



General surgery

STUDY OF FACTORS INFLUENCING MAJOR AMPUTATION IN DIABETIC FOOT

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ABSTRACT **Introduction** Diabetes becoming progressively dominant global due to decreased physical activity, westernizing food behaviours, obesity; consequently, rising the diabetic foot incidence. Patients with diabetes predicted to have 25% possibility of getting at least a single episode of diabetic foot ulcer through their lifespan further ulcer progress and ends in Amputation. The main aim of study is to determine various factors that are influencing Major amputation in diabetic foot. **Methodology** Prospective observational study of diabetic patients undergoing amputation in JSS hospital Mysore over period of 18 months with sample size of 45 was done. Data was collected from patients by History taking, clinical examination and relevant investigations. Factors like age, duration of diabetes, previous history of amputation, smoking were collected from patient. Arterial insufficiency, neuropathy were assessed by Peripheral pulse, ABPI and monofilament test respectively. Investigations like HBA1c, Haemoglobin, serum albumin, Renal function test, Xray were obtained. After collection of data statistical analysis was made by mean, median, SD, proportion and Inter-quartile range q1 -q3 and determine various factors influencing amputation in diabetic foot. **Result** Total of 45 patients undergoing amputation were studied of which Gender, Smoking, Previous history of minor amputation, Elevated HBA1c, Presence of neuropathy, Vasculopathy, Hypo albuminemia were statistically significant. **Conclusion** In this study history of smoking, history of minor amputation, Elevated HBA1c, Presence of neuropathy, Vasculopathy, Hypo albuminemia are significant factors influencing/ Predicting amputation in Diabetic patients

KEYWORDS : Diabetic foot infection, Major amputation, Diabetic neuropathy, Diabetic vasculopathy

INTRODUCTION

Diabetes becoming progressively dominant global due to increasing age, decreased physical activity, westernizing food behaviours, hiking population, obesity; consequently, rising the diabetic foot incidence. Patients with diabetes predicted to have 25% possibility of getting at least a single episode of diabetic foot ulcer through their lifespan. Additionally, diabetic foot leading to amputation of lower limb is performed globally every 30 seconds, with tolls reaching 30 - 40 times increased chance in patients with diabetes on comparing with the people with no diabetes (Boulton et al., 2005)

DFU is one amongst the more prevalent aftermath of diabetic patients whose blood sugar levels are uncontrolled. DFU also contributes to be a main cause for foot osteomyelitis and lower extremities amputation. The DFI with amputation is expected to increase by 70% in coming years (Nickinson et al., 2020). This is a chronic disease which needs an interprofessional approach to have best results. Once DFU patient develops, the risk of diabetic foot-related amputation rapidly increases (Lin et al., 2020)

Main aim of study is to determine various factors that are influencing Major amputation in diabetic foot also to look for various outcomes of Amputation and to emphasise on various actions that were needed to prevent Amputation.

METHODOLOGY

Prospective observational study of diabetic patients undergoing amputation in JSS hospital Mysore over period of 18 months from December 2019-june 2021 with sample size of 45 was done. Patient undergoing major amputations following trauma were excluded. After obtaining valid consent, Data was collected from patients by History taking, clinical examination and relevant investigations. Factors like age, duration of diabetes, previous history of amputation, smoking were collected from patient. Arterial insufficiency and neuropathy were assessed by Peripheral pulse, ABPI and monofilament test respectively. Investigations like HBA1c, Haemoglobin, serum albumin, Renal function test, Xray were obtained.

After collection of data statistical analysis was made by mean, median, SD, proportion and Inter-quartile range q1 -q3 and determine various factors influencing amputation in diabetic foot

RESULTS

Total of 45 patients were studied of which 37 were male and 8 were

female with Mean age of our study population was 60.17. Mean duration of Diabetes was 9.88 ± 5.25 years. < 5 years in 24.4%, 6-10 years in 44.4%, 11-15 years in 17.8%, 16-20 years in 13.3%. Based on history of previous amputation, 22.2% had ray amputation, 26.7% had toe disarticulation, 4% had symes amputation, 5% had mid tarsal amputation. 60% had habit of smoking.

