

# Assessment of Factors Leading to Poor Outcomes in Diabetic Foot.

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## ABSTRACT

**Background:** Diabetic foot disease is a significant and severe complication of Diabetes which, if poorly managed, leads to deformity and disability in diabetic patients. Poor diabetic control, poor knowledge of foot care in diabetic patients is associated with poor outcomes. All diabetic foot cases must receive surgical consultation in the early course of the disease to prevent disability and limb loss. **Methods:** This study was conducted comprising 30 patients of diabetic foot disease admitted in the department of general surgery at Government Hospital in the rural area, and fulfilling the inclusion criteria. Data was collected by detailed history taking, thorough physical examination, routine investigations, relevant special investigations, choosing the appropriate line of treatment. **Results:** A total of 30 patients with diabetic foot ulcer disease were included in the study. Fifty percent of the patients underwent surgical treatment, and the remaining 15 patients were managed conservatively. The patients who underwent surgical treatment were younger; however, the difference was not statistically significant. The male to female ratio was 1:1. Forty percent of the patients had a history of trauma, while 10% had a previous history of infection. Ten patients had no co-morbidities. Sex, history of injury, infection, neuropathy, vasculopathy, and comorbidities were not associated with the treatment. **Conclusion:** Diabetic foot disease is a surgical condition, and all such patients must take surgical consultation in the early course of the disease. All efforts should be made to prevent deformity and disability in diabetic patients.

**Keywords:** Diabetic foot, Gangrene, Amputation, surgical management.

## INTRODUCTION

Diabetes is a significant public health issue that is gradually becoming an epidemic worldwide. According to the International Diabetes Federation-Diabetes Atlas 2019, Approximately 463 million adults are living with Diabetes, and its number will be 700 million by 2045. Approximately 374 million people are at risk for Diabetes. The total health expenditure in 2019 over Diabetes was 760 billion USD. Diabetes puts people at increase risk of cardiovascular and renal complications, blindness, and lower limb amputation (diabetic foot).

Diabetic foot syndrome or disease (DFD) is the result of several pathologies, mainly diabetic peripheral neuropathy and peripheral arterial disease, which result in foot ulceration. Diabetic foot ulceration may ultimately lead to amputation, especially when wound infection or osteomyelitis are involved. A diabetic foot ulcer is defined as a full-thickness wound, which is present at a level distal to the ankle in patients with diabetes.<sup>[1,2]</sup> Special categories like Charcot neuroarthropathy are also included in the DFD.<sup>[3]</sup> Patients with the diabetic foot are also more likely to present with

other Diabetes-related complications such as nephropathy, retinopathy, ischemic heart disease, and cerebrovascular disease.<sup>[4]</sup> It is estimated that the prevalence of Diabetic foot globally is about 6.4%.<sup>[5]</sup> And the annual incidence of DF in diabetic patients is 2-5%, and lifetime risk is 15-20%.<sup>[6,7]</sup> DFD is a common complication that is multifactorial in nature. A good understanding of its various predisposing risk factors would help in both prevention and treatment of this devastating medical condition.

Diabetic foot is one of the worse and difficult to treat complication of Diabetes. Patients with DF have a poor quality of life, and they are dependent on others for their daily routine, and many patients end up with amputations. Diabetic foot is the most common cause of non-traumatic lower limb amputation. But even little trauma can lead to the formation of diabetic foot in diabetic patients. Patients with diabetic foot live in fear of recurrence, and lifetime disability. The present study attempts to address the significant challenges and barriers to a better approach to the DFD.

## MATERIALS AND METHODS

This study was conducted comprising 30 patients of diabetic foot disease admitted in the department of general surgery at Government Hospital in the rural area.

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**Method of collection of data**

Detailed history taking, thorough physical examination, routine investigations, relevant special investigations, choosing the appropriate line of treatment.

**Inclusion criteria**

All patients with Diabetes mellitus suffering from foot ulcers and infections of all age groups, incidental diagnosis of Diabetes on admission with diabetic foot ulcers, and patients with gangrenous foot, complicated by Diabetes, are included in the study.

**Exclusion criteria**

Exclusion criteria were patients with foot infections without diabetes mellitus, patients with gangrene foot of etiology other than disease of foot complicated by Diabetes, patients whose treatment could not be completed.

**RESULTS**



**Figure 1: Patient needed amputation for diabetic foot (gangrene)**

A total of 30 patients with diabetic foot ulcer disease were included in the study. Fifty percent of the patients underwent surgical treatment, and the remaining 15 patients were managed conservatively.

