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## A clinical study of the risk factors leading to complication in diabetic foot ulcer

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### Abstract

**Introduction:** The prevalence of foot ulceration in the general diabetic population is 4–10%, being lower (1.5–3.5%) in young and highest (5–10%) in older patients. The lifetime risk for foot ulcers in diabetic patients is about 15%. The major adverse outcome of foot ulceration is amputation. The aim of the study was to analyze the risk factors leading to complication in diabetic foot and to study the outcome of treatment of different modalities for diabetic foot.

**Material and Methods:** This study was conducted in 100 patients of diabetic foot in the Department of general surgery at Jhalawar Hospital and medical college Jhalawar, during the period of Aug 2015 to Oct 2018.

**Results:** Commonest presenting lesion was ulcers (59%), followed by cellulitis (26%), and gangrene (15%). Trauma is the initiating factor in most of the cases. Out of which 82% of patients had infection. Most common microorganism grown from wound discharge culture was staphylococcus aureus (53%), 71 patients were treated with wound debridement out of them skin grafting was done in 15 patients, 14 of patients underwent amputation. Prognosis was better in patients with controlled blood sugar level.

**Conclusion:** Diabetes Mellitus is a lifelong disease and diabetic foot ulceration can be life threatening, physically incapacitating, costly to treat and result in extensive morbidity if not treated properly. Screening, proper evaluation, early identification and treatment of the 'at risk foot' can reduce complications.

**Keywords:** Diabetes, foot ulcers, neuropathy, ischemia

### Introduction

Knowledge of Diabetes <sup>[1]</sup> is important because of its high prevalence. Diabetes has proved itself to be a silent killer disease. It has been estimated that there are more than two hundred million diabetics in the world. Today in the world, maximum numbers of patients are suffering from this disease, and moreover they are associated with complication secondary to diabetes <sup>[2]</sup>. According to WHO, diabetes is a chronic disease that occurs when the pancreas don't produce enough insulin or when body cannot effectively use the insulin when it produces. Diabetic foot ulcers <sup>[3, 4]</sup> are a growing problem in the diabetic community.

Globally, diabetes mellitus has grown to pandemic proportions, affecting 194 million people worldwide and is expected to increase in prevalence to 344 million by the year 2030. Of these patients, between 2 to 6% will develop a diabetic foot ulcer (DFU) yearly. The onset of a DFU often precipitates a complex chain of events that may lead to limb loss. The long-term outcome for a diabetic patient after a major limb amputation is grave, with 50% of these patients deceased at 5 years. Aim of the study was to analyze the risk factors leading to complication in diabetic foot ulcer and to study the outcome of treatment of different modalities in diabetic foot ulcer.

### Material and Methods

This study is based on a prospective study of 100 cases admitted and treated (from Aug 2015 to Oct 2018) in Jhalawar Hospital and medical college Jhalawar Rajasthan, The present study, was undertaken to find out etiology, clinical presentation, complications, risk factors, management, and prevention of surgical complications of diabetic foot. The age, sex, occupation and socio economic status of patient were noted. Detailed History of the current illness was noted and previous history of wounds, gangrene, ulcer, boils were noted. Any associated arterial or venous disorders associated with diabetes are noted.

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Patients were evaluated with General physical and local examination and systemic examination based on history and clinical findings. Routine investigations such as complete blood counts, Fasting and Postprandial Blood sugar levels, ESR, ECG, complete urine examination for the presence of ketone bodies, sugar and X- ray of the part involved, culture and sensitivity of the discharge from ulcer were also done. Patients with diabetic ulcer foot were treated with, debridement, split skin grafting, and amputation.<sup>6,7</sup> STATISTICAL ANALYSIS Descriptive statistics like mean and percentages were used for results interpretation using Microsoft office 2007.

## Results

**Table 1:** Risk factors for developing of DFU

Risk factors	100%
Trauma	85%
Infection	82%
uncontrolled DM	56%
Poor hygiene of foot	65%
age >50 yrs	72%
sex, male	64%
low socioeconomic status	74%

An analysis of 100 cases of diabetic foot was done. These cases were admitted and treated in different surgical units in Jhalawar Hospital and medical college Jhalawar Rajasthan, during the period of Aug 2015 to Oct 2018. Age Distribution Diabetic foot lesions are commonly found in middle aged person usually in the 5th decades of their life. No patient was below 30 years of age and majority being in the 40-70 years of life (Table-1). Sex Distribution there were 64 males and 36 females, of which 74% of patients belonged to low socioeconomic status.

**Table 2:** Presentation of patients

Presentation of Complication of DM	No of pt
Ulcer	58
Cellulites	24
Gangrene	14

The higher incidence of diabetic foot lesions in male is mainly due to the unhygienic foot care, trauma and smoking. Clinical Presentation Of these 100 patients, 58% of patients presented with diabetic ulcer foot, 24% of patients presented with diabetic cellulites foot, 14% of patients presented with diabetic gangrene foot or toe (Table-2).

