

The Prevalence of Microalbuminuria in Patients with Hypertension and Acute Ischemic Stroke

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ABSTRACT

Objective: The purpose of this study was to ascertain the prevalence of microalbuminuria in hypertensive individuals who had recently suffered from an acute ischemic stroke.

Study Design: Cross-sectional study

Place and Duration: Department of Physiology, Sheikh Zayed Medical College, Rahim Yar Khan in the duration from July, 2022 to December, 2022.

Methods: This study comprised 148 hypertension individuals of either sex who had suffered an ischemic stroke. Participants' full demographic information, including age, sex, BMI, and comorbidities, was recorded after obtaining informed written consent. Microalbuminuria was detected in a urine sample collected over the course of 24 hours using the Pyrogallol Red assay. Microalbuminuria was defined as a daily urinary albumin content of 30-300 mg. Association of Microalbuminuria was determined among all cases. SPSS 22.0 was used to analyze all data.

Results: Among 148 cases, 87 (58.8%) were males and 61 (41.2%) were females. Patients mean age was 57.6±14.82 years and had mean BMI 25.9±7.48 kg/m². Mean duration of HTN was 3.19±5.28 years. History of ischemic stroke was found in 14 (9.5%) cases, and family history of myocardial infarction found in 23 (15.5%) cases. Comorbidities were DM, CAD, Congestive heart failure, Atrial fibrillation and peripheral artery disease. We found Microalbuminuria in 68 (45.9%) cases. In 68 cases of microalbuminuria 38 cases had age >50 years, 19 cases were aged between 36-50 years and 11 cases were aged between 18-35 years.

Conclusion: The high prevalence of microalbuminuria in hypertension patients with acute ischemic stroke led us to the conclusion that this marker can be used to reliably identify hypertensive individuals at high risk for ischemic stroke at a low cost.

Keywords: Hypertension, Albuminuria, Ischemic stroke, Diabetes mellitus

INTRODUCTION

When there is albumin in the urine, it suggests that the barrier function of the glomerular endothelial cells (podocytes) has been damaged.[1,2] This is often expressed as a milligrams per 24 hours or milligrams per milliliter of urine. Once albumin excretion into the urine has beyond pathological limits, serious renal damage may ensue, hence early detection is crucial. The term "microalbuminuria" (MAU) refers to a 24-hour urine output (AUP) of 30 mg to 300 mg. Increased blood creatinine levels and the prevalence of end-stage renal disease are also linked to MAU, as is an increased risk of cardiovascular disease.[3]

The presence of albuminuria is often assumed to indicate renal disease. The retina develops cotton-wool spots, while albumin is produced into the retinal layer simultaneously.[4] Animal studies using tagged albumin have also shown the systemic nature of this illness, including myocardium[5] and brain involvement.[6,7]

Ischemic stroke risk factors may be split up into modifiable and unmodifiable categories. Stroke risk rises with age, while other risk variables such as gender, race, family history, and prior stroke experience are fixed. Risk factors that can be altered include arterial hypertension (HTN), smoking cigarettes, diabetes mellitus (DM), obesity, oral contraceptive use, dyslipidemia, alcohol consumption, low socioeconomic status, cardiovascular disease, asymptomatic carotid artery disease, high fibrinogen, high homocysteine, high anticardiolipin antibodies, and sickle cell disease.[8]

It has been hypothesized that albuminuria is a risk factor for cerebrovascular disease in the general population. Microalbuminuria (MA) has been shown to be a strong predictor of ischemic stroke, and this evidence is mounting [9]. The acute ischemic stroke prognostic relevance has also been studied. A urine albumin:creatinine ratio (UACR) of 30-300 mg/g or a daily albumin excretion of 30-300 mg is characteristic of people with MA [10]. Despite its widespread use as a proxy for impending kidney disease (i.e., glomerular filtration barrier degradation), MA is really a marker of endothelial dysfunction and interacts with

other established vascular risk factors.[11] In the United States' Insulin Resistance and Atherosclerosis Study, researchers showed that intima-media thickness of the carotid arteries was independently associated with MA.[12]

It is still unknown what pathophysiological processes lead to microalbuminuria. This may be a reflection of systemic atherosclerotic vascular disease or the outcome of altered intrarenal hemodynamics, as seen in insulin-dependent diabetic mellitus, or both. Several epidemiological studies [13] show a correlation between microalbuminuria and an increased risk of death and illness, most notably from cardiovascular disease.[14] The focus of this study was to determine the prevalence of MA in hypertensive individuals who had had an ischemic stroke.

MATERIALS AND METHODS

This cross-sectional study was conducted at Department of Physiology, Sheikh Zayed Medical College, Rahim Yar Khan in the duration from July, 2022 to December, 2022 and comprised of 148 hypertensive patients. Included patients were aged between 18-80 years. Patients admitted with a diagnosis of acute ischemic stroke within 72 hours after initial symptoms were included in the study using a nonprobability, sequential sampling design, with a 95% confidence interval and a 7% margin of error. Sample size was determined using the World Health Organization's online tool. Pregnant females, patients <18 years of age and those did not provide any written consent were excluded.

In every instance, the diagnosis of hypertension was verified through the use of a mercury sphygmomanometer to measure the patient's blood pressure twice. After establishing that hypertension was present, a collection of urine for 24 hours was tested using the Pyrogallol Red assay in order to make an assessment of microalbuminuria. All numerical and categorical factors, such as age, gender, hypertension, and microalbuminuria, were among those on which data were recorded on a proforma that had been especially crafted for the purpose. IBM SPSS-22 was utilised for the purposes of statistical analysis. For each parameter,

rudimentary arithmetic analyses such as the mean, standard deviation, and/or percentages were derived. The categorical variables were characterised using frequencies and percentages of their occurrence.