**General characteristics**

General characteristics of the patients have been shown in table 1. The patients who underwent

surgical treatment were younger; however, the difference was not statistically significant. The male to female ratio was 1:1. Forty percent of the patients had a history of trauma, while 10% had a previous history of infection. Ten patients had no comorbidities. Sex, history of injury, infection, neuropathy, vasculopathy, and comorbidities were not associated with the treatment.



**Figure 2: Showing the patient needed extensive debridement for wet gangrene.**



**Figure 3: Showing toe amputation for Diabetic foot with osteomyelitis.**

**Table 1: General characteristics**

	Conservative treatment (n=15)	Surgical treatment (n=15)	P value
Age (years)	59 [52.0, 65.0]	53 [48.0, 63.0]	0.261
Sex, n			0.465
Male: Female	6:9	9:6	
History of trauma, n	5	7	0.709
History of infection, n	1	2	1.000
Neuropathy, n	8	9	1.000
Vasculopathy, n	2	5	0.388
Alcoholics, n	0	1	-
CAD, n	3	0	-
CKD, n	2	2	-
COPD, n	0	2	-
Hypertension, n	5	8	-
Mental retardation, n	0	1	-
Parkinsonism	1	0	-

Data were expressed as median [interquartile range; Q1, Q3]

CAD, coronary artery disease; CKD, chronic kidney disease, COPD, chronic obstructive pulmonary disease

**Table 2: Wagner's grade**

	Conservative treatment (n=15)	Surgical treatment (n=15)	P-value
Wagner's grade, n			<0.0001
Grade 1	7	0	
Grade 2	5	0	
Grade 3	3	10	
Grade 4	0	5	
Cellulitis, n	8	14	0.039
Ulcer, n	9	0	0.001
Gangrene, n	0	8	0.004
Abscess, n	0	11	<0.0001

**Table 3: Investigations.**

	Conservative treatment (n=15)	Surgical treatment (n=15)	P value
Hb	10.2 [9.2, 12.0]	10.8 [9.1, 11.4]	0.934
TLC	6600 [5100, 12345]	9800 [7800, 13200]	0.042
Creatinine	1.0 [0.9, 1.2]	1.1 [1.0, 1.4]	0.294
Fasting blood sugar	159.0 [112.0, 180.0]	154.0 [142.0, 205.0]	0.206
HbA1c	7.2 [5.7, 7.9]	8.1 [6.6, 8.7]	0.081

Data were expressed as median [interquartile range; Q1, Q3]

**Table 4: Comparison of treatments.**

	Conservative treatment (n=15)	Surgical treatment (n=15)	P-value
On insulin, n	2	0	0.464
On OHA, n	13	11	0.648
Prior treatment, n antibiotics	9	11	0.699
Duration of diabetes (years)	2.0 [1.0, 4.0]	6.0 [3.0, 10.0]	0.008

Data were expressed as median [interquartile range; Q1, Q3]

## DISCUSSION

Diabetic foot disease is a major emerging health issue of modern society, and it is common to see young people suffering from Diabetes and due to poor management of illness, and its complication, they end up with limb deformity and limb loss. In our study the majority of patients with diabetic foot disease had a history of previous trauma or some infection of the foot which led to diabetic foot. Though some people of diabetic foot were managed conservatively, but a significant number of patients required surgical intervention to manage the disease. In this study we found that patients with high HbA1c, prolonged duration of Diabetes, patient on OHA compare to insulin were associated with severe diabetic foot disease and they required surgical intervention; hence it can be concluded that these factors predict poor outcome in diabetic foot disease patients. Comorbidities like HTN, CAD, and CKD were present in both groups of patients, and no general consensus could be made about their association with diabetic foot; it is maybe due to a small sample size of patients. As a significant number of patients needed surgical intervention despite the fact they were already put on antibiotics by their Physician, we can conclude that an early surgical consultation should be taken to prevent deformity or limb loss by early effective and minimal surgical intervention. Through this study, we came to know that majority of patients were unaware of knowledge of foot care in diabetic patients; therefore it is recommended to all health

care professionals to explain and guide their patients about foot care in Diabetes.

## CONCLUSION

Diabetic foot disease is a surgical condition, and all such patients must take surgical consultation in the early course of the disease. All efforts should be made to prevent deformity and disability in diabetic patients.

### Limitations of study

Small sample size, no wound culture, and sensitivity report available due to limited resources.

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