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**Research Article**

### ASSOCIATION OF SOCIOECONOMIC STATUS, HYPERTENSION AND TREATMENT MODALITY WITH DIABETIC AMPUTATION- A CASE CONTROL STUDY

<sup>1</sup>Dr. Muhammad Haseeb Ul Rasool, <sup>1</sup>Dr. Maleeha Saleem, <sup>2</sup>Dr. Nazarat Habib

<sup>1</sup>MBBS, King Edward Medical University, Lahore.

<sup>2</sup>MBBS, Basic Health Unit, Jatri Kohna District Sheikhupura

**Abstract:**

**Objective:** To association of hypertension, treatment modality and socioeconomic status with lower extremity amputation in persons with diabetes mellitus.

**Methods:** 100 patients fulfilling the inclusion criteria were recruited. %0 of them were controls and 50 of them were cases with amputation caused by diabetic lesions, admitted for treatment in the Department of Surgery for care of Diabetes Mellitus. Various treatment modalities, hypertension, and socioeconomic background were evaluated among controls and cases according to a pre-designed questionnaire during period from August, 2017 to March, 2018. Demographic data was gathered from the respondents. Frequency tables were generated regarding research variables.

**Results:** 100 participants were interviewed about the treatment they used, hypertensive control and socioeconomic background in association with diabetic foot. Patients were allocated to either cases or control group, based on whether they had an amputation or not. There was slight male dominance in both cases and controls with males contribution 68% and 70% to sample respectively. Predominant fractions of patients' were of age greater than 50 years. 64% of samples were from low socioeconomic background in cases, whereas among controls 74% of patients were on middle class background. Equal fraction of cases and controls had hypertension. Among cases, 58% were using oral hypoglycemics, 72% were using Insulin and 16% had taken homeopathic medications. The proportion of oral hypoglycemics, insulin and homeopathic medications were 68%, 60% and 14% among controls. Age and Hypertension did not showed any significant risk association, same holds true for gender, whereas socioeconomic background had a strong risk association with amputation. None of the treatment pattern, whether oral hypoglycemic drugs, Insulin or homeopathic medication showed any significant risk association

**Conclusion:** Age, hypertension and medicines used failed to show any significant association with development of diabetic ulcers, leading to amputation. Whereas lower socioeconomic status had a stronger risk association with development of Diabetic Amputation.

**Key Words:** Diabetic Foot. Diabetes Mellitus, Amputations. Glycemic Control, Complications of Diabetes Mellitus.

**Corresponding Author:**

**Muhammad Haseeb Ul Rasool,**

**MBBS,**

**King Edward Medical University,**

**Lahore.**

**QR code**



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## INTRODUCTION:

One of the most disabling complication of diabetes mellitus is Lower extremity amputation(LEA) and it basically results from the combined pathophysiologic effects of peripheral artery disease and peripheral neuropathy.<sup>1</sup> and the life time risk of developing a foot ulcer is estimated to be 15% in a diabetic patient.<sup>2</sup> Foot wounds are a frequent precursor of lower extremity amputations and are also one of the most common cause of diabetes related hospitalizations.<sup>3</sup>

Despite its utmost clinical significance, amputation is probably the least studied among all complications of the diabetes.<sup>4</sup> One study conducted by Carlson et al in 2003, demonstrated risk factors as gender, foot infection, and diabetic nephropathy in amputation<sup>5</sup>. Chaturvedi N and colleagues in 2001 in a study concluded that the risk of amputation is directly related to the other vascular complications in a diabetic patient indicating a role for hyperglycemia.<sup>6</sup> Al-Maskari F et al in his article in 2007 , predicted using univariate analysis that the major risk factors associated with neuropathy were the male gender ( $p = 0.006$ ), age ( $p = 0.01$ ), poor level of education ( $p = 0.04$ ) and poor glycemic control ( $p = 0.006$ ). He also predicted that male gender, age , incidental diagnosis of diabetes , duration of diabetes and presence of hypertension , were the major risk factors involved in the development of peripheral artery disease which in turn is a significant risk factor for Diabetic ulcer ,gangrene and amputation.<sup>7</sup> Almost 100% of the amputations were associated with the presence of peripheral vascular disease, 78% were associated with neuropathy and 24% were associated with infection.

The present study was undertaken to identify the various risk factors that are involved in the amputations in diabetic patients so that it may help to have a better insight into them and to adopt different measures and therapies to control them at an early stage and thus reduce the overall risk of amputation and improve the quality of life. In Pakistan, since due to the rising prevalence of diabetes and lack of awareness and insight into the illness, it is significantly important to conduct this study that will, in addition to spreading awareness will also quantify the risk factors involved in amputation.

## OBJECTIVES:

To association of hypertension, treatment modality and socioeconomic status with lower extremity amputation in persons with diabetes mellitus.

## METHODS AND MATERIALS:

**STUDY DESIGN:** Comparative Cross Sectional Study

**STUDY SETTING:** Department of Surgery ,Mayo Hospital, Lahore

**DURATION:** 8 months (August 2017-March 2018)

**SAMPLE SIZE:** 50 patients having amputation associated with diabetes and 50 diabetic controls without limb lesions were enrolled from inpatient care and outpatient surgical patients seen at the Mayo Hospital Lahore.

**SAMPLING TECHNIQUE:** Simple Random sampling

### SAMPLE SELECTION CRITERIA:

#### INCLUSION CRITERIA:

1. Adult (young, middle aged and old) male and female suffering from diabetes mellitus.

#### EXCLUSION CRITERIA:

1. Unable to coordinate or with cognitive and hearing impairment.
2. Traumatic amputation patients.
3. Gestational diabetes mellitus.
4. Diabetic patients with previous history of amputations.
5. Ulcer and gangrene due to reasons other than diabetes mellitus, and signs of acute peripheral arterial thrombosis.