Demographic details

	Number	Frequency
AGE		
	Mean	60.17
Gender		
	Male	37
	Female	8
Duration of diabetes		
	<5 Yr	11
	6 - 10 yr	20
	>10 yr	14
History of previous amputation		
	Ray amputation	10
	Toe disarticulation	12
	Symes	2
	Mid tarsal	2
	Nil	19
Smoking		
	Yes	27
	No	18

On evaluation of Peripheral vasculopathy Peripheral pulses felt in 60%. The mean ABPI in the affected limb was 0.83 ± 0.16 . 60% had neuropathy. The mean HB levels in the present study was 9.16 ± 1.63 . 28.9% had Hb level at <8g/dl, 8-12g/dl in 64.4% and >12g/dl in 6.7%. The mean RBS value at admission was 250.73 ± 75.42 . 4.4% had RBS value ranging from 12-140. 22.2% had RBS range of 140 -200 and 73.3% had >200. 51.1% had serum creatinine <1.3, 48.9% had serum creatinine >1.3. 37.8% had Osteomyelitis

The mean HbA1c in the present study was 9.45 ± 1.96 . 60% belong to 7-9, 26.7% had 9.1-12 and 13.3% had >12.1

22.2% had complications like surgical site infection which was treated

using antibiotics.

		Number	Frequency
Peripheral pulse	Yes	27	60
	No	18	40
ABPI	0.4-0.8	18	40
	>0.9	27	60
Neuropathy	Yes	27	60
	No	18	40
HB	<8	13	29
	8--12	29	64
	>12	3	7
RBS on admission	120-140	2	4
	140-200	10	23
	>200	33	73
Serum creatinine	<1.3	23	51
	>1.3	22	49
Osteomyelitis	Yes	17	38
	No	28	62
HbA1C	7--9	27	60
	9--12	12	27
	>12	6	13
Complication	Yes	10	22
	No	35	78

DISCUSSION

Mean age of our study population was 60.17 Similar to Bal BS et al study were mean age was 67.31±5.37(Bal BS, i 2019;7:1190-5,)

Though the mean age of patients undergoing amputation was 60 years, significant amount of population were below 50 years of age, who belong to the working age group causing serious economic burden to the family Mean duration of diabetes was 9.88 ± 5.25 years which is comparable to Bal BS et al study were mean duration was 9.9±2.55 years ,in Seth et all were mean duration was 12 years.(Seth et al., 2019) In literature, most of the previous studies the duration of diabetes mellitus directly correlates with increased risk of amputation, in our study though mean duration of diabetes was 9 years significant number of amputations were done in patient who had diabetes for a duration from 6 to 10 years when compared to those having more than 10 years.

The mean HbA1c in the present study was 9.45 ± 1.96. 60% belong to 7-9, 26.7% had 9.1-12 and 13.3% had >12.1. The cut off value of HBA1c in the present study at which complications can be predicted in the present study is >9. At this cutoff value, complications can be predicted with 80% sensitivity and 7.43 specificity with area under the curve 0.79 similar to Arya et al conducted a study and reported on the association Deranged HbA1c values and the risk of amputation. (Arya S, Binney ZO, 1;67(1):217-28,..). Katherine et al reported that there is significant worsening in the 30-day surgical outcomes in patients with Uncontrolled diabetes of HbA1c value >10.0%(McGinigle KL, y. 2020)

The mean ABPI in the affected limb was 0.83 ± 0.16 in the present study. 60% had neuropathy The mean HB levels in the present study was 9.16. The mean RBS value at admission was 250.73Also, in this study only 40 % of patient who underwent amputation had Arterial insufficiency and 60 % had peripheral neuropathy and so there are significant people who underwent amputation had no Arterial insufficiency and Neuropathy and this requires further detailed study for correlation between arterial insufficiency, neuropathy and risk of amputation Among 45 person studied in this study Gender, Smoking, Previous history of minor amputation, Elevated HBA1c, Presence of neuropathy, Vasculopathy, Hypo albuminemia were statistically significant

CONCLUSION

In this study history of smoking, history of minor amputation, Elevated

HBA1c, Presence of neuropathy, Vasculopathy, Hypo albuminemia are significant factors influencing amputation in Diabetic patients.

If risk factors were identified in early stage and corrected can prevent Diabetic foot and amputation. Good glycaemic control and Education in terms of foot care plays an important role in preventing complications associated with diabetic foot ulceration. By creating proper awareness among diabetic patients regarding Course of disease, Risk factors can be identified in initial stage and by Providing proper podiatric care and glycaemic control Amputation can be avoided.

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