

ORIGINAL ARTICLE

FREQUENCY OF MICROALBUMINURIA IN HYPERTENSIVE PATIENTS WITH ACUTE ISCHEMIC STROKE

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Background: Stroke, and its most common variant ischemic stroke, is one of the major causes of morbidity and mortality worldwide. Besides conventional risk factors, microalbuminuria (MA) is considered to be associated with atherosclerosis, hence ischemic stroke. Early detection of microalbuminuria may help in identifying hypertensive patients at high risk of ischemic stroke. The aim of current study was to determine the frequency of microalbuminuria in hypertensive patients with ischemic stroke. **Methodology:** This cross-sectional study was conducted at the Department of Medicine, Hayatabad Medical Complex Peshawar, Pakistan from July 2020 to June 2021. A total of 196 hypertensive patients of either sex with ischemic stroke were included in this study. They were tested for microalbuminuria in a 24-hours urine sample using Pyrogallol Red method. Urine albumin concentration of 30–300 mg/day was considered as microalbuminuria. The frequency of microalbuminuria was stratified according to age and gender using Microsoft Excel sheet. **Results:** The participants were aged 30–70 years and most of them (88, 45%) were in the age group 61–70 years. Majority (122, 62%) of the patients were male. Microalbuminuria was identified in 92 (47%) patients with slight male predominance (57, 62%). **Conclusion:** Given the high frequency of Microalbuminuria in hypertensive patients with acute ischemic stroke, microalbuminuria is a useful and inexpensive parameter in identifying hypertensive patients at increased risk of ischemic stroke.

Keywords: Albuminuria, Hypertension, Diabetes mellitus, Ischemic stroke

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INTRODUCTION

Stroke or cerebrovascular accident (CVA) is a focal neurological deficit due to vascular lesion. It is sub-classified into ischemic and haemorrhagic CVA. The former accounts for more than 80% cases worldwide.¹ Ischemic stroke is a major cause of mental and physical disability making it the third leading cause of death in the developed countries.² According to 2015 WHO report, nearly 5.7 million deaths were caused by stroke and over 50% deaths occurred in Asia.³ The reported prevalence of stroke is 4.8% in Pakistani population.⁴

Stroke has risk factors that are related to coronary heart disease and other cardiovascular illnesses. Targeting the primary modifiable causes of hypertension, high triglycerides, dyslipidaemias and diabetes are all effective preventative measures. Lifestyle-related risks can also be included. Smoking, lack of physical activity, unhealthy diet, and abdominal obesity are all factors that contribute to cerebrovascular events. Major important modifiable risk factors for stroke are diabetes mellitus, hypertension, and smoking. Other risk factors include age above 55 years, heavy alcohol consumption, left ventricular hypertrophy, arrhythmias and illicit drugs use.⁵ Atherosclerosis of the cerebral arteries is believed to be the main aetiological factor in ischemic stroke, and hypertension is one of the major risk factors for cerebral atherosclerosis.^{6,7} Microalbuminuria (MA), defined as albumin concentration of 30–300 mg/day in a 24-hour urine

collection, is considered to be associated with atherosclerosis and arterial hypertension.^{8,9} It is considered to be a marker of vascular endothelial damage due to the severity and/or duration of various pathophysiological insults especially poorly controlled diabetes mellitus and hypertension.¹⁰ Albumin leakage into the urine may reflect the renal sign of global endothelial dysfunction, and has been associated with an elevated risk of serious cardiovascular events including stroke.¹¹

The pathophysiologic processes which link MA and cerebrovascular diseases are unclear. The suggested mechanism of microalbuminuria resulting in clinical vascular disease is increased systemic vascular permeability due to endothelial dysfunction caused by systemic atheroma formation.¹² It is believed to be an independent risk factor for acute ischemic stroke as well as cardiovascular diseases.¹³ MA is strongly linked to stroke risk and its measurement is one of the most important screening test for determining the risk of atherosclerotic disease as well as those who are prone to develop ischemic stroke.¹⁴ The aim of this study was to determine the frequency of MA in hypertensive patients with acute ischemic stroke.

METHODOLOGY

This cross-sectional descriptive study was carried out at the Department of Medicine, Hayatabad Medical Complex (HMC), Peshawar, Pakistan, from July 2020

to June 2021. Ethical approval was obtained from the Departmental Committee and patients were enrolled after written informed consent from the patients or their relative if the patient was unable to give consent.

A total of 196 hypertensive patients admitted to the Medical Unit, with a diagnosis of acute ischemic stroke on the basis of focal neurological deficit and infarction on CT scan or MRI brain within 72 hours of admission, were included in the study with non-probability consecutive sampling technique¹⁵, with 95% confidence interval and 7% margin of error. Sample size was calculated using WHO sample size calculator¹⁶. Patients were divided into 4 groups based on age: Group I (30–40 years), Group II (41–50 years), Group III (51–60 years), and Group IV (61–70 years).