## DATA COLLECTION PROCEDURE:

After taking informed written consent, data was collected by the researchers with the help of Pre-tested data collecting tool (questionnaire). Data was collected according to the variable of questionnaire. Demographic data was taken from the participants. Questions were asked from the patients of Diabetes Mellitus, attending the Out Patient Department, Department of Surgery ,Mayo Hospital, Lahore about their severity of disease and causative factors related to amputation and all risk factors-related information were collected from clinical records using a short structural chart. Kuppuswamy's socioeconomic scale was used to determine the socioeconomic status of respondents which include occupation, education and income.

## DATA ANALYSIS:

The collected data was analyzed by SPSS (statistical package for social scientist) version 20. The data was

reported using descriptive and inferential statistics. The quantitative variables like age, gender etc. were reported using standard deviation, standard errors and mean. The qualitative variables like gender etc. were reported using percentages and frequencies. Association between outcome and risk factors were calculated by using chi square test. P-value of  $>0.05$  was used as a cut off value for determining significance of association.

#### **SOCIAL AND ETHICAL CONSIDERATIONS:**

We got proper consent from the registrars of the Surgical Wards of Mayo Hospital, Lahore. Proper Consent was taken from the subjects after thoroughly explaining the topic, its outcome and effect on patient health.

#### **RESULTS:**

Sr. No	Socioeconomic Status	Percentage of cases	Percentage of controls
1.	Lower Class	64	18
2.	Middle Class	36	74
3.	Higher Class	00	08

Amputation due to diabetes mellitus was used as the inclusion criteria, so cases and controls were recruited according to inclusion criteria. 58% cases have been using oral hypoglycemic drugs for diabetes, 72% were using insulin and 16% had used homeopathic medications. Among controls, the distribution was 68%, 60%, and 14% respectfully. 52% of cases were hypertensive where as 52% of controls were hypertensive.

Using Pearson Chi Square test, association between various risk factors was calculated at p-value $<0.05$ . Following were the result of chi square test:

Sr. No.	Risk Factor	Pearson's chi Square test	P-Value
1.	Age	0.047	0.500
2.	Educated	21.236	0.000
3.	Socioeconomic Status	23.466	0.000
4.	Gender	0.437	0.330
5.	Oral hypoglycemic Drugs use	1.073	0.204
6.	Insulin use	1.604	0.146
7.	Homeopathic drugs	0.078	0.500
8.	Hypertension	0.000	0.579

#### **DISCUSSION:**

Diabetic foot ulcers are the major predisposal factor for amputation of lower limbs. Diabetic amputation is the least commonly studied complication of diabetes, whereby role of various factors, either arising as a result of diabetes or are independent co morbid condition are controversial. In a study done in 2001, it was found that patients with diabetes had an earlier age at amputation of limbs as compared to generalized population, but we didn't find that age had any significant association with amputation due to diabetes.<sup>8</sup>

100 participants were recruited from the department of surgery who fulfilled the inclusion criteria of study. They were asked for the demographic data, the medical treatment they opted for, and hypertension, in association with development of diabetic foot, that later on can result in amputation. Out of total respondents, 71 were male and 29 were female. Out of cases, 68% were male and 32% were female, whereas among controls, males constituted 74% of sample and 26% by females. 68% of patients were of age more than 50 years among cases. Among controls, 70% patients were of age more than 50 years. 30% of cases were educated and 76% of controls were educated. Using Kuppuswamy's socioeconomic scale, participants were asked about their Education, Monthly Income and Occupation. Following were the distribution of socioeconomic status among cases and controls.

It was found in a study that Males were more likely to have an amputation following diabetic foot ulceration, whereas females had more mortality ration after lower extremity Amputation.<sup>9</sup> However no such link could be elicited in our study and the association of gender with amputation was just meagre.

In a prospective cohort study done at Department of Orthopedic Surgery, Yong Loo Lin School of Medicine, National University of Singapore, Singapore, It was found that Education up to secondary school level, Low average monthly

income, were significantly associated with diabetic lesions.<sup>10</sup> A similar effect of association was found in our study. Whereby educated patients were well aware of the complications and likely outcome of disease and so were more concerned and diligent in managing the diabetic control in tight limits, where as the majority of patients who underwent amputation were uneducated, unable to understand the severity of disease and its impact on their limbs. Similarly, most of the cases studied were of poor socioeconomic background, limiting the availability of resources for proper follow up required. Much cases had a sedentary life style without allowing collateral supply of arteries to grow, that could ameliorate effect of any insult on diabetic foot. Much of the cases were exercising, keeping in view the role of development of collateral blood supply, whereas that also help them regulate their glucose levels in required limits.

A cross sectional study done in a tertiary care hospitals in 2015, an extensive study was done to study association of Hypertension among general population to study their distribution. Hypertension, was statistically significantly associated with Amputation risk, whereas Age, was not significantly associated with risk of amputation.<sup>11</sup> In our study we had that Hypertension failed to demonstrate any significant effect on development of diabetic foot ulcers. Tight blood pressure control in patients with hypertension and type 2 diabetes achieves a clinically important reduction in the risk of deaths related to diabetes, complications related to diabetes, progression of diabetic retinopathy, and deterioration in visual acuity.<sup>12</sup> However no such effect of hypertension could be elicited in our study.

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