation. The hospital stay and serum creatinine values were significantly higher in patients with HbA1c>8.5. Out of 100 patients with diabetic foot; 30 (30%) patients had pseudomonas; 24 (24%) patients had E. Coli; 22 (22%) patients had Klebsiella; 21 (21%) patients had staphylococci and 3 (3%) patients had no growth on aerobic culture media.

Conclusion: Diabetic foot pathologies are common in diabetics and pose serious health problems for developing countries. They seem to affect both sexes equally. The present study highlighted the significance of patients with DFU in tertiary care hospital in India context where diabetes is poorly controlled, there was also little awareness for foot care and delay in seeking treatment, as this will worsens the extent of tissue destruction.

Keywords: Diabetic Foot, Clinical Profile, Amputation

Introduction

Diabetes is one of the most prevalent chronic diseases: in 2010, one study reported that 285 million adults worldwide had diabetes and this figure is projected to rise to 439 milion by the year 2030. [1] Such a profound demographic shift is likely to yield a corresponding increase in the prevalence of diabetes chronic complications, including those in the lower extremity, the diabetic foot. [2] It is estimated that the annual population-based incidence of a diabetic foot ulcer (DFU) ranges from 1.0% to 4.1%. The lifetime incidence may be as high as 25%. [3] Despite the efforts of conservative therapy, there will always be a percentage of ulcers that necessitate hospitalization. These cases may require surgical debridement, resection of distal osseus and soft tissue structure, endovascular intervention, daily dressings, strict glycemic control, and intravenous antibiotic therapy for eradication of infection. [4,5] Foot problems in diabetics can frequently be life or limb threatening, yet have not received the same level of attention as other diabetes complications. [6]

Exactly estimating the total burden of all foot complications is not easy, because the associated problems are managed by various specialties of the health services. Therefore, amputation rates have been usually recommended as the indicator of the quality of foot care. [7] Foot problems can be life or limb treated frequently in diabetic individuals. As many as 50% to 83% of all non-traumatic lower-extremity amputations are performed on diabetic patients. [8-10] The most important intervention to prevent foot ulceration and its consequences is early detection and appropriate treatment of high-risk patients. Several large clinical centers have experienced a 44-85% reduction in the rate of amputations among individuals with diabetes after the implementation of improved foot-care programs. [5,11]

Diabetic complications may be disabling or even life threatening. [12] According to the International Working Group on the Diabetic Foot (IWGDF), a diabetic foot ulcer (DFU) is a full thickness wound penetrating through the dermis (the deep vascular and collagenous inner layer of the skin) located below the ankle in a diabetic patient. [13] Eight out of 10 non-traumatic limb amputations are attributable to diabetes, of which 85% are due to DFU. [14] The incidence of type 2 diabetes is rising to epidemic proportions in India and the whole world. [15,16] Because of its relatively low case fatality rate, prevalence of associated chronic complications is expected to increase. The burden of diabetic foot is set to rise further in the future since its contributory factors such as peripheral neuropathy and peripheral vascular disease (PVD) are present in >10% of the cases at the time of diagnosis. [17]

In the current study, we attempt to record the clinical profile and outcome of diabetic foot hospitalization, and to provide a report which may become a reference for further improvement in diabetic foot management in our tertiary care center, Darbhanga Medical College and Hospital, Darbhanga, Bihar, India.

Materials and Methods

This prospective observational study was conducted at the Department of Surgery, Darbhanga Medical College and Hospital, Darbhanga, Bihar, India. 100 patients with diabetes attending general surgery ward for diabetic foot ulcer management at Dmch , Department of General Surgery, Darbhanga Medical College and Hospital, Darbhanga, Bihar, India were included during the study period for the period of 8 months

Inclusion criteria:

- The patients >18 years of age with diabetic foot

Exclusion criteria:

- The patients who had deranged renal function tests.
- Previously undergone revascularization surgery or Burger's disease.

