Original Research Article

A STUDY ON PREVALENCE AND PROGNOSTIC ASSOCIATION OF MICROALBUMINURIA IN NON-DIABETIC PATIENTS WITH ACUTE ISCHEMIC STROKE

Chennareddy V.[1]

[1]*Associate Professor, Department of General Medicine, CMR Institute of Medical Sciences and Hospital, Hyderabad, India.*

ABSTRACT

Background: Cerebrovascular diseases, such as ischemic and hemorrhagic strokes, AV malformations, and intracranial aneurysms, are major causes of disability worldwide. Prevention can be enhanced through public awareness and improved medical training. Research shows traditional risk factors explain about fifty percent of ischemic stroke cases, leading to the investigation of new risk factors like inflammation markers and infections. Microalbuminuria, linked with conditions like diabetes and hypertension, is emerging as a potential risk factor for stroke. Its role as an independent predictor of stroke outcomes, especially in non-diabetic individuals, is under investigation. The present study aims to determine the presence and prognostic significance of microalbuminuria in these patients.

Material and Methods: 75 non-diabetic patients with acute ischemic stroke were evaluated for microalbuminuria in the Department of General Medicine, CMR Institute of Medical Sciences and Hospital, Kandlakoya, Hyderabad over 7 months. Presence of micro-albuminuria was correlated with the stroke severity and functional outcome using NIHSS scale and modified Rankin score, respectively.

Results: Most of the patients with stroke belonged to 41-50 years of age and the majority of the patients were males. 60% of the patients with acute ischemic stroke had microalbuminuria. Patients with microalbuminuria had relatively higher levels of lipid profile, blood pressure and creatinine.

Conclusion: Presence of microalbuminuria is an independent risk factor in patients with acute ischemic stroke and is associated with relatively poor prognosis. Identification of such patients will guide treating physicians towards better decision making during the management of such patients.

Keywords: Microalbuminuria, cerebrovascular accidents, non-diabetes, stroke.

INTRODUCTION

Stroke is defined as abrupt onset of neurological deficit due to abrupt cessation of vascularity. Stroke is the most common cause of morbidity and mortality worldwide.[1]

Over the last two decades, there has been a 50% rise in the prevalence of strokes in India, with every 1 person out of 4 being at risk. This prevalence rate is higher in older men and women. A study done by Global burden of disease (GBD) in India found out that cerebrovascular accidents are responsible for the cause of 9.4 million morbidities.[2-4]

Age, gender, race, substance abuse, metabolic syndrome, arrhythmias such as atrial fibrillation, and hereditary factors are some of the well-established risk factors for stoke. However, recent studies have shown the emergence of newer risk factors in predicting and prognosticating cerebrovascular accidents, such as microalbuminuria Microalbuminuria is defined as presence of urinary albumin levels between 20-200 micrograms/minute. Presence of microalbuminuria is suggestive of

inflammatory changes in the renal vascular permeability owing to which the negatively charged anions (albumin) are restricted to the glomerular membrane and are therefore excreted in the urine of not only diabetic individuals but also non- diabetic individuals.

Although microalbuminuria is linked with cerebrovascular disease risk factors such as hypertension, a history of myocardial infarction, diabetes, aging, and left ventricular hypertrophy, limited data exists on microalbuminuria as an independent predictor of stroke risk. Hence this study was taken up to evaluate the prognostic significance of microalbuminuria in patients with acute ischemic stroke.

MATERIAL AND METHODS

This prospective observational study was conducted in the Department of General Medicine, CMR Institute of Medical Sciences and Hospital, Kandlakoya, Hyderabad, over 7 months (Jan 2023 to July 2023). All non- diabetic patients with ischemic stroke (confirmed on Ct- brain) who gave consent to participate in the stud were included in the study.

Patients with hemorrhagic stroke, or those who did not give consent, or patients with diabetes or patients with renal disease were excluded from the study.

A detailed history was taken with special emphasis on onset of symptoms. A thorough clinical examination was done. Severity of the stroke was assessed using NIHSS scale. Routine investigations such as complete blood picture, liver function test, serum protein and albumin levels, renal function tests, random blood sugar levels, complete urine examination were done. Cardiac evaluation was done using 1 12- lead electrocardiogram and 2D echo. Severity of the stroke was assessed using NIHSS scale and functional assessment was done using modified Rankin scale. CT scan of brain was done to confirm ischemic infarct.

