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Original Research Article

Comparative Evaluation of Glycemic Profile in Diabetic Patients with and without Diabetic Foot Ulcers: An Institutional Based Study

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ABSTRACT

Background: Diabetic foot ulcer (DFU) is not only a patient problem but also a major health care concern throughout the world. Diabetic foot ulcer is one of the common and serious complications in diabetic patients. Hence; the present study was undertaken for comparatively evaluating glycemic profile in diabetic patients with and without diabetic foot ulcers.

Materials & Methods: A total of 50 diabetic patients without diabetic foot lesion and 50 diabetic patients with diabetic foot lesion were enrolled in the present study. Complete demographic profile of all the patients was obtained. Detailed clinical history of all the patients was recorded separately. Blood samples were obtained and were sent to laboratory for assessment of random blood sugar, HbA1c and fasting blood sugar levels. All the results were recorded in Microsoft excel sheet and were analyzed by SPSS software.

Results: Mean HbA1c concentration of the patients with and without diabetic foot ulcer was found to be 9.1% and 8.36% respectively. Mean FBS among the patients with and without diabetic foot ulcer was found to be 129.5 mg/dL and 102.7 mg/dL respectively. Mean RBS among the patients with and without diabetic foot ulcer was found to be 122.7 mg/dL and 146.7 mg/dL respectively. Mean glycemic profile of the patients of the diabetic foot ulcer was found to be significantly higher in comparison to the patients without diabetic foot ulcer.

Conclusion: Diabetic foot ulcers patients are associated with increased glycemic profile.

Key words: Glycaemic Profile, Diabetic Foot Ulcer.

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INTRODUCTION

Diabetic foot ulcers are common and estimated to affect 15% of all diabetic individuals during their lifetime. It is now appreciated that 15 – 20% of patients with such foot ulcers go on to need an amputation. Almost 85% of the amputations are preceded by diabetic foot ulcers. Numerous risk factors for the development of foot ulcers have been suggested, the most important being peripheral sensory neuropathy followed by peripheral vascular disease. The proportion of neuropathic, neuroischemic, and purely ischemic lesions in diabetics is 54, 34, and 10%, respectively. In India, it is estimated that approximately 40,000 legs are being amputated every year, of which 75% are neuropathic with secondary infection, which is potentially preventable.[1-3]

DFU is not only a patient problem but also a major health care concern throughout the world. Diabetic foot ulcer is one of the common and serious complications in diabetic patients. Treatment of infection in diabetic ulcer is difficult and expensive. Patients usually need to take long-term medications or become hospitalized for an extended period of time. It is estimated that usually 15-25% of diabetic patients develop DFU during their life-time. On the other hand, more than 70% of patients who have developed DFU, experience an exacerbation of the disease in the next 5 years. The ulcer usually appears in the same extremity or the extremity of the opposite side; at least a quarter of these ulcers do not heal.[4-6] Hence; the present study was undertaken for comparatively evaluating glycemic profile in diabetic patients with and without diabetic foot ulcers.

MATERIALS & METHODS

The present study was conducted in the Department of Medicine, Heritage Institute of Medical Sciences, Varanasi, Uttar Pradesh (India) and it included comparative evaluation of glycemic profile in diabetic patients with and without diabetic foot. Ethical approval was obtained from institutional ethical committee and written consent was obtained from all the patients after explaining in detail the entire research protocol.

A total of 50 diabetic patients without diabetic foot lesion and 50 diabetic patients with diabetic foot lesion were enrolled in the present study.

Exclusion Criteria

- Patients with history of any other systemic illness,
- Patients with any known drug allergy,
- Patients between the age group of 25 to 60 years

Complete demographic profile of all the patients was obtained. Detailed clinical history of all the patients was recorded separately. Blood samples were obtained and were sent to laboratory for assessment of random blood sugar, HbA1c and fasting blood sugar levels. All the results were recorded in Microsoft excel sheet and were analyzed by SPSS software. Chi-square test and student t test was used for assessment of level of significance.

RESULTS

In the present study, a total of 50 diabetic patients with diabetic foot ulcer and 50 diabetic patients without diabetic ulcer were enrolled in the present study. Mean age of the patients with and without diabetic foot ulcer was found to be 52.8 and 53.9 years respectively. Majority of patients of both the study groups belonged to the age group of more than 50 years. 52 percent of the patient without diabetic foot ulcer was found to be males while 58 percent of the patients with diabetic foot ulcer were found to be 58 percent. Mean weight of the patients with and without diabetic foot ulcer was found to be 78.15 and 76.85 Kg respectively. In the present study, mean duration of diabetes among patients with and without diabetic foot ulcer was found to be 19.2 years and 15.3 years respectively.

