

ORIGINAL ARTICLE

MICROALBUMINURIA IN NONDIABETIC NONHYPERTENSIVE PATIENT WITH ACUTE ISCHEMIC STROKE

Ghulam Fareed¹

¹Assistant Professor, Department of Medicine, Isra University, Hyderabad

ABSTRACT

Introduction: Acute ischemic stroke is a leading neurological emergency associated with high morbidity and mortality. While conventional risk factors such as diabetes and hypertension are well-established, emerging evidence points to microalbuminuria as an independent predictor of adverse outcomes in stroke patients, even in those without these traditional comorbidities.

Objective: To determine the frequency of microalbuminuria in non-diabetic, non-hypertensive patients presenting with acute ischemic stroke.

Methods: This cross-sectional study was conducted at the Medical Unit of Isra University, Hyderabad, over a two-year period (June 2022 to June 2024). A total of 200 patients aged 18–60 years, without prior history of diabetes or hypertension, and diagnosed with acute ischemic stroke confirmed via CT brain scan, were enrolled using non-probability consecutive sampling. Microalbuminuria was assessed within 24 hours of admission. Data were analyzed using SPSS v20.0 with stratification for age and gender.

Results: The mean age was 52.57 ± 9.01 years; 68% of the participants were male. The majority (79%) were above 50 years of age and from rural areas (68%). Microalbuminuria was detected in 44% of patients. It was more prevalent in males and those with normal CT scan findings, though the associations were not statistically significant ($p > 0.05$).

Conclusion: A substantial proportion of non-diabetic, non-hypertensive patients with acute ischemic stroke exhibited microalbuminuria. This simple and cost-effective marker may aid in early risk stratification and management of stroke patients, potentially reducing complications and improving outcomes.

Keywords: *Microalbuminuria, acute ischemic stroke, non-diabetic, non-hypertensive, risk stratification.*

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INTRODUCTION:

Ischemic stroke is a heterogeneous disease which is defined by a sudden loss of blood flow to a specific brain region, leading to a corresponding neurological deficit. It occurs due to thrombotic or embolic obstruction of a cerebral artery and is more prevalent than hemorrhagic stroke. Common symptoms include the sudden onset of hemiparesis, monoparesis (rarely quadriplegia), hemisensory deficits, monocular or binocular vision loss, visual

field deficits, diplopia, dysarthria, facial droop, ataxia, vertigo (rarely in isolation), nystagmus, aphasia, and an abrupt decline in consciousness.¹ Urgent imaging of the brain is very crucial for the management of acute ischemic stroke. It is a major neurological disease of the current time with an incidence of 1.5/1000 per year. The most commonly done neuroimaging in its acute evaluation is non-contrast computed tomography (CT).² The risk factors for stroke are old age, smoking, hypertension, diabetes mellitus, heart diseases (Coronary Heart Disease, Valvular, atrial fibrillation), and dyslipidemia. Inflammatory markers and functional markers like microalbuminuria are seen to be some

Correspondence: Ghulam Fareed

Isra University, Hyderabad

Email: drghulamfareed@yahoo.com

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emerging new risk factors.³ Microalbuminuria is defined as ‘excretion of 30–300 mg of albumin per 24 hours (or 20–200 mcg/min or 30–300 mcg/mg creatinine) on 2 of 3 urine collections’. The presence of microalbuminuria is an early marker of diabetic kidney disease, indicating the need for aggressive management to prevent or slow the progression to overt diabetic nephropathy. It also serves as a prognostic marker in renal disease and is associated with increased morbidity and mortality even in individuals without significant renal impairment. In hypertensive patients, microalbuminuria has been linked to left ventricular hypertrophy. Moreover, in both hypertensive and normotensive individuals, it predicts an elevated risk of cardiovascular complications and mortality. Although traditionally, 24-hour excretion has been preferred, now a more valid and similar screening tool for diabetic nephropathy is the albumin/creatinine ratio. A study conducted at Allied Hospital, Faisalabad, Pakistan, showed that the frequency of microalbuminuria in non-diabetic and non-hypertensive patients suffering from acute ischemic stroke was 40.5%.⁴ After a transient ischemic attack or minor episode of stroke, estimation of microalbuminuria can help the risk stratification for patients suffering from it. The presence of microalbuminuria in acute ischemic stroke patients is not only associated with complications in the patients, but is also being investigated as an independent predictor of ischemic stroke. It can also be used as a predictor of stroke recurrence in patients suffering from acute ischemic stroke.⁵ In the previous literature, there has been a controversy in the frequency of microalbuminuria in acute stroke patients who are neither diabetic nor hypertensive. This study would add up the local database of this issue as well as resolve the controversy in the previous literature and also these stats would help the clinicians in not only identifying

the patients which are susceptible to ischemic stroke and its complications, but also reduce the morbidity and mortality of the population by taking some proper in time measures in such patients.