RESULTS

Among 148 cases, 87 (58.8%) were males and 61 (41.2%) were females. Patients mean age was 57.6±14.82 years and had mean BMI 25.9±7.48 kg/m². Mean duration of HTN was 3.19±5.28 years. History of ischemic stroke was found in 14 (9.5%) cases, and family history of myocardial infarction found in 23 (15.5%) cases.(table 1)

Table-1: Demographics of the included cases

Variables	Frequency (n=148)	Percentage
Gender		
Male	87	58.8
Female	61	41.2
Mean age (years)	57.6±14.82	
Mean BMI (kg/m ²)	25.9±7.48	
Mean Duration of HTN (years)	3.19±5.28	
History of IS	14	9.5
History of MI	23	15.5

Comorbidities were DM in 45 (30.4%) cases, CAD in 37 (25%) cases, Congestive heart failure in 17 (11.5%) cases, Atrial fibrillation in 14 (9.5%) cases and peripheral artery disease in 8 (5.4%) cases.(table 2)

Table-2: Comorbidities among included cases

Variables	Frequency	Percentage
Comorbidities		
DM	45	30.4
CAD	37	25
CHF	17	11.5
PAD	8	5.4
Atrial fibrillation	14	9.5

We found Microalbuminuria in 68 (45.9%) cases among all cases.(figure-1)

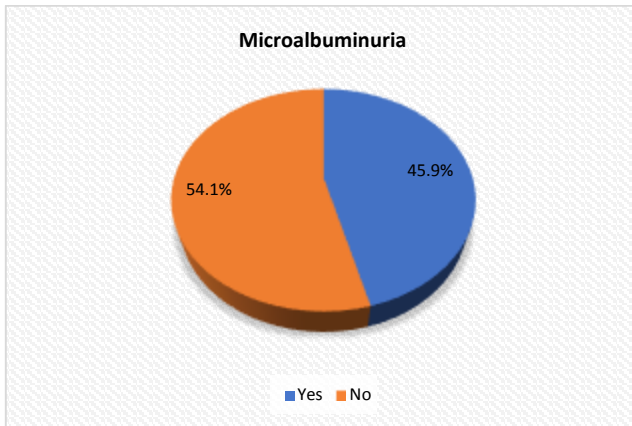


Figure-1: Patients with Microalbuminuria among cases

In 68 cases of microalbuminuria 38 cases had age >50 years, 19 cases were aged between 36-50 years and 11 cases were aged between 18-35 years.(table 3)

Table-3: Patients of microalbuminuria with age distribution

Variables	Frequency (n=68)	Percentage
Age		
18-35 years	11	16.2
36-50 years	19	27.9
>50 years	35	51.5

DISCUSSION

Stroke, the most common type of cerebrovascular accident (CVA), can have far-reaching consequences for a person's health and wellbeing. There are certain risk factors, and research has been done on them at the national and international levels. Microalbuminuria has been suggested as a novel possible risk factor for ischemic stroke, in addition to the traditional risk factors. Due to a dearth of research illustrating the prevalence of MA in hypertensive patients with acute ischemic stroke, the current investigation was done.

In current study 148 hypertensive patient with ischemic stroke were presented. 87 (58.8%) were males and 61 (41.2%) were females. Patients mean age was 57.6±14.82 years and had mean BMI 25.9±7.48 kg/m². Mean duration of HTN was 3.19±5.28 years. Results were comparable to the previous studies.[15,16] According to the findings of this study, hypertensive patients who presented with acute ischemic stroke had an MA prevalence of 45.9%, while 54.1% did not. These findings are in line with those of a more recent research study that looked at 60 stroke patients in Poland and discovered that 46.7% of those without diabetes who had an acute ischemic stroke also had MA. This study was conducted in Poland.[17]Due to the correlation between microalbuminuria, atherosclerosis, hypertension, and ischemic stroke, the presence of microalbuminuria may serve as a risk factor for ischemic stroke that is easy to assess and does not require a lot of money.[18]

For instance, the HYDRA study[19,20] conducted in primary care found that 21.2% of patients had hypertension and that 37.8% of patients had both hypertension and diabetes. The worldwide DEMAND study found that 39% of primary care patients had both MAU and hypertension.[21]In this analysis, we found that MAU was linked to an array of cardiovascular illness and risk factors. Consistent with prior results from primary care and population-based studies[22], this finding makes sense. [19,20] It shows that MAU is frequent among patients referred to cardiology departments and is linked to several other risk factors for cardiovascular disease. Previous clinical trials involving men have described this connection.

When hypertensive persons have microangiopathy, the chance of having a stroke is increased since this condition indicates that atherosclerosis has begun. Early recognition of MA in hypertensive patients will assist in determining of those individuals who are at a high risk of having an ischemic stroke. Early pharmacological intervention with medications such as angiotensin converting inhibitors of enzymes (ACEIs), blockers of angiotensin receptors (ARBs), blockers of calcium channels (CCBs), beta-blockers as Aliskiren, testosterone antagonists, and statins may be beneficial in reducing morbidity and mortality in this population.[23]

Our research established a link between a diagnosis of MA and the clinical manifestations of acute ischemic stroke. Exactly what pathophysiological mechanism is at play is unknown. Our results are consistent with the idea that MA is a marker of dysfunctional endothelial cells and plays a crucial role in the inflammation that occurs during the initial stages of a vascular event.

CONCLUSION

The high prevalence of microalbuminuria in hypertension patients with acute ischemic stroke led us to the conclusion that this marker can be used to reliably identify hypertensive individuals at high risk for ischemic stroke at a low cost.

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