Significant results were obtained while comparing the mean duration of diabetes among the patients of the two study groups. In the present study, mean HbA1c concentration of the patients with and without diabetic foot ulcer was found to be 9.1% and 8.36% respectively. Mean FBS among the patients with and without diabetic foot ulcer was found to be 129.5 mg/dL and 102.7 mg/dL respectively. Mean RBS among the patients with and without diabetic foot ulcer was found to be 122.7 mg/dL and 146.7 mg/dL respectively. Mean glycemic profile of the patients of the diabetic foot ulcer was found to be significantly higher in comparison to the patients without diabetic foot ulcer.

Table 1: Age-wise distribution

Age group	Patients without Diabetic foot ulcer		Patients with Diabetic foot ulcer	
	N	%age	n	%age
Less than 30	10	20	8	16
31 to 40	10	20	11	22
41 to 50	12	24	15	30
More than 50	18	36	16	32
Total	50	100	50	100

Table 2: Gender-wise distribution

Gender	Patients without Diabetic foot ulcer		Patients with Diabetic foot ulcer	
	N	%age	N	%age
Males	26	52	29	58
Females	24	48	21	42
Total	50	100	50	100

Table 3: Descriptive results

Parameter	Patients without Diabetic foot ulcer	Patients with Diabetic foot ulcer
Mean weight (Kg)	76.85	78.15
Mean BMI (Kg/m^2)	26.34	27.78

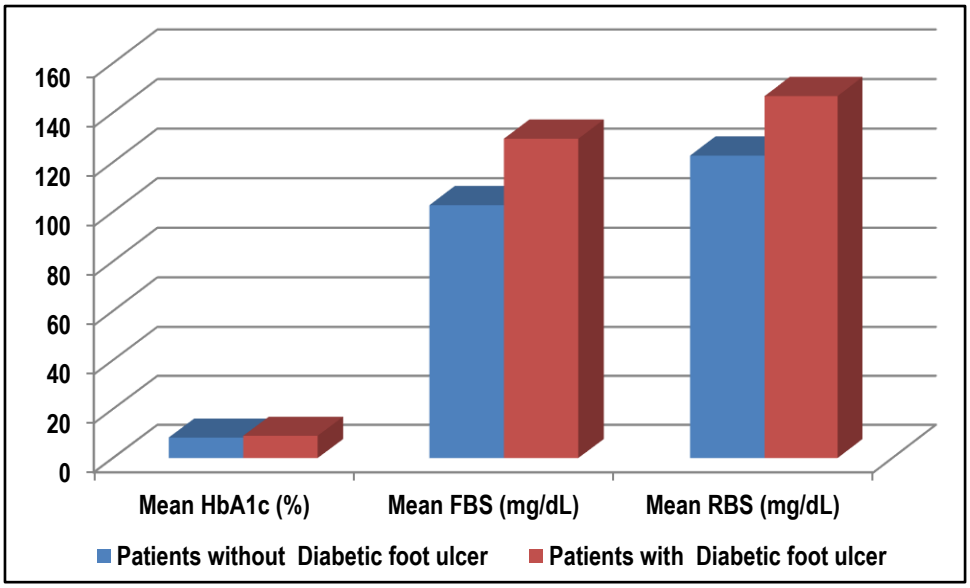
Table 4: Duration of diabetes

Duration of diabetes	Patients without Diabetic foot ulcer		Patients with Diabetic foot ulcer		p- value
	N	%age	N	%age	
Less than 5 years	6	12	2	4	0.002 (Significant)
5 to 10 years	9	18	4	8	
11 to 15 years	12	24	7	14	
More than 15 years	23	46	37	74	
Total	50	100	50	100	

Table 5: Comparison of HbA1c, FBS and RBS values

Parameter	Patients without Diabetic foot ulcer	Patients with Diabetic foot ulcer	p- value
Mean HbA1c (%)	8.36	9.1	0.00 (Significant)
Mean FBS (mg/dL)	102.7	129.5	0.02 (Significant)
Mean RBS (mg/dL)	122.7	146.7	0.01 (Significant)

