

ORIGINAL RESEARCH

Assessment of Outcome of Management of Diabetic Foot Ulcer**Dinulal PP¹, Mubashir D^{2*}**

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ABSTRACT

Background: To assess outcome of management of diabetic foot ulcer.

Materials and Methods: One hundred ten patients of diabetic foot ulcer of both genders were enrolled. Parameters such as Wagner's classification, type of operations performed were recorded. Previous history of diabetes, wound healing, ulcers and boils in other part of the body were recorded. D.

Results: Out of 110 patients, males were 65 (59%) and females were 45 (40%). Wagner classification grade 0 was seen in 6, grade 1 in 8, grade 2 in 14, grade 3 in 26, grade 4 in 30 and grade 5 in 26 patients. Clinical presentation was gangrene seen in 20, cellulitis in 30 and ulcer in 60 patients. Bacteria isolated were staphylococcus aureus in 72, Beta haemolytic streptococci in 16, gram negative organisms in 20 and anaerobic cocci in 2 cases. The difference was significant ($P < 0.05$). Management performed was incision and drainage in 10, amputation in 52, debridement in 26, transmetatarsal in 8, below knee amputation in 4 and above knee amputation in 10 patients. The difference was significant ($P < 0.05$). Complete healing was observed in 68, outcome was unknown in 26 and patient death occurred in 2 cases. The difference was significant ($P < 0.05$).

Conclusion: The management of diabetic foot ulcers remains a major therapeutic challenge which implies an urgent need to review strategies and treatments in order to achieve the goals and reduce the burden of care in an efficient and cost-effective way. Grade 5, presence of ulcers and bacteria such as staphylococcus aureus and gram- negative organisms were major risk factors for the surgical management of diabetic foot ulcer.

Keywords: diabetic foot ulcer, knee amputation, staphylococcus aureus.

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INTRODUCTION

Diabetes mellitus (DM) is a non-communicable disease and one of the most common chronic diseases. World health organization defined DM as a metabolic disorder of multiple etiology characterized by chronic hyperglycemia with disturbances of carbohydrate, fat and protein metabolism resulting from defects in insulin secretion, insulin action, or both. Complications of DM become a major public health problem in all countries.¹

Approximately 5% of diabetic patients develop a foot ulcer every year. About 15% of all diabetics develop foot problems during course of their illness. Diabetic foot ulcers carry a significant risk of amputation.² Factors such as age and duration of the disease will increase its incidence. Once tissue damage has occurred in form of ulceration or gangrene, aim is

preservation of viable tissue.³ Diabetic foot ulcers are commonly classified according to Wagner classification. Wagner classification assesses ulcer depth and presence of osteomyelitis or gangrene. The main goal of surgical therapy is to control the deep infection, with the hope of salvaging the limb.⁴ This is accomplished by drainage of any pus, removal of all necrotic or infected tissues, and creating a healthy wound bed. It is also important to keep in mind the functional results after surgery. Residual foot deformities may lead to abnormal pressure points and, thus, re-ulceration.⁵ The present study was conducted to evaluate outcome of management of diabetic foot ulcer.

MATERIALS & METHODS

A sum total of one hundred ten patients of diabetic foot ulcer of both genders were enrolled after obtaining written consent for the participation in the study. Ethical clearance was obtained before starting the study.

A thorough case history followed by examination was carried out. All patients underwent routine blood examination, blood sugar test, urine analysis, culture & sensitivity of the discharge from the infection. Parameters such as Wagner's classification, type of operations performed were recorded. Previous history of diabetes, wound healing, ulcers and boils in other part of the body were recorded. Data thus obtained were subjected to statistical analysis using Mann Whitney U test. The level of significance was set below 0.05.

