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Original Research Paper



General Surgery

" ASSESSMENT OF SEVERITY OF DIABETIC FOOT ULCERS USING DIABETIC ULCER SEVERITY SCORE."

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ABSTRACT

INTRODUCTION : Diabetes mellitus is a common metabolic disorder, prevalence steadily increasing over the past few decades. The complications associated with it , hence , has also increased. Diabetic

foot ulcer is one of the most serious complications, utilizing resources, significantly contributing to the morbidity of the patient. There is hence, a need to correctly identify the severity of the diabetic foot ulcer so as to plan the appropriate management and to help in counselling of such patients.

AIM: To assess severity in diabetic foot ulcer using diabetic ulcer severity score.

MATERIAL AND METHODOLOGY : This is a hospital based longitudinal study, conducted on 93 study subjects admitted with diabetic foot ulcers. Diabetic ulcer severity score was calculated for each patient. The score was calculated by adding scores of the respective parameters constituting site of ulcer, number of ulcers, presence/absence of pedal pulsations, presence/ absence of bone involvement. Each patient was followed up for a period of 6 months, or earlier in case of patient undergoing minor/major amputation. After the study was conducted, analysis was done by calculating various percentages of healing /amputation with respect to the score.

RESULTS: Out of the total 93 study subjects, 74.2% were males. The mean age was calculated to be 59.6 years with maximum number of subjects being in 55-60 years of age group range. Majority of them had diabetic ulcer severity score of 2 (42%). Out of the total study subjects, 58% had a complete healing, 28% underwent minor amputation whereas 14% underwent major amputation. 100% of the study participants with score 0 had healing of ulcer which decreased to 85% for score 1, 53.8% for score 2, 6.25% for score 3 and 0% for score 4. This was suggestive of poorer chances of healing as the diabetic ulcer severity score increases.

CONCLUSION : With the increasing incidence of patients diagnosed with diabetes mellitus , the rate of complications of diabetes has also increased over the past few decades including the risk and occurence of diabetic foot ulcers. There is an increasing need for diabetic foot ulcer prognostication systems and universal use of the same. Thus, we recommend the use of diabetic ulcer severity score as a prognostic tool to assess the severity of the diabetic foot which will further enhance communication and counselling of the patient and will help in providing the appropriate treatment to such patients.

KEYWORDS : diabetic foot ulcers, severity , prognostic classification, amputation.

INTRODUCTION :

Diabetes mellitus is one of the most common metabolic disorders with the world prevalence of 8.8 % and globally involving an increasing number of patients .¹India is considered to be the diabetic capital with the prevalence of diabetes being 8.7% (2016) .² This follows that the morbidity associated with diabetes mellitus has also increased over the past few decades.It is one of the major causes of non traumatic lower limb amputations.⁴

Diabetic foot is defined as "an ulceration of the foot (distally from the ankle and including the ankle) associated with neuropathy and different grades of ischemia and infection." Diabetic foot ulcer classification systems are an important means for assessing and selecting treatment and for improving communication amongst health professionals. There are various classification systems described for diabetic foot ulcer outcome prediction , none of which is universally followed.

Thus, this study is an attempt to assess the severity of diabetic foot ulcer using diabetic ulcer severity score (described first by Beckert and colleagues) and associate it with the outcome which will eventually help in improving the care and counselling of such patients with diabetic foot ulcer.

OBJECTIVE:

To assess severity in diabetic foot ulcer using diabetic ulcer severity score.

METHODOLOGY :

This was a one year hospital based prospective study conducted on total 93 study participants between January 2019 till December 2019. The diabetic ulcer severity score was calculated for each patient and were followed up at 3 and 6 months.

INCLUSION CRITERIA: Patients diagnosed with diabetes mellitus with ulcer/s over foot and all diabetic foot ulcers.

EXCLUSION CRITERIA: Diabetic patients with venous ulcers of foot The diabetic ulcer severity score for each patient was calculated as follows:

Parameter	Score of 0	Score of 1
Site of ulcer	Toe	Foot
Number of ulcers	Single	Multiple
Peripheral pulses /doppler	Present	Absent
X ray foot-osteomyelitis	Absent	Present

Diabetic Ulcer Severity score was calculated as addition of the four individual scores

A subject could have a maximum score of 4 and mininum of 0.

Two follow up visits at 3 and 6 months were done to assess the healing of the ulcer whether it is healed or not or earlier if patient undergoes amputation (at which point the participant will be said to have completed the study).

Healing was defined as epithelialisation of the ulcer by primary intention or skin grafting. Toe amputation or fore foot

amputation was taken as minor amputation while above or below knee amputation as major.

The data collected was entered in Microsoft Excel sheet and analysed using percentages by assessing the percentage of healing/amputation correspondingly.

RESULTS:

In the study, a total of 93 study subjects were included of which the maximum percentage were of the age group range of 55-60 years (21.5%). The mean age calculated was 59.6 years. Youngest patient was 35 years of age and oldest patient was 89 years of age.