Graph 1: Comparison of HbA1c, FBS and RBS values



DISCUSSION

Diabetic foot is one of the most significant and devastating complications of diabetes, and is defined as a foot affected by ulceration that is associated with neuropathy and/or peripheral arterial disease of the lower limb in a patient with diabetes. The prevalence of diabetic foot ulceration in the diabetic population is 4–10%; the condition is more frequent in older patients. It is estimated that about 5% of all patients with diabetes present with a history of foot ulceration, while the lifetime risk of diabetic patients developing this complication is 15%.[7-9]

The pathogenesis of foot ulceration is complex, clinical presentation variable, and management requires early expert assessment. Interventions should be directed at infection, peripheral ischaemia, and abnormal pressure loading caused by peripheral neuropathy and limited joint mobility. Despite treatment, ulcers readily become chronic wounds. Diabetic foot ulcers have been neglected in health-care research and planning, and clinical practice is based more on opinion than scientific fact. Furthermore, the pathological processes are poorly understood and poorly taught and communication between the many specialties involved is disjointed and insensitive to the needs of patients.[10] Hence; the present study was undertaken for comparatively evaluating glycemic profile in diabetic patients with and without diabetic foot ulcers.

In the present study, a total of 50 diabetic patients with diabetic foot ulcer and 50 diabetic patients without diabetic ulcer were enrolled in the present study. Mean age of the patients with and without diabetic foot ulcer was found to be 52.8 and 53.9 years respectively. Majority of patients of both the study groups belonged to the age group of more than 50 years. 52 percent of the patient without diabetic foot ulcer was found to be males while 58 percent of the patients with diabetic foot ulcer were found to be 58 percent. Mean weight of the patients with and without diabetic foot ulcer was found to be 78.15 and 76.85 Kg respectively. Ramani A et al estimated Glucosyled haemoglobin (HbA1c) in 60 diabetic patients, 30 with foot ulceration and 30 without foot lesions. Peripheral neuropathy and vascular disease were commonly found in the ulcer' group. The mean HbA1c level in diabetics without ulcers was 9.77 +/- 2.34, while the corresponding level in diabetics with ulcers was 14.14 +/- 3.63. The difference in values is statistically highly significant (p less than 0.001) suggesting that foot ulcers are more likely to occur in poorly controlled diabetic patients.[11]

In the present study, mean duration of diabetes among patients with and without diabetic foot ulcer was found to be 19.2 years and 15.3 years respectively. Significant results were obtained while comparing the mean duration of diabetes among the patients of the two study groups. The most common contributing factors in creating DFU are neuropathy, peripheral artery disease (PAD), deformity and minor trauma. However, when the ulcer appears, other factors usually influence the outcome of the disease. The additional contributing factors are necrosis, gangrene, infection, PAD, advanced age of the patient and other co morbidities such as end stage renal disease (ESRD), and heart failure. The DFU patients are usually older males with a history of prolonged DM combined with poor health condition. They usually depend on assistance of others to perform their daily activities. The average age of these patients is 65 years and they are usually presented with the disease for at least 10 years. The majority of them have a history of uncontrolled diabetes in addition to increased level of HbA1c, and in one-third of the cases other co-morbidities are present.[10- 12]

In the present study, mean HbA1c concentration of the patients with and without diabetic foot ulcer was found to be 9.1% and 8.36% respectively. Mean FBS among the patients with and without diabetic foot ulcer was found to be 129.5 mg/dL and 102.7 mg/dL respectively. Mean RBS among the patients with and without diabetic foot ulcer was found to be 122.7 mg/dL and 146.7 mg/dL respectively. Mean glycemic profile of the patients of the diabetic foot ulcer was found to be significantly higher in comparison to the patients without diabetic foot ulcer. Gadepalli R et al determined the microbiological profile and antibiotic susceptibility patterns of organisms isolated from diabetic foot ulcers. Pus samples for bacterial culture were collected from 80 patients admitted with diabetic foot infections. All patients had ulcers with Wagner's grade 3-5. Fifty patients (62.5%) had coexisting osteomyelitis. Gram-negative bacilli were tested for extended spectrum beta-lactamase (ESBL) production by double

disc diffusion method. Staphylococcal isolates were tested for susceptibility to oxacillin by screen agar method, disc diffusion, and mec A-based PCR. Potential risk factors for MDRO-positive samples were explored. 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 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). Infection with MDROs is common in diabetic foot ulcers and is associated with inadequate glycemic control and increased requirement for surgical treatment.[12]

CONCLUSION

From the above results, the authors concluded that diabetic foot ulcers patients are associated with increased glycemic profile. However; further studies are recommended.

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