

## Original Article

### Assessment of management and complications of diabetic foot ulcers

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#### ABSTRACT:

**Background:** Diabetic foot ulcers (DFUs) are one of its most severe and costly complications and represent one of the most common causes of hospitalization of diabetic patients. The present study was conducted to assess cases and management of diabetic foot ulcers. **Materials & Methods:** 84 cases of diabetic foot ulcers of both genders were categorized into six grades from 0 to 5 based on Meggit–Wagner classification system. Parameters such as duration of diabetes mellitus, type of treatment and complications of DFU were recorded. **Results:** Duration of diabetes was 1-5 years in 12, 5-10 years in 28 and >10 years in 44. Wagner grading 0 was seen in 2, grade 1 in 10, grade 2 in 18, grade 3 in 25, grade 4 in 15 and grade 5 in 14. Management was medical in 2, I & D in 25, debridement in 10, SSG in 11, amputation of toe in 14 and below knee amputation in 10. Common complication was serum hyperosmolarity in 2%, septic shock in 32%, ketosis in 14% and hyponatremia in 10%. The difference was non-significant ( $P > 0.05$ ). **Conclusion:** Long duration of diabetes is one of the reasons for diabetic foot ulcer. Most of the cases had grade 3 and management requirement was incision and debridement followed by amputation of toe.

**Key words:** diabetic foot ulcers, Meggit–Wagner, hyponatremia

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#### INTRODUCTION

Diabetes mellitus (DM) is a global epidemic, and diabetic foot ulcers (DFUs) are one of its most severe and costly complications and represent one of the most common causes of hospitalization of diabetic patients.<sup>1</sup> DFUs are complex, chronic wounds which have a major long-term impact on patients' morbidity, mortality, and quality of life. DFUs are relatively common.<sup>2</sup> Once the protective layer of a skin is broken, deep tissues are exposed to a bacterial infection that progresses rapidly. Patients with DFUs frequently require amputation of the lower limbs, and in more than half of the cases, infection is the predominant factor. It has been reported that around 25% of people with diabetes will develop a DFU during their lifetime.<sup>3</sup>

The World Health Organization defines diabetic foot as the lower limb of a diabetic patient that has the potential risk of pathological consequences, including infection, ulceration, and/or destruction of deep tissues associated with neurologic abnormalities,

various degrees of peripheral vascular disease, and/or metabolic complications of diabetes.<sup>4</sup>

Among persons with diabetes, 15 % develop foot ulcers during their lifetime. Their risk of lower extremity amputation increases by a factor of 8 once an ulcer develops. There is a mortality rate of 36 % at 2 years following transtibial amputation for diabetic foot ulcer.<sup>5</sup> In fact, every year, approximately 5 % of diabetics develop foot ulcers and 1 % requires amputation. Diabetic peripheral neuropathy, present in 60 % of diabetic persons and 80 % of diabetic persons with foot ulcers, confers the greatest risk of foot ulceration and microvascular disease, and suboptimal glycemic control also contributes.<sup>6</sup> The present study was conducted to assess cases and management of diabetic foot ulcers.

#### MATERIALS & METHODS

This study comprised of 84 cases of diabetic foot ulcers of both genders. All cases were part of the study once they gave their written consent.

A case history proforma was made containing information regarding name, age, gender etc. All cases were categorized into six grades from 0 to 5 based on Meggit–Wagner classification system. Parameters such as duration of the symptoms, duration of diabetes mellitus, type of treatment, compliance to treatment, hemoglobin percentage at the time of admission, number of units of blood

transfused and complications of DFU were recorded. Neuropathy was assessed by a 128-Hz tuning fork and a 10-g monofilament. Absent pulsations of dorsalis pedis and posterior tibial, popliteal, or femoral vessels were considered to be the sign of ischemia. Results were subjected to further statistical analysis. P value <0.05 was considered significant.

