



# Frequency of Microalbuminuria in Vascular End Point Events

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## ABSTRACT

**Introduction:** Microalbuminuria (MA) is considered as an independent risk factor for stroke and various cardiovascular disorders. MA is modifiable with pharmacological intervention. Screening for MA may help in decreasing morbidity and mortality from stroke and Myocardial Infarction (MI) if early pharmacological intervention is instituted. **Objective:** To evaluate the frequency of microalbuminuria in patients with vascular end point events. **Study Design:** Cross-sectional study. **Settings:** Medical Unit V, DHQ/ Civil Hospital, Faisalabad Pakistan. **Duration:** Six months, from 01-07-2018 to 31-12-2018. **Methodology:** 126 patients presenting in hospital with stroke, MI with or without hypertension and diabetes mellitus were evaluated for 24-hour urinary albumin excretion, after excluding patients with raised serum creatinine, urinary tract infection, congestive heart failure and menstruation. A urinary albumin level between 30 to 300 mg/24hour was defined as MA. **Results:** Total of 126 patients, 76 patients had stroke, 50 patients had MI. Out of 76 patients presenting with stroke, MA was detected in 31(40%) patients. Out of 50 patients with MI, MA was detected in 9 (18%) patients. 17 stroke patients with microalbuminuria (55%) were diabetics and 14 (45%) were non diabetics. 5 MI patients with microalbuminuria (55%) were diabetics while 4 (45%) were non-diabetics. **Conclusion:** As shown in the study, the high frequency of microalbuminuria was found in patients with stroke and MI. Microalbuminuria is an important modifiable risk factor along with other risk factors in identifying the patients who are having increased risk of developing vascular end point events i.e. stroke, MI.

**Keywords:** Albuminuria, Diabetes Mellitus, Hypertension, Stroke, Myocardial Infarction.

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## INTRODUCTION

Cerebrovascular and cardiovascular medical events comprise a large proportion of patients presenting in Medical Emergency. Vascular end point events in context of cardiovascular system are myocardial infarction and in case of cerebrovascular disease are complete stroke.<sup>1</sup> Stroke is the commonest cause of physical disability and second leading cause of death worldwide. Its incidence increases with age.<sup>2</sup> It is important to stress on the fact that stroke is preventable by controlling the modifiable risk factors.<sup>3</sup>

Although there are a number of modifiable and non-modifiable risk factors for the development of generalized vascular disease, microalbuminuria (MA) is claimed to be an early indicator of vascular damage. It is believed that the mechanism by which microalbuminuria leads to clinically evident vascular event is increase in systemic vascular permeability because of endothelial injury produced by generalized atheroma formation. An increased urinary albumin excretion rate i.e. microalbuminuria, has been believed to be an independent prognostic factor of cardiovascular mortality and morbidity both in non-diabetic and diabetic patients.

Microalbuminuria (MA) is defined as albumin concentration of 30 to 300 mg/day in a 24hour urine collection or 30 to 300 µg/mg creatinine in a spot urine sample. MA is believed to have strong association with the development of atherosclerosis.<sup>4</sup>

Microalbuminuria is detected in up to 13.6% of patients presenting with MI.<sup>5</sup> The percentage is even higher (50%) in patients with stroke.<sup>6</sup>

In patients with MI, albuminuria has proved to be an important predictor of subsequent outcomes.<sup>7</sup> In a recent study, microalbuminuria (MA) was found to be present in about 60% of patients with ischemic stroke.<sup>8</sup> Up till now, there is no large local study available about the prevalence of MA in ischemic stroke patients. Multiple studies are being conducted worldwide to find out the role of microalbuminuria as a modifiable cardiovascular risk factor, especially in individuals with hypertension and diabetes. Although there are pharmacological agents that decrease or slow the progression of microalbuminuria and decrease the chances of progression to overt nephropathy, their role in reduction of mortality and morbidity due to cerebrovascular and cardiovascular diseases has not been studied in detail.

The rationale of this study was to find out the frequency of microalbuminuria (MA) in vascular end point events i.e. stroke, Myocardial Infarction (MI), to find out the role of MA as a modifiable risk factor for stroke and MI. By identifying MA as a risk factor for vascular end point diseases, the incidence of stroke and MI can be reduced by eliminating the MA which is modifiable with the use of ACE inhibitors, angiotensin receptor blockers and diuretics.

## METHODOLOGY

**Study Design:** Cross-sectional study.

**Settings:** Medical Unit II, V Allied & DHQ Hospitals Faisalabad

**Duration:** 6 months from 01-07-2018 to 31-12-2018.

**Sample Technique:**

**Sample Size:** 126 patients.

**Inclusion Criteria:** Patients between ages 20-80 of either gender who presented with cardiovascular or cerebrovascular events were included in the study.

**Exclusion Criteria:** All patients with plasma creatinine more than 1.2 mg/dl, patients with urinary tract infection and patients with heart failure were excluded from this study.