Albumin excretion in urine was assessed using turbidimetry tests and spot urine albumin levels were estimated. Microalbuminuria was defined as urinary excretion of albumin between 20-200 mg/24 hours.

All patients with acute ischemic stroke were assessed for microalbuminuria at the time of presentation, and 6 weeks later. All data was entered and analyzed in Microsoft excel.

Ethical committee approval was taken prior to the start of study. A written informed consent was taken from the patients prior to inclusion of them into the study.

RESULTS

75 non-diabetic cases with acute ischemic stroke were included in the study. The mean age of cases was 52.4 years. Most of the cases were aged between 41-50 years, followed by 51-60 years. The youngest patient with ischemic stroke in present study was 21 years and the oldest being 75 years old. Males were the predominant gender in the study population (66.7%). [Table 1]

The right middle cerebral artery was the most commonly involved artery (32%), followed by the left middle cerebral artery (26.7%). [Table 2]

Amongst the 75 cases with acute ischemic stroke, microalbuminuria was seen in 45 patients. The prevalence of microalbuminuria in the cases with acute ischemic stroke is 60%. Microalbuminuria is predominantly observed in males (40%). [Table 3]

The mean cholesterol levels, HDL levels, LDL levels, Triglyceride levels, Blood pressure, serum creatinine, blood urea levels were higher in patients with proteinuria, but it was not statistically significant. [Table 4]

Severity of stroke was assessed by the NIHSS score. The NIHSS score was > 20 in 40% of the cases. Statistically significant higher NIHSS scores were found in patients with microalbuminuria.

Functional assessment of stroke patients was done using the modified Rankin score. The modified Rankin score was < 3 in 74.6% cases, out of which 40% had microalbuminuria. Most of the patients with modified Rankin score >3 had microalbuminuria, which was significant.

Table 1: Age and gender-wise distribution of cases

		No. of cases	Urine albumin <20 mg/day	Urine albumin 20-200 mg/day	P value
Age in years	<40 years	8	4	4	0.34 (not significant)
	41-50 years	28	10	18	0.024 (significant)
	51-60 years	24	11	13	0.01 (significant)
	>60 years	15	5	10	0.008 (significant)
Gender	Males	50	20	30	0.067 (not significant)
	Females	25	10	15	0.3 (not significant)

Table 2: Artery involved

Artery involved	No. of cases
Right anterior cerebral artery	4
Left anterior cerebral artery	6
Right middle cerebral artery	24
Left middle cerebral artery	20
Right posterior cerebral artery	10
Left posterior cerebral artery	11

Table 3: Microalbuminuria

Microalbuminuria	Cases	
	Males	Females
<20 mg/ day	20	10
20-200 mg/ day	30	15
Total	50	25

Table 4:

	Urine albumin <20 mg/day	Urine albumin 20-200 mg/day	P value
Mean cholesterol	191.8±10.24	199.54±12.47	0.07 (not significant)
Mean HDL	47.9±3.58	50.2±3.10	0.15 (not significant)
Mean LDL	104.2±6.2	111.78 ±8.47	0.78 (not significant)
Mean Triglyceride	200.4±9.28	202.78± 6.74	0.91 (not significant)
Mean SystolicBP	130.57± 1.24	139.21±10.24	0.27 (not significant)
Mean DiastolicBP	80.24 ± 7.84	90.4±8.21	0.34 (not significant)
Mean blood urea	27.05±2.47	28.7±4.58	0.77 (not significant)
Mean serum creatinine	0.74±0.12	0.91 ±1.24	0.09 (not significant)
NIHSS score <20	25	15	0.0124 (significant)
NIHSS score >20	4	30	0.0287 (significant)
Modified Rankin score <3	26	30	0.9 (not significant)
Modified Rankin score >3	4	10	0.0074 (significant)

DISCUSSION

In present study, 75 patients with acute ischemic stroke were included. The study was conducted to assess the prevalence of microalbuminuria in acute ischemic stroke and correlate the severity and functional outcomes of stroke patients having microalbuminuria.