All the patients underwent detailed history including duration of diabetes, presenting features and clinical examination at baseline including details of ulcer, evaluation of palpable pulses (i.e., femoral, popliteal, anterior tibial, posterior tibial, and dorsalis pedis), and Ankle brachial index (ABI). The discharge from the ulcer was sent for microbiological examination. Patients were classified as per the IWGDF-IDSA classification into mild, moderate, and severe diabetic foot infections (DFI). Ulcer size was determined by tracing the outline of the wound on a graph paper divided into 1 cm squares. The wound area was calculated by manually counting the squares within the wound. The ulcers of the patient were debrided, antibiotic was given as per culture sensitivity, and the daily aseptic dressing was done. The patients were followed up every month for 3 months. The outcome was assessed in terms of ulcer healing, readmission, minor/major amputation, and mortality during the 3 months.

Statistical Analysis

The statistical analysis was carried out using the SPSS Version 20, IBM, NY, USA. The normality of the data was checked by the Kolmogorov Smirnov test. The quantitative data were presented as mean ± SD for normally distributed data, means were compared using an independent t-test, and for skewed data/scores Mann–Whitney U-test was applied. The Chi-square test was applied for qualitative data. A value of $P < 0.05$ was considered statistically significant. The association of clinical outcome (ulcer healing, readmission, minor/major amputations, and mortality) with various parameters was computed using the Cross Tabs-Chi-square test or ANOVA. A baseline logistic regression analysis was carried out with all the parameters.

Results

Table 1: Age distribution of patients with diabetic foot and Distribution of patients according to the treatment and lipid profile

Age (in years)	**Diabetic foot(n=100)**	**Percentage**
<20	0	0%
21-40	20	20%
41-60	42	42%
>60	38	38%
Treatment (n=100)	Deranged lipid profile	Normal lipid profile
Amputation (n=10)	8	2
Debridement (n=90)	35	55

100 patients were diagnosed as diabetic foot. In diabetic foot, the age of patients ranged from 19 to 80 years. 20 (20%) patients were between 21 to 40 years; 42 (42%) patients were between 41 to 60 years and 38 (38%) patients were above 60 years. Out of 100 patients with diabetic foot, 90 patients were treated by debridement, in which 35 patients had deranged lipid profile and 55 had normal lipid profile. Out of 100 patients with diabetic foot, 10 patients were treated by amputation, out of which 8 patients had deranged lipid profile and 2 had normal lipid profile. Patients with deranged lipid profile had increased chances of amputation.

Table 2: Mean parameters of patient according to HbA1c

Mean Parameters	**HbA1c> 8.5 (n= 70)**	**HbA1c <8.5 (n= 30)**
Mean hospitalstay	10.40	7
Mean creatinine	1.70	1.25

Out of 100 patients with diabetic foot, 70 patients had HbA1c more than 8.5 and 30 patients had HbA1c <8.5. Mean hospital stay of patients with HbA1c> 8.5 was 10.40 days. Mean hospital stay with HbA1c<8.5 was 7 days. Mean serum creatinine of patients with HbA1c >8.5 was 1.70 mg/dl. Mean serum creatinine of patients with HbA1c< 8.5 was 1.25 mg/dl. The hospital stay and serum creatinine values were significantly higher in patients with HbA1c>8.5.

Table 3: Organism in Diabetic Foot

Organism	Diabetic foot(n= 100)	Percentage
Pseudomonas	30	30%
E. coli	24	24%
Klebsiella	22	22%
Staphylococci	21	21%
No growth	3	3%

Out of 100 patients with diabetic foot; 30 (30%) patients had pseudomonas; 24 (24%) patients had E. Coli; 22 (22%) patients had Klebsiella; 21 (21%) patients had staphylococci and 3 (3%) patients had no growth on aerobic culture media.