**Data Collection:** After taking approval from Hospital Ethical Committee, all consecutive subjects presenting in Medical Out door and Emergency Departments with cardiovascular or cerebrovascular events were considered for the study after informed written consent who met the inclusion criteria. Clinical features suggestive of cardiovascular events included severe left sided chest pain associated with breathlessness, nausea, vomiting, sweating while those with cerebrovascular events had clinical features of unconsciousness hemiparesis, hemiplegia and aphasia. After emergency resuscitation, these patients underwent more elaborate clinical and laboratory work up to exclude the patients mentioned in the exclusion criteria. Common workup for both cardiovascular and cerebrovascular patients included detailed history, thorough examination, CBC with ESR, LFT's, blood urea, serum creatinine levels, urine complete examination. Special investigation for cardiac patients included serial ECGs and serial cardiac enzyme levels at presentation and after 24 and 48 hours. Cerebrovascular patients underwent CT brain (non contrast). Written informed consent was taken from the patients who were included in the study after fulfilling the inclusion criteria. 24- hour urine was collected, sent to laboratory and was subjected to analysis for presence or absence of albumin (level between 30-300 mg/24 hours). All the laboratory, radiological and pathological investigations were carried out in the respective departments. Data was analyzed with the help of SPSS 10. Mean  $\pm$  standard deviation was calculated for the age of the patients. For gender and type of vascular end point events having micro albuminuria detected in their 24-hour urine sample, percentages and frequencies were noted. All the data were presented in form of tables and graphs.

## RESULTS

A total of 126 patients of stroke and myocardial infarction (MI) were included in the study. Out of these patients 76 (60%) patients had stroke while 50 (40%) patients had MI. (Table 1). Out of 76 patients with stroke 42 (55%) were male and 34 (45%) were female (table 2). Out of 50 patients with MI 28 (56%) were male and 22 (44%) female (table 3). Minimum age was 22 years and maximum age 80 years. Mean  $\pm$  standard deviation of patients with stroke was  $60.04 \pm 15.01$  years and that of patients with MI was  $58.24 \pm 14.08$  (table 4). Out of 76 patients with stroke 40 (52%) had diabetes while 36 (48%) were non-diabetic.

In patients with MI 28 (56%) were diabetic while 22 (44%) were non-diabetic (table 5).

In 76 stroke patients, microalbuminuria was found in 31 patients (40%). Out of those 31 patients, 18 (58%) were male and 13 (42%) were female (table 6, Fig 1). 17 patients with microalbuminuria (55%) were diabetics and 14 (45%) were non diabetics.

In 50 patients with MI, microalbuminuria was found in 9 patients (18%). Out of those 6 were male (66%) while 3 (34%) were female. (Table 7, Fig 2). 5 patients (55%) with microalbuminuria were diabetic, while 4 (45%) were non-diabetic.

**Table 1: Total number of patients & gender distribution (N= 126)**

Disease	No. of Patients	Percentage	Male	Female
Stroke	76	60%	42 (55%)	35 (45%)
MI	50	40%	28 (56%)	22 (44%)

**Table 2: Mean Age of Patients**

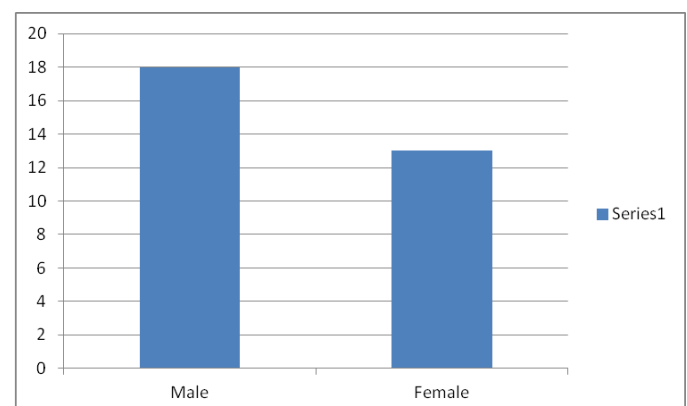
Stroke	60.04 $\pm$ 15.01
MI	58.24 $\pm$ 14.08

**Table 3: Prevalence of Diabetes Mellitus**

	Stroke	MI
Diabetics	40 (52%)	28 (56%)
Non-Diabetics	36 (48%)	22(44%)

**Table 4: Frequency of microalbuminuria in stroke patients (N= 76)**

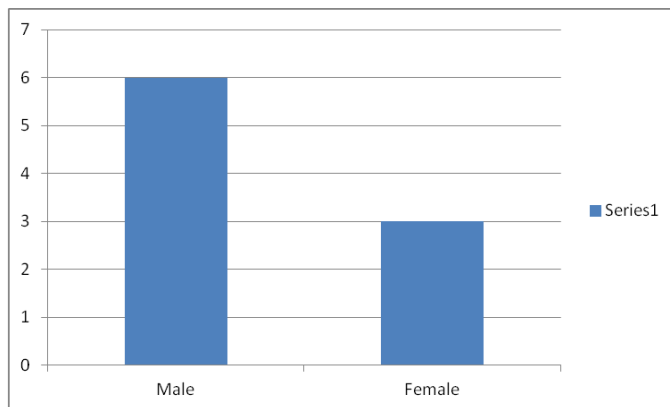
Microalbuminuria present	31
Microalbuminuria absent	45