**Table 3:** Status of patients at the time of admission

Investigation at the time of admission	Biochemistry	No of patient
Random Blood Sugar	<150	36
	150-250	47
	>250	17
Blood Urea	<45	68
	>45	32
Serum Creatinin	<1.5	74
	>1.5	26
Hemoglobin	<10gm/dl	54
	>10gm/dl	46

**Table 4:** Associated diseases with DFU

Associated diseases	N0 of pt
Newly diagnosed DM	78
Hypertension	42
diabetes mellitus	22
Diabetic neuropathy	11
Family h/o DM	8

In the present study 42(42%) patients had associated hypertension. It is observed that 22 patients (22%) were known case of diabetes already and were under anti diabetic treatment while 78 (78%) patients were diagnosed as diabetic, they were unaware about the diabetes. 8% of patients has family history of Diabetes. In the present study 11% of patients have loss of sensation over foot (Table-3)

Random blood sugar levels at the time of admission are <150 mg/dl in 36% of cases, 150-250mg/dl in 47% of cases and >250 mg/dl in 17% of cases. Anaemia (Hb <10gm/dl) was present in 54% of cases (Table-4).

In culture and Sensitivity, Staphylococcus aureus was most common bacteria isolated from 58% of cases of Diabetic foot infection, Beta hemolytic streptococci in 10% of cases and anaerobic cocci in 24% of cases, gram negative organisms in 34% of cases, klebsiella and pseudomonas in 15% of cases. (Table-5)

**Table 5:** Bacteriological study

Bacteria	
Staphylococcus Aureus	58
Gram negative organisms	34
Anaerobic cocci	22
Klebsiella and pseudomonas	15
Beta hemolytic streptococci	10

Treatment of the 71 patients who present with Diabetic ulcer foot, were treated debridement followed by clean and dress, 15 patients were treated with debridement followed by split skin grafting, 14 patients were treated with amputation of toes or trans metatarsal amputation or below knee amputation (Table-6). All the patients who presented with Diabetic gangrene of foot (14 patients) were treated with amputation of toes or transmetatarsal amputation or below knee amputation. We require more than 2 times of surgery in 12% of cases.

**Table 6:** Modality of treatment

Modality of treatment	%
Debridement of diabetic foot	71%
Debridement f/b skin grafting	15%
Amputation	14%

## Discussion

1. This study consists of 100 cases of diabetic foot patients with emphasis on risk factors, surgical management and complications of diabetic ulcer foot, over a period of three years. After analysis of the data, the highest number of patients was seen in the age group of 40- 70 years. Male to female ratio was approximately 1.7:1.2. Uncontrolled diabetes mellitus is the another risk factor for development of Diabetic foot ulcers 3. People with low immunity, low socioeconomic and poor

hygiene are more prone to develop diabetic foot ulcer.<sup>4</sup> Diabetic foot ulcers are more common in men due to their increased susceptibility to trauma, smoking, and alcoholism. More common in people who do not care of their feet (unawareness) <sup>[5]</sup>. Ulcer is the commonest presenting feature, followed by cellulites and gangrene. Commonest site of lesion was planter surface of foot, followed by fore foot and toes.<sup>6</sup> Most common microorganisms grown from culture taken from the lesion was staphylococcus aureus <sup>[7]</sup>. Conservative treatment consists of control of diabetes with insulin along with appropriate oral or iv antibiotics was effective in most of the cases. Wound debridement, slough excision, followed by dressing with povidine-iodine, dressings resulted in healing of ulcers <sup>[8]</sup>. Split skin grafting, disarticulation, bellow knee amputation were the other modes of treatment. Wong *et al.* reported 87% success rate in limb salvage after using repeated 'piecemeal' debridement <sup>[9]</sup>. Dressing materials used include saline-soaked gauze dressings; moisture retaining dressing, optimize the wound environment and promote healing <sup>[10]</sup>. Medicated honey has anti inflammatory, antiseptic and osmotic properties and has been used as such or in combination with sterile dressings <sup>[11]</sup>. A randomized control trial compared the efficacy of a TCC and removable cast walker and half-shoe in patients with Diabetic foot ulcer, it is found that TCC to be the most effective modality <sup>[12]</sup>. Hyperbaric Oxygen (HBO) has been found to be a useful adjunctive therapy for DFUs and is associated with decrease in amputation rates <sup>[13]</sup>. Topical phenytoin application before auto grafting promoted granulation tissue formation and was found to enhance graft uptake in large DFUs. Patient education and self-care practices like maintaining foot hygiene and nail care should be promoted <sup>[14]</sup>. Skin is kept moisturized with the use of topical moisturizers after washing the feet gently with soap and water. Of loading and appropriate footwear to relieve focal high pressure areas is recommended for foot at-risk.

### Conclusion

Diabetic foot, a complication of Diabetes Mellitus disease, can be life threatening, physically incapacitating, costly to treat and result in extensive morbidity. Screening, proper evaluation, early identification and treatment of the '*at risk foot*' can reduce its complications. A multidisciplinary team approach to diabetic foot problems can save costs and reduce most foot complications and amputation rate. If we incorporate these diabetic foot management guidelines into our practice protocols we may attain the objectives of preventing limb loss, and decrease mortality and increase the quality of life of the patient.

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