

## Frequency of microalbuminuria in patients with ischemic stroke

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**Objective:** To determine the frequency of microalbuminuria in patients with ischemic stroke.

**Methodology:** This cross-sectional study was conducted from 1<sup>st</sup> April 2009 to 30<sup>th</sup> September 2009 at Allied Hospital, Faisalabad. 195 patients of ischemic stroke, with or without diabetes mellitus and hypertension were tested for early morning urine albumin to creatinine ratio. A urinary albumin to creatinine ratio of 30 to 300 g/mg was considered as microalbuminuria.

**Results:** Out of 195 patients, microalbuminuria was present in 94 (48.2%) patients. Out of 68 diabetic patients, microalbuminuria was present in 37 (54.4%) patients while out of 127 non-diabetics, 57 (44.9%) had microalbuminuria. Out of 113 hypertensive patients, microalbuminuria

was present in 56 (49.6%) while out of 82 non-hypertensives, 38 (46.3%) had microalbuminuria. Among 28 patients having both diabetes mellitus and hypertension, 16 (57.1%) had microalbuminuria. Out of 42 patients without both diabetes and hypertension, 17 (40.5%) had microalbuminuria.

**Conclusion:** We found high frequency of microalbuminuria in patients with ischemic stroke. Therefore, microalbuminuria could be is a useful modifiable factor, in addition to conventional risk factors, in identifying those at increased risk of ischemic stroke. (Rawal Med J 2013;38:97-99).

**Keywords:** Albuminuria, diabetes mellitus, hypertension, ischemic stroke.

### INTRODUCTION

Ischemic stroke is the leading cause of physical disability and third leading cause of death worldwide.<sup>1</sup> It is predicted that stroke will soon become the leading cause of death worldwide.<sup>2</sup> One study reported a stroke prevalence of 4.8% in Pakistani population.<sup>3</sup> The most important modifiable risk factors for stroke are hypertension, diabetes mellitus, cigarette smoking and hypercholesterolemia.<sup>4</sup> Other risks include heavy alcohol consumption, illicit drug use and age above 55 years.<sup>5</sup> Atherosclerosis of the arteries supplying the central nervous system is believed to be the main etiologic factor in ischemic stroke and microalbuminuria (MA), defined as albumin concentration of 30 to 300 mg/day in a 24-hour urine collection or 30 to 300 µg/mg creatinine in a spot urine sample (preferred method), is considered to be associated with atherosclerosis.<sup>6-8</sup>

The proposed mechanism of MA leading to clinical vascular disease is increased systemic vascular permeability due to endothelial damage caused by systemic atheroma formation.<sup>9</sup> It is believed to be a

major independent risk factor for cardiovascular disease as well ischemic stroke.<sup>9</sup> It has been observed in 46-50% of patients with ischemic stroke in various international studies.<sup>10,11</sup> Interestingly, it is found in 5-7% of seemingly healthy individuals.<sup>12</sup> These data suggest that MA merits further examination as a potentially inexpensive and easily measured marker of increased risk for stroke.<sup>13</sup> Albuminuria is strongly linked to stroke risk, and persons with elevated urinary albumin excretion may especially benefit from more intensive vascular risk reduction.<sup>14,15</sup> The aim of this study was to determine the frequency of MA in patients with ischemic stroke.

### METHODOLOGY

Patients admitted via outpatient department/medical emergency of Allied Hospital, Faisalabad with diagnosis of ischemic stroke on basis of focal neurological deficit and infarction on CT scan brain within 72 hrs of admission were included in this cross sectional study. An informed written consent from patient or a first degree relative was obtained.

An ACR of 30 to 300 g/mg was considered as MA. With sample size of 195, all patients of ischemic stroke with or without diabetes mellitus, with or without hypertension, with or without hypercholesterolemia and with or without smoking were included in the study. Those with plasma creatinine >1.2mg/dl, urinary tract infection, congestive cardiac failure and menstruating women were excluded from the study. Data was analyzed using SPSS v 10.

**RESULTS**

Out of 195 patients, there were 105 (53.8%) male and 90 (46.2%) females. Age ranged from 22 -100 years (mean 60.06±14.31). Patients were distributed in 4 different age groups; Group 1 (20-40 years) had 20 patients (10.3 %), group 2 (41-60 years) had 80 patients (41 %), group 3 (61-80 years) had 85 patients (43.6 %) and group 4 (81-100 years) had 10 patients (5.1%).