**Figure 1: Frequency of Stroke Male and Female Patients having Microalbuminuria**

**Table 5: Frequency of Microalbuminuria in MI Patients (N= 50)**

Microalbuminuria present	9
Microalbuminuria absent	41

**Figure 2: Frequency of MI Male and Female Patients having Microalbuminuria**

## DISCUSSION

This study was carried out to evaluate the role of microalbuminuria (MA) as a risk factor for atherosclerosis and its relationship with vascular end point events i.e stroke and myocardial infarction (MI), in 126 patients with stroke and myocardial infarction admitted to DHQ hospital, Faisalabad. Previously many studies conducted worldwide show that microalbuminuria leads to an increase in risk for mortality and morbidity due to cerebrovascular and cardiovascular diseases and peripheral arterial disorders.

A study conducted by Yudkin *et al*<sup>9</sup> was one of the first study to suggest relationship between microalbuminuria and the prevalence of ischemic heart disease. After that, various studies both in the common population and in individuals with multiple risk factors have pointed out the association of microalbuminuria with various confirmed cardiovascular risk factors (age of the patients, diabetes mellitus, smoking hypertension, dyslipidemia and obesity), in addition to multiple new cardiovascular risk factors such as endothelial dysfunction and hyperhomocysteinaemia.<sup>10</sup>

Our study results show that MA was found in 40% stroke patients. 45% of patients who were not suffering from diabetes mellitus had MA. Our results are similar to the study conducted by Slowik *et al* in which MA was found in 46.7% of acute non-diabetic ischemic stroke patients.<sup>11</sup>

The largest prospective study to date, studying the correlation between MA and fatal and non-fatal cerebrovascular events in common population was EPIC-Norfolk study which was performed by Yuyun *et al* in British population.<sup>12</sup> The participants in the study comprised of 23,630 people between the ages of 40-79 years and participants were followed up for an average of 7.2 years. 246 events of stroke were reported during this period. In multivariate analysis, MA was independently predictive of ischemic stroke (HR 2.01;95% CI 1.29 to 3.31). It was concluded

that increased MA is associated independently with about 50% increase in the risk of development of cerebrovascular events in common population.<sup>10</sup> The results of our study are in accordance with these findings.

In our study, the frequency of microalbuminuria (MA) in patients with diabetes and stroke was 55%. These results are in accordance with the results of the study by Beamer *et al*. They suggested that the commonest clinical entity which is associated with MA is diabetes mellitus in patients with recent cerebrovascular events and in the combined group including patients with cerebrovascular disease.<sup>12</sup>

As discussed above, 45% of non-diabetic patients with stroke had microalbuminuria. This points out the fact that presence of MA is common in patients with ischemic stroke even though hypertension and diabetes mellitus which are considered to be the main risk factors for development of stroke have been excluded. Our results are similar to a study by Singh S *et al* in which the frequency of MA in patients presenting with ischemic stroke was 41.6%.<sup>13</sup>

In another cross-sectional study by Naha S *et al* it was concluded that MA is related independently to ischemic heart disease and levels greater than 12.6 mg/g are predictive of ischemic heart disease.<sup>14</sup> In our study 18% of patients with MI had microalbuminuria suggesting it as an important marker for MI.

The results of our study show that the frequency of MA in patients with ischemic cerebrovascular events and MI is quite significant. In the general population having additional risk factors for development of stroke, screening for microalbuminuria should be carried out routinely as a result of which early pharmacological intervention can be provided to patients which will lead to decrease in mortality and morbidity caused by these diseases.

## CONCLUSION

This study concludes because of the high frequency of microalbuminuria present in patients presenting with ischemic cerebrovascular disease and myocardial infarction, microalbuminuria is an important reversible risk factor along with other known risk factors like diabetes mellitus and hypertension in identification of individuals who are at increased risk of ischemic stroke and myocardial infarction in general population.

## LIMITATIONS

As the study is of cross-sectional design, it is not possible to suggest with certainty that MA precedes ischemic stroke or vice versa. Large scale cohort studies in future will help in finding an answer.

## SUGGESTIONS

As there is increasing evidence that there is increase in risk of mortality of patients with MA even without hypertension and diabetes mellitus, large multicenter prospective studies are needed to confirm the effectiveness of routine screening for microalbuminuria in general population of non-diabetic individuals without any risk factors.

## CONFLICT OF INTEREST

The authors have no conflict of interest in this study. No funding was involved in this study.




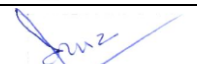

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