METHODS:

Study Design and Setting

This was a descriptive cross-sectional study conducted at the Medical Unit of Isra University, Hyderabad, Pakistan.

Study Duration

The study was carried out over a period of two years, from June 1, 2022, to June 30, 2024, after obtaining approval from the Institutional Ethical Review Board.

Sample Size and Sampling Technique

A total of 200 patients were enrolled using a non-probability consecutive sampling technique.

Inclusion Criteria

Patients of either gender, aged between 18 and 60 years, presenting with acute ischemic stroke within 24 hours of symptom onset and having no previous history of diabetes mellitus or hypertension were included in the study.

Exclusion Criteria

Patients were excluded if they had more than 5 white blood cells or more than 3 red blood cells per high power field on urine microscopy, a history or CT evidence of recurrent stroke, hemorrhagic stroke on CT scan, menstruation at the time of evaluation, serum creatinine levels greater than 1.2 mg/dL, body temperature above 99°F, or ultrasound findings of nephrolithiasis or urinary tract tumors.

Data Collection Procedure

Diagnosis of acute ischemic stroke was confirmed through a non-contrast CT scan of the brain. Microalbuminuria was assessed within 24 hours of hospital admission using a spot urine sample, analyzed via the albumin-to-creatinine ratio. Patient

information and clinical data were recorded using a pre-tested questionnaire.

Data Analysis

Data were analyzed using SPSS version 20.0. Means and standard deviations were calculated for quantitative variables such as age and time of symptom onset, while frequencies and percentages were determined for qualitative variables such as gender, CT findings, and microalbuminuria status. Effect modifiers like age and gender were controlled through stratification, and the chi-square test was applied post-stratification. A p-value of less than 0.05 was considered statistically significant.

RESULTS:

A total of 200 patients were included in the study. The majority of participants were male, accounting for 68% of the study population. The mean age was 52.57 ± 9.00 years, with an age range of 22 to 60 years. Most patients (79%) were over the age of 50. A significant proportion of the study population (68%) resided in rural areas. The average time from the onset of ischemic stroke symptoms to hospital presentation was 5.31 ± 3.20 hours, with the largest group of patients (47%) arriving within 4 to 8 hours. Non-contrast CT scans of the brain were normal in 59% of the cases. Microalbuminuria was detected in 44 patients (22%), as illustrated in Figure 1.

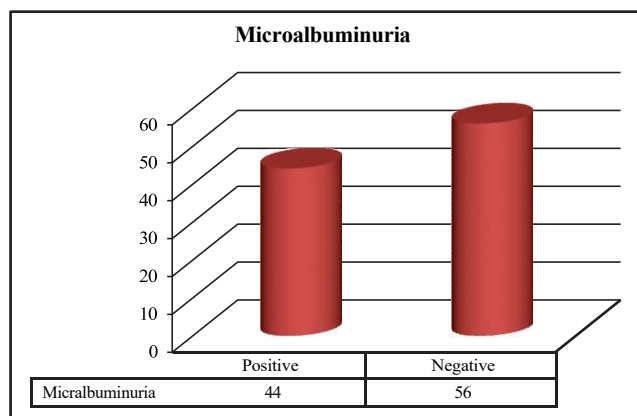


Figure 1: Frequency of Microalbuminuria

Microalbuminuria was more common in males, and it was statistically significant ($p > 0.05$), and the patients whose CT Scan Brain plain was normal ($p > 0.05$), as shown in Table 1.