TABLE 1 : DISTRIBUTION OF STUDY SUBJECT ACCORDING TO AGE

AGE GROUP	NUMBER OF PATIENTS	PERCENTAGE (%)
	(n)	
35-40	5	5.38
40-45	4	4.30
45-50	5	5.38
50-55	12	12.90
55-60	20	21.50
60-65	16	17.20
65-70	12	12.90
70-75	12	12.90
75-80	5	5.38
80-85	1	1.07
85-90	1	1.07
TOTAL (N)	93	100

Almost three fourth of the study subjects studied were of male gender whereas the rest 25.8% were females.

FIGURE 1 DEPICTION OF STUDY SUBJECTS ACCORDING TO GENDER



FIGURE 2: DEPICTION OF STUDY SUBJECTS WITH RESPECT TO DIABETIC ULCER SEVERITY SCORE



42% of the patients included in the study were found to have diabetic ulcer severity score of 2 , followed by patients with score 1 (29%) , score 3 (17%) , score 0 (9.6%) and score 4 (2.15%).

FIGURE 3 : DEPICTION OF STUDY SUBJECTS WITH RESPECT TO OUTCOME



100% of the patients with diabetic ulcer severity score of 0 had complete healing.

score of 1, had healing of the ulcer in the follow up period of 6 months, whereas 15% of them underwent minor amputation.

53.8% of the patients assessed with diabetic ulcer severity score of 2 had complete healing of ulcer where as 28% of them underwent minor amputation and 18 % underwent major amputation.

56.25% of the patients assessed having diabetic ulcer severity score of 3 underwent minor amputation , as compared to 6.25% who had complete healing of ulcer in the follow up period.

100% of the patients assessed with diabetic ulcer severity score of 4 underwent amputation.

TABLE 2: DISTRIBUTION OF STUDY SUBJECTS WITH ABSENT PEDAL PULSES WITH RESPECT TO OUTCOME

OUTCOME	NUMBER (n)	PERCENTAGE (%)
HEALED	2	6.4
MINOR AMPUTATION	18	58.1
MAJOR AMPUTATION	11	35.5
TOTAL	31	100

TABLE 3: DISTRIBUTION OF STUDY SUBJECTS WITH POSITIVE BONE INVOLVEMENT WITH RESPECT TO OUTCOME

OUTCOME	NUMBER (n)	PERCENTAGE (%)
HEALED	8	30.77
MINOR AMPUTATION	14	53.85
MAJOR AMPUTATION	4	15.38
TOTAL	26	100

DISCUSSION:

Diabetic ulcer severity score as a prognostic scoring system for diabetic foot ulcers was first described by Beckert and his colleagues in the year 2006, in Germany.³ They concluded in their study that this score is important primarily to improve the communication between health care providers and to facilitate an appropriate treatment with respect to ulcer grading.

A total of 93 patients were recruited in this study, age ranged from 35-90 years. Most of the patients belonged to the 55-60 years age group, median age being 59.6 years which is comparable to other studies.³⁵Almost three fourth of the study population were males (74.2%) as compared to 67.5% in the study conducted by Beckert and his colleagues.

Majority of the patients included in the study were examined to have a diabetic ulcer severity score of 2 (42%) followed by score of 1 (29%).

58% of the total patients included in this study, had probability of healing of the ulcer; wherein 100% of the patients with score 0 will have healing of ulcer, decreasing to 85% for score 1, 53.8% for score 2, 6.25% for score 3 and 0% for score 4. This was in contrast with 93% of healing for score 0 and 57% of healing for score 4 in the study conducted by Beckert and colleagues. The result was however comparable to study conducted by Shashikala and colleagues, in Bangalore.⁵

42% of the patients studied underwent some form of amputation ,with 28% having underwent minor amputation and 14% underwent major amputation.

The results of the study also showed that the outcome of the disease worsens as score increases and this trend is comparable to other studies previously done.^{3.56}

The outcome of the patients with absence of pedal pulses was separately studied and it was found that 93.5% of these patients underwent amputation.

85% of the patients assessed having diabetic ulcer severity

This is important to know that as we can infer from the result

that having a component of peripheral vascular disease in the patient affects the outcome of the patient. Diabetes mellitus is known to affect the vessels and cause vasculopathy.

Similarly, the outcome of the patients having bone involvement in the form of erosion or osteomyelitis as seen on radiographs was noted and compared to the outcome and it was found that 69.23% of such patients underwent amputation.

Thus ,this study further reinforces the importance of the finding of osteomyelitis or bone involvement in diabetic foot patients which also eventually affects the outcome

CONCLUSION

With the increasing incidence of patients diagnosed with diabetes mellitus, the rate of complications of diabetes has also increased over the past few decades including the risk and occurrence of diabetic foot ulcers

There is an increasing need for diabetic foot ulcer prognostication systems and universal use of the same.

The importance of counselling of diabetic patients about the various complications of diabetic foot and the risk of amputation can not be understated.

Thus, we recommend the use of diabetic ulcer severity score as a prognostic tool to assess the severity of the diabetic foot which will further enhance communication and counselling of the patient and will help in providing the appropriate treatment to such patients.

Image 1 : Diabetic foot post debridement and amputation of toes.

Image 2 : Diabetic foot with diabetic ulcer severity score of 1



Image 3 : Post below knee amputation.



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