Discussion

The most common cause of soft tissue infections is Staphylococcus aureus. [18] Frequently these patients are diabetic, immune compromised, etc. Establishing the diagnosis of Necrotizing Soft Tissue Infection (NSTI) can be the main challenge in treating patients with NSTI, and knowledge of all available tools is the key for early and accurate diagnosis. [19] The skin is the largest organ of the body and, with the underlying soft tissue, which includes the fat layers, fascia and muscle, represents the majority of the tissue in the body. It acts as a tough, flexible, structural barrier to invasion. [20] Failure to do so result in an extremely high mortality rate (80 to 100%), and even with rapid recognition and intervention, current mortality rates remain approximately 30 to 50%. [21]

Abbott et al [22] reported that more than 2% of diabetic patients will develop new foot ulcers annually. The prevalence of DFU varied between 4% and 20.4% among hospital-based studies in individuals with diabetes. [23,24] According to some authorities [25,26], diabetic foot problems are responsible for 23–50% of the hospital bed occupancies by diabetic patients. Our study documented a 16.2% prevalence rate of DFU among consecutive, unselected diabetic patients admitted to the largest medical inpatients service in Semarang, Indonesia. These patients have a significant risk of poor-healing ulcers, foot infection, and LEA, which is reportedly more frequent among low socioeconomic group patients with precarious hygiene conditions. [27] 100 patients were diagnosed as diabetic foot. In diabetic foot, the age of patients ranged from 19 to 80 years. 20 (20%) patients were between 21 to 40 years; 42 (42%) patients were between 41 to 60 years and 38 (38%) patients were above 60 years. Out of 100 patients with diabetic foot, 90 patients were treated by debridement, in which 35 patients had deranged lipid profile and 55 had normal lipid profile. Out of 100 patients with diabetic foot, 10 patients were treated by amputation, out of which 8 patients had deranged lipid profile and 2 had normal lipid profile. Patients with deranged lipid profile had increased chances of amputation. In a study by Lavery et al. duration of ulcers > 30 days was a factor related to development of a wound infection. [28] In our report, infection was present invariably in nearly all patients and Gram-negative bacteria were the most commonly isolated.

Out of 100 patients with diabetic foot, 70 patients had HbA1c more than 8.5 and 30 patients had HbA1c <8.5. Mean hospital stay of patients with HbA1c> 8.5 was 10.40 days. Mean hospital stay with HbA1c<8.5 was 7 days. Mean serum creatinine of patients with HbA1c >8.5 was 1.70 mg/dl. Mean serum creatinine of patients with HbA1c< 8.5 was 1.25 mg/dl. For a variety of reasons, good glucose control is not easily obtained in many Indian patients; poor drug compliance, lack of financial resources, and poor access to medical facilities may all compound this problem. [29] Overall mean HbA1c in this study was 11.2%, higher than what Hartemann-Heutier et al. and Ozkara et al. have shown (mean HbA1c 8.7% and 10.3%, respectively). [30,31] The patients with diabetic foot having HbA1c levels> 8.5 showed increased serum creatinine levels and increased duration of hospital stay. Christman et al demonstrated that patients with HbA1c >7 have poor wound healing as compared to patient with HbA1c < 7. [32]

The hospital stay and serum creatinine values were significantly higher in patients with HbA1c>8.5. In studies from England, Tanzania, and Nigeria, the mean duration of hospital stay was 22.2, 36.2 days, and 60.3 days, respectively. [33-35] The variation from study to study might be related to differences in clinical practice, severity of illness, and availability of supportive care in their hospital. However, the relatively lower duration of hospitalization in the present study may be a result of death at early date or discharge from the hospital.

Conclusion

Diabetic foot pathologies are common in diabetics and pose serious health problems for developing countries. They seem to affect both sexes equally. The present study highlighted the significance of patients with DFU in tertiary care hospital in India context where diabetes is poorly controlled, there was also little awareness for foot care and delay in seeking treatment, as this will worsens the extent of tissue destruction. Many patients fail to receive timely and optimal care once present in the hospital. In the end, Lower Extremity Amputation is a common outcome of Diabetic Foot who was admitted to our hospital, as well as being a notable cause of morbidity and mortality.

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