Table 1: Stratification of Microalbuminuria For Findings of CT Scan Brain Plain

| | | | CT Scan Brain Findings | | P < 0.05 |
|------------------|----------|-----------|------------------------|----------------------|----------|
| | | | Normal | Hypodense Area/Areas | |
| Microalbuminuria | Positive | Count | 52 | 36 | 88 |
| | | %of Total | 26.0% | 18.0% | |
| | Negative | Count | 66 | 46 | 112 |
| | | %of Total | 33.0% | 23.0% | |
| Total | | Count | 118 | 82 | 200 |
| | | %of Total | 59.0% | 41.0% | |

DISCUSSION:

We have found that the occurrence of microalbuminuria in patients presenting with acute ischemic stroke who are neither suffering from diabetes mellitus nor hypertension. The percentage of these patients was found to be 44%. These results are in accordance with the previous study conducted at Mumbai, India by Badgular et al, in which the presence of microalbuminuria was found to be 42%¹ whereas in a study done by Singh et al, the prevalence was found to be 33.3% in non non-hypertensive non diabetic group.⁶ Most of the patients included in the study were males (68%). The mean age of the patient was 52.57 ± 9.005 years, with a range of 22 to 60 years. Most of the patients were above the age of 50 years (79%). The majority of the patients belonged to rural areas (68%). This is similar to the study done by Maskey et al, where the maximum patients lie in the age group of 50-60 years of age.⁷ In other studies done by Vaidya CV et al and Aiyar et al, the mean age was 61 years and 63.6 years, respectively.^{8,9} The mean time of presentation of the patient to the hospital after onset of symptoms of ischemic stroke was 5.31 ± 3.203 hours. Most of the patients presented to the hospital within 4-8 hours of the onset of symptoms (47%). Most of the patients had a normal

CT scan Brain (59%). Microalbuminuria was more common in males, which is in accordance to the study done by Zakria et al, and it was statistically significant ($p > 0.05$), and the patients whose CT Scan Brain plain was normal ($p > 0.05$).¹⁰

Elyas S et al in their study followed the patients presenting with acute ischemic stroke for 90 days after the primary insult. They found that patients who were having microalbuminuria on their first presentation had an increased risk of recurrent events as compared to others. ACR was seen raised in high-risk patients (3.4 [95% CI 2.2–5.2] vs. 1.7 [1.5–2.1] mg/mmol, $P = 0.004$), which was regardless of age, gender, diabetes, blood pressure, and previous stroke. An ACR exceeding 1.5 mg/mmol predicted high-risk patients (Cox proportional hazard ratio 3.5 (95% CI 1.3–9.5, $P = 0.01$). They concluded that in patients with TIA or minor stroke, an elevated ACR was seen to be associated with recurrent events and significant ICA stenosis. There could be seen improvement in risk stratification by incorporating urinary ACR from a spot sample in the acute setting in patients suffering from TIA and minor stroke.¹¹

It was found by Yuyun et al that microalbuminuria was the only independent predictor of ischemic stroke (HR 2.01; 95%CI 1.29 to 3.31), and it was concluded that it was associated with a minimum duration of stroke of 3 hours while increasing in risk of stroke in the general population. Microalbuminuria was more common in the first 24 hours of presentation, and it was also demonstrated by Mathur PC et al.¹²

In another study done by Jha et al done at Kathmandu, the outcome of ischemic stroke patients was investigated in accordance with microalbuminuria. This study shows that microalbuminuria independently increases the risk of ischemic stroke as compared to the control group, and it serves as a reliable indicator for early assessment of clinical severity and potential fatal

outcomes. It was detected in 91.67% of cases with lacunar infarcts and 72.7% of those with territorial infarction. Additionally, it is also simple, cost-effective, and an affordable diagnostic tool.¹³

The type of stroke and microalbuminuria has also been investigated in another study done by Li et al. The association between microalbuminuria and subtypes of ischemic stroke was observed. It was seen that higher levels of microalbuminuria are more likely to suffer from larger area of cerebral infarction (36.88%). The presence of microalbuminuria seems to independently predict clinical outcomes following acute stroke.¹⁴ There is support for this from previous studies, which demonstrated that the incidence of MAU in patients with ischemic stroke varied from 12% to 60%.¹⁵

CONCLUSION:

This study demonstrates a high prevalence of microalbuminuria in non-diabetic, non-hypertensive patients presenting with acute ischemic stroke. Its presence in this population highlights its potential role as an independent and early marker of vascular dysfunction. Given that microalbuminuria is a simple, cost-effective, and modifiable parameter, incorporating its assessment into the routine evaluation of stroke patients may help in early risk stratification, timely intervention, and potentially reduce the burden of stroke-related morbidity and mortality. Further large-scale, prospective studies are recommended to establish its prognostic value and guide clinical decision-making.

DECLARATION OF INTEREST: The authors declare no conflict of interest.

AUTHORS CONTRIBUTIONS:

G.F: Conceptualization, literature review, data collection, data analysis, write up, proofreading and final editing of manuscript.

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