**RESULTS**

**Table I Distribution of patients**

Total- 84		
Gender	Males	Females
Number	52	32

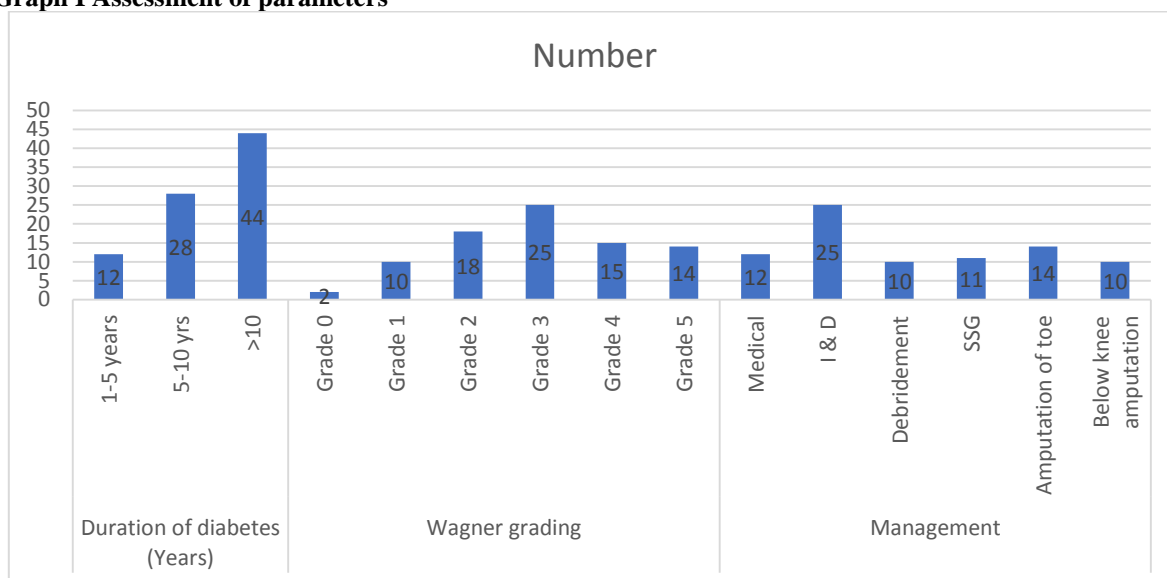
Table I shows that out of 84, males were 52 and females were 32.

**Table II Assessment of parameters**

Parameters	Variables	Number	P value
Duration of diabetes (Years)	1-5	12	0.01
	5-10	28	
	>10	44	
Wagner grading	Grade 0	2	0.05
	Grade 1	10	
	Grade 2	18	
	Grade 3	25	
	Grade 4	15	
	Grade 5	14	
Management	Medical	12	0.09
	I & D	25	
	Debridement	10	
	SSG	11	
	Amputation of toe	14	
	Below knee amputation	10	

Table II, graph I shows that duration of diabetes was 1-5 years in 12, 5-10 years in 28 and >10 years in 44. Wagner grading 0 was seen in 2, grade 1 in 10, grade 2 in 18, grade 3 in 25, grade 4 in 15 and grade 5 in 14. Management was medical in 12, I & D in 25, debridement in 10, SSG in 11, amputation of toe in 14 and below knee amputation in 10. The difference was significant (P< 0.05).

**Graph I Assessment of parameters**



**Table III Complications in patients**

Complications	Percentage	P value
Serum hyperosmolarity	2%	0.12
Septic shock	32%	
Ketosis	14%	
Hyponatremia	10%	

Table III shows that common complication was serum hyperosmolarity in 2%, septic shock in 32%, ketosis in 14% and hyponatremia in 10%. The difference was non-significant ( $P > 0.05$ ).