RESULTS

Table I Distribution of patients

Total- 110		
Gender	Males	Females
Number	65 (59%)	45 (40%)

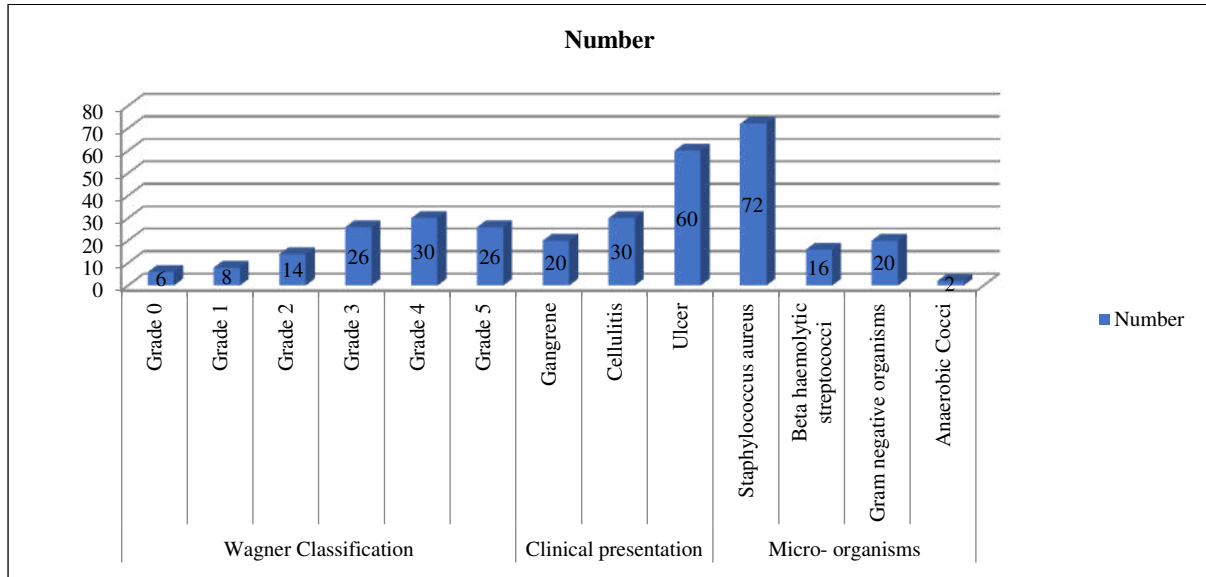
Out of 110 patients, males were 65 (59%) and females were 45 (40%).

Table II Assessment of parameters

Parameters	Variables	Number	P value
Wagner Classification	Grade 0	6	0.05
	Grade 1	8	
	Grade 2	14	
	Grade 3	26	
	Grade 4	30	
	Grade 5	26	
Clinical presentation	Gangrene	20	0.04
	Cellulitis	30	
	Ulcer	60	
Micro- organisms	Staphylococcus aureus	72	0.03
	Beta haemolytic streptococci	16	
	Gram negative organisms	20	
	Anaerobic Cocci	2	

Wagner classification grade 0 was seen in 6, grade 1 in 8, grade 2 in 14, grade 3 in 26, grade 4 in 30 and grade 5 in 26 patients. Clinical presentation was gangrene seen in 20, cellulitis in

30 and ulcer in 60 patients. Bacteria isolated were staphylococcus aureus in 72, Beta haemolytic streptococci in 16, gram negative organisms in 20 and anaerobic cocci in 2 cases. The difference was significant ($P < 0.05$) (Table II, Graph I).



Graph I Assessment of parameters

Table III Management of diabetic foot

Management	Number	P value
Incision and drainage	10	0.041
Amputation	52	
Debridement	26	
Transmetatarsal	8	
Below knee amputation	4	
Above knee amputation	10	

Management performed was incision and drainage in 10, amputation in 52, debridement in 26, transmetatarsal in 8, below knee amputation in 4 and above knee amputation in 10 patients. The difference was significant ($P < 0.05$) (Table III).

Table IV Outcome

Outcome	Number	P value
Complete healing	68	0.01
Patient death	2	
Outcome unknown	26	

Complete healing was observed in 68, outcome was unknown in 26 and patient death occurred in 2 cases. The difference was significant ($P < 0.05$) (Table IV).