**Table 1. Distribution of patients according to DM, HTN and Microalbuminuria.**

Variable	Present (%)	Absent (%)
Diabetes Mellitus	68 (34.9%)	127(65.1%)
Hypertension	113 (57.9%)	82 (42.1%)
Microalbuminuria	94 (48.2%)	101 (51.8%)

Minimum duration of stroke was 3 hours while maximum was 70 hours (mean 13.80±9.9). Minimum ACR was 2.53 g/mg while maximum was 295.60 g/mg (mean 63.54±66.63). More patients had hypertension then diabetes and MA was present in 94 (48.2%) patients (Table 1). Among 90 female patients, MA was present in 46 (51.1%) patients.

**Table 2. Distribution of patients with microalbuminuria in relation with DM and HPTN.**

		Microalbuminuria		Chi-square value	p-value
		Present	Absent		
Diabetes Mellitus	Present	37	31	1.611	0.204
	Absent	57	70		
Hypertension	Present	56	57	0.197	0.657
	Absent	38	44		

Among a total of 68 diabetic patients, MA was present in 37 (54.4%) patients and out of 127 non-diabetics, 57 (44.9%) had MA (p=0.204). Among a

total of 113 hypertensive patients, MA was present in 56 (49.6%) patients and out of 82 non-hypertensives, 38 (46.3%) had MA (p=0.657) (Table 2). Among a total of 40 patients having diabetes without hypertension MA was present in 21 (52.5%) and out of 85 patients having hypertension without diabetes, 40 (47.1%) had MA (Table 2). Among a total of 28 patients having both diabetes and hypertension, 16 (57.1%) patients had MA and among a total of 42 patients without both diabetes and hypertension, 17 (40.5%) patients had MA. MA was more frequent in first 24 hours when plotted according to duration of ischemic stroke.

**DISCUSSION**

Our study results revealed that MA was present in 48.2% of patients with ischemic stroke and among non-diabetics, 44.9% of patients had MA. These results are in accordance with earlier studies reporting MA in 46.7% of acute non-diabetic ischemic stroke patients and as opposed to only 13.5% of controls, who had stroke several months ago.<sup>16,17</sup> In an Indian study MA was found in 68% of acute non-diabetic ischemic stroke patients.<sup>18</sup> Yuyun et al, in multivariate analysis found that MA was only independent predictor of ischemic stroke (HR 2.01; 95% CI 1.29 to 3.31) and concluded that it was independently associated with approximately 50% increase in risk of stroke in general population.<sup>10</sup> In our study, frequency of MA was 52.5% in patients with diabetes alone and 47.1% in patients with hypertension alone. In the presence of both diabetes and hypertension, frequency arose to 57.1%. These results are in accordance with the study of Beamer et al who reported that diabetes was the clinical factor most closely related to MA in both patients with recent stroke and the combined group with cerebrovascular disease.<sup>19</sup> Even after adjusting for diabetes and hypertension, 40.5% of our patients had MA. This is in accordance with EPIC-Norfolk study and study of Beamer et al.<sup>10,19</sup> We found that MA was more common in first 24 hours after ischemic stroke. Similar findings were noted by others.<sup>18</sup> This may be partially as a consequence of inflammatory reaction that involves renal system in patients with ischemic stroke.

MA is modifiable with the use of ACE inhibitors,

ARBs, ACE inhibitor plus ARB, ARB plus Aliskiren, calcium channel blockers, beta blockers, aldosterone antagonists and statins. With significant frequency of MA in patients with ischemic stroke, MA screening in general population with additional risk factors for cerebrovascular disease should be a routine, so that with early pharmacological intervention we may be able to decrease the morbidity and mortality in this group of patients. This study limitations include a single early morning spot urine sample was tested for MA for cost effectiveness, while current guidelines require at least two of three specimens fall within the microalbuminuric range in order to label as MA.<sup>20</sup> Moreover, as the study was of cross-sectional in design, it is not easy to predict exactly whether MA preceded stroke or vice versa. Future cohort studies will be helpful in providing an answer.

## CONCLUSION

There was a high frequency of microalbuminuria in patients with ischemic stroke. This is a useful modifiable factor in identifying those at increased risk of ischemic stroke.

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Conception and design: Muhammad Ahsan Farooq, Muhammad Sohail Anjum, Fayyaz Ahmed Malik, Naila Kalsoom

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**Conflict of Interest:** None declared

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