The diagnosis of hypertension was confirmed on measuring blood pressure twice by mercury sphygmomanometer in all cases. After confirming hypertension, the evaluation of microalbuminuria was made on 24 hours collection of urine testing with Pyrogallol Red method in the Biochemistry Section of the Main Laboratory of HMC, Peshawar.

Data was recorded on a specially designed proforma for all numerical and categorical variables including age, gender, hypertension, and microalbuminuria. Statistical analyses were performed on IBM SPSS-20. Simple arithmetic analyses (mean, standard deviation and/or percentages) were deduced for each parameter. Categorical variables were described in terms of frequencies and percentages.

RESULTS

Participants of the current study were analyzed based on age distribution and they ranged in age from 30–70 years. Group I had 20 (10%) patients, Group II had 29 (15%) patients, Group III had 59 (30%) patients and Group IV comprised of 88 (45%) patients. Minimum duration of stroke was 3 hours while maximum duration since stroke was 70 hours. Mean age of the patients was 60±2.71 Years (Table-1).

Out of the 196 patients under study, 122 (62%) were male while 74 (38%) were female (Table-2). Microalbuminuria was observed in 92 (47%), whereas 104 (53%) patients did not have microalbuminuria. Stratification of microalbuminuria with age and gender is shown in Table-3 and 4 respectively.

Table-1: Age distribution (n=196)

Age Groups	Mean Age (Years)	Frequency	Percentage
Group I (30–40 Years)	60±2.71	20	10
Group II (41–50 Years)		29	15
Group III (51–60 Years)		59	30
Group IV (61–70 Years)		88	45

Table-2: Gender distribution of patients (n=196)

Gender Distribution	Frequency	Percentage
Male	122	62
Female	74	38

Table-3: Stratification of microalbuminuria with age (n=196)

Micro-albuminuria	Group I	Group II	Group III	Group IV	Total
Yes	9	14	28	41	92 (47%)
No	11	15	31	47	104 (53%)
Total	20	29	59	88	196 (100%)

χ^2 test applied, ($p=0.996$, NS)

Table-4: Stratification of microalbuminuria with gender (n=196)

Microalbuminuria	Male	Female	Total
Yes	57	35	92
No	65	39	104
Total	122	74	196

χ^2 test applied, ($p=0.94$, NS)

DISCUSSION

Cerebrovascular accident (CVA) and its most common variant, ischemic stroke has a devastating multifaceted effect on an individual's life. It has got some risk factors and work has been done nationally and internationally to study these risk factors. Along with the conventional risk factors, microalbuminuria has been considered as a new potential risk factor for ischemic stroke. The current study was conducted to elucidate the frequency of MA in hypertensive patients with acute ischemic stroke, as literature lacks studies depicting this frequency in local population. In this study, majority of the patients were male 122 (62%) and most of them (88, 44.90%) were in the age group 61–70 years; mean age was 60±2.71 years. These findings are supported by those of a study conducted on 120 ischemic stroke patients in Bangladesh which identified male predominance and higher mean age.¹⁷

The results of the current study revealed that MA is present in 47% hypertensive patients who presented with acute ischemic stroke, whereas 53% were not having MA. These findings are in accordance with those of a previous study conducted on 60 Polish ischemic stroke patients, which identified MA to be present in 46.7% of acute non-diabetic ischemic stroke patients.¹⁸ The close relation between MA, atherosclerosis, hypertension and stroke suggest that microalbuminuria is a potentially inexpensive, and easily measured marker of increased risk for ischemic stroke.¹⁹

Presence of MA in hypertensive patients indicates the initial stages of atherosclerosis which is alarming for stroke. Early detection of MA will help in identifying hypertensive patients at high risk of ischemic stroke. Timely pharmacological intervention with angiotensin converting enzyme inhibitors (ACEIs), angiotensin receptor blockers (ARBs), calcium channel blockers (CCBs), β -blockers, Aliskiren, aldosterone antagonists and statins may help to decrease morbidity and mortality in this group.²⁰ However, other factors like obesity, dyslipidaemias, atrial fibrillation, ischemic heart

disease, left ventricular hypertrophy, hypercoagulable states (myeloproliferative disorders, protein C and S deficiency, high factor VIII level, antiphospholipid syndrome) family history of ischemic stroke, metabolic syndrome, inherited conditions of kidney are also important to be addressed as risk factors for cerebrovascular problems.

CONCLUSION

Given the high frequency of Microalbuminuria in hypertensive patients with acute ischemic stroke, microalbuminuria is a useful and inexpensive parameter in identifying hypertensive patients at increased risk of ischemic stroke.

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