DISCUSSION

Diabetes foot infection due to gangrene is the most common cause of prolonged hospitalization and amputation of their limbs. Besides, 28%–51% of amputated diabetics will

have a second amputation of the lower limb within five years of the first amputation. Generally, diabetic foot complications remain the major medical, social, and economic problems for all types of diabetes. Clinical signs of infection may not manifest until the infection is advanced.⁶ The typical bacterial pathogens encountered vary with the Wagner grade and severity of infection. Early infections are generally monomicrobial, whereas advanced infections tend to be polymicrobial.⁷ Wounds of the foot are the most common reason for diabetes-related hospital admissions.^{8,9} In many of these cases, surgical intervention is the best option. Presence of several characteristic diabetic foot pathologies such as infection, diabetic foot ulcer and neuropathic osteoarthropathy is called diabetic foot syndrome.^{10,11} The present study was conducted to evaluate management of diabetic foot ulcer.

Our results showed that out of 110 patients, males were 65 (59%) and females were 45 (40%). Bekeke et al¹² found that of the 115 diabetes foot ulcer patients, fifty-eight (50.43%) of the patients had chronic health problems and 56 (48.69%) had diabetic complications. Of patients with complications, 35 (30.43%) were undergone amputations. Diabetic foot ulcer grade ≥ 4 , inappropriate antibiotics use, overweight, obesity, poor blood glucose control and neuropathy were predictors of amputation up on multivariable logistic regression analysis. Blood glucose level, higher body mass index, inappropriate antibiotics use, neuropathy and advanced grade of diabetic foot ulcer were independent predictors of amputation.

Our results showed that Wagner classification grade 0 was seen in 6, grade 1 in 8, grade 2 in 14, grade 3 in 26, grade 4 in 30 and grade 5 in 26 patients. Clinical presentation was gangrene seen in 20, cellulitis in 30 and ulcer in 60 patients. Bacteria isolated were staphylococcus aureus in 72, Beta haemolytic streptococci in 16, gram negative organisms in 20 and anaerobic cocci in 2 cases. Gupta et al¹³ assessed the risk factors leading to complication in diabetic foot infection. The diabetic foot was found in the middle- aged group persons usually in 4th and 5th decade. There were 50 males and 50 females of which 70% patients had symptoms of diabetic foot ulcer, 20% patients had diabetic foot cellulites, 10% of patients presented with gangrene diabetic foot. The surgical site infection was the most common complications accounting for total of 10 patients.

Our results revealed that management performed was incision and drainage in 10, amputation in 52, debridement in 26, transmetatarsal in 8, below knee amputation in 4 and above knee amputation in 10 patients. Armstrong et al¹⁴ validated a diabetic foot-wound classification system that demonstrated that the combination of infection and ischemia resulted in the worst outcome. Both of these studies emphasize the need for a thorough assessment of the infection.

Complete healing was observed in 68, outcome was unknown in 26 and patient death occurred in 2 cases. Garcia et al¹⁵ determined the clinical and surgical characteristics of diabetic foot ulcers. The most affected areas were the forefoot (48%) and the plantar region (55%) of the foot. Also, most of the patients arrived with advanced stages of diabetic foot ulcers, since 93% of the lesions were of grades III–V according to the Wagner classification. Moreover, lesions usually present with advanced states of infection, since 60% of the lesions were of grades 3–4 in the PEDIS scale. The great majority of the patients are prone to complications because we found that 43% of the patients suffered from hypertension, 47% of the patients had chronic kidney disease, and 45% reported smoking. 45% of the patients eventually suffered an amputation. The situation is more difficult because the great majority of the patients (96%) have a low level of education and very low income and they do not have any health insurance. An efficient treatment can help in avoiding amputations, since

53% of grade IV and 25% of grade V lesions according to the Wagner system did not suffer an amputation.

CONCLUSION

The management of diabetic foot ulcers remains a major therapeutic challenge which implies an urgent need to review strategies and treatments in order to achieve the goals and reduce the burden of care in an efficient and cost-effective way. Grade 5, presence of ulcers and bacteria such as staphylococcus aureus and gram- negative organisms were major risk factors for the surgical management of diabetic foot ulcer.

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