In present study 60% of the patients had microalbuminuria. Other studies by Beamer et al5, Slowik et al,[6] and Turaj et al7 have reported a relatively lower incidence of microalbuminuria (29%, 46.7% and 46.1% respectively). The higher incidence of microalbuminuria could be attributed to the higher rate of screening for end organ damage as a part of stroke protocol in our institution.

In present study, most of the patients belonged to 41-50 years of age group followed by 51-60 years of age group. The prevalence of microalbuminuria was increasing with increase in age; however, it was not significant. In study done by Turaj et al7 the mean age of patients with microalbuminuria was 73.3±11.6 years, which is relatively higher when compared to present study.

In present study, microalbuminuria was predominantly seen in males, but the difference was statistically insignificant. However, in study done by Turaj et al,[7] males and females were equally involved.

In present study, most of the acute ischemic stroke patients with microalbuminuria had dyslipidemia, hypertension; however, the difference was not statistically significant. In study done by Li et al,[8] the difference was statistically significant.

In present study, most of the patients with NIHSS score >30 had microalbuminuria suggestive of relatively higher severity of stroke. Majority of the patients with modified Rankin score >3 also had microalbuminuria suggestive of poorer functional outcomes in them. Similar such observations were seen by Gumbinger et al,[9]Chowdhary et al,[10] Das et al,[11] and Gaurav et al,[12] who has significantly higher NIHSS score and poor functional outcomes in patients with acute ischemic stroke.

CONCLUSION

Our study explored the role of microalbuminuria (MA) as a risk factor for acute ischemic stroke. We found that 45% of non-diabetic acute ischemic stroke patients had MA, corroborating previous studies that connect MA with atherosclerotic vascular disease.

MA emerged as a strong predictor of stroke outcome, with a notable correlation between higher urine albumin excretion and greater stroke severity, as measured by the NIHSS score. This marker could be useful for risk assessment and management prioritization.

Conflicts of Interest: No conflicts of interest declared.

REFERENCES

1. Goldstein L evidence based medicine and stroke Current neuroepidemiology1999,18, 120-124
2. Lozano, R. et al. Global and regional mortality from 235 causes of death for 20 age groups in 1990 and 2010: A systematic analysis for the Global Burden of Disease Study 2010. Lancet 380, 2095–2128 (2012).
3. Kalita, J., Bharadwaz, M.P. & Aditi, A. Prevalence, contributing factors, and economic implications of strokes among older adults: a study of North-East India. Sci Rep 13, 16880 (2023). https://doi.org/10.1038/s41598-023-43977-z
4. Kamalakannan, S. et al. Incidence and prevalence of stroke in India: A systematic review. Indian J. Med. Res. 146, 175–185 (2017).
5. Beamer NB, Coull BM, Clark WM, Wynn M. Microalbuminuria in Ischemic Stroke. Arch Neurol. 1999;56(6):699–702. doi:10.1001/archneur.56.6.699
6. Słowik A, Turaj W, Iskra T, Strojny J, Szczudlik A. Microalbuminuria in nondiabetic patients with acute ischemic stroke: prevalence, clinical correlates, and prognostic significance. Cerebrovasc Dis. 2002;14(1):15-21. doi: 10.1159/000063718. PMID: 12097846.
7. Turaj W, Słowik A, Wyrwicz-Petkow U, Pankiewicz J, Iskra T, Rudzińska M, Szczudlik A. The prognostic significance of microalbuminuria in non-diabetic acute stroke patients. Med SciMonit. 2001 Sep-Oct;7(5):989-94. PMID: 11535947.
8. Li F, Chen QX, Peng B, Chen Y, Yao T, Wang G. Microalbuminuria in patients with acute ischemic stroke. Neurol Res. 2019 Jun;41(6):498-503. doi: 10.1080/01616412.2019.1576320. Epub 2019 Apr 1. PMID: 30931822.
9. Gumbinger C, Sykora M, Diedler J, Ringleb P, Rocco A. Microalbuminuria: A potential prognostic marker for acute stroke Nervenarzt. 2012