## DISCUSSION

The prevalence of diabetes mellitus (DM) is growing at epidemic proportions in the U.S. and has been reported as the most common reason for hospital admissions in western countries.<sup>7</sup> There continues to be an alarmingly steady increase in the incidence of type 2 DM (T2DM), especially among the young and obese.<sup>8</sup> Long-term diabetes-related complications also are likely to rise in prevalence. In particular, the diabetic foot is associated with morbidity and disability, leading to a significant impairment of quality of life.<sup>9</sup> People with DM develop foot ulcers because of neuropathy (sensory, motor, and autonomic deficits), ischemia, or both. The initiating injury may be from acute mechanical or thermal trauma or from repetitively or continuously applied mechanical stress. From foot ulcerations to neuropathy to peripheral vascular disease, the challenges are significant and can result in amputations and even premature death.<sup>10</sup> In most patients, peripheral neuropathy, peripheral arterial disease, or both play a central role in the development of foot ulcer. A proper assessment of the outcome of foot ulcer requires inspection, palpation, and probing of the soft tissue wound on the feet on initial presentation and during follow-up.<sup>11</sup> The present study was conducted to assess cases and management of diabetic foot ulcers.

In present study, out of 84, males were 52 and females were 32. Gadepalli et al<sup>12</sup> in their study found that gram-negative aerobes were most frequently isolated (51.4%), followed by gram-positive aerobes and anaerobes (33.3 and 15.3%, respectively). Seventy-two percent of patients were positive for MDROs. ESBL production and methicillin resistance was noted in 44.7 and 56.0% of bacterial isolates, respectively. MDRO-positive status was associated with presence of neuropathy ( $P = 0.03$ ), osteomyelitis ( $P = 0.01$ ), and ulcer size  $>4 \text{ cm}^2$  ( $P < 0.001$ ) but not with patient characteristics, ulcer type and duration, or duration of hospital stay. MDRO-infected patients had poor glycemic control ( $P = 0.01$ ) and had to be surgically treated more often ( $P < 0.01$ ).

We found that duration of diabetes was 1-5 years in 12, 5-10 years in 28 and  $>10$  years in 44. Wagner grading 0 was seen in 2, grade 1 in 10, grade 2 in 18, grade 3 in 25, grade 4 in 15 and grade 5 in 14. Management was medical in 2, I & D in 25, debridement in 10, SSG in 11, amputation of toe in 14 and below knee amputation in 10. Quddus et al<sup>13</sup> revealed that diabetic foot ulcers are not uncommon

complication in our country. The purpose of the study was to undergo a thorough evaluation of diabetic foot ulcers for better management as well as better outcome of patients. The maximum age group of this study was 41-50 years; mean $\pm$ SD age was 55 $\pm$ 15 years and male to female ratio was 1.4:1. This study showed that diabetic foot ulcers were more common in low-socio-economic group, among smokers, among poor glycemic controlled group and long duration of diabetics. In this series, 92% patients had peripheral neuropathy, 22% had foot deformity and 70% patients had vascular insufficiency in the foot and legs. In this series, 68% patients presented early diabetic complication i.e. 44% patients belonged to grade '0' and 24% patients belonged to Grade 1, which were suitable for safety of the limb or reducing major amputation if treated properly.

We observed that common complication was serum hyperosmolarity in 2%, septic shock in 32%, ketosis in 14% and hyponatremia in 10%. Mudduli et al<sup>14</sup> found that among the 60 DFU patients studied, 42 (70%) were males and 18 (30%) were females. Male-to-female ratio is 2.33:1. The age of patients ranged from 20 to 80 years. Mean age was 54.57 years and the SD was 13 years. Majority of patients (54%) were in the age group of 51 to 70 years. Majority of male patients were in the age group of 51 to 60 years. Majority of female patients were in the age group of 61 to 70 years. Seventy-five percent ( $n = 45$ ) of patients were above 40 years of age, while 25% ( $n = 15$ ) were 40 years and below at the time of diagnosis of diabetes mellitus.

## CONCLUSION

Authors found that long duration of diabetes is one of the reasons for diabetic foot ulcer. Most of the cases had grade 3 and management requirement was incision and debridement followed by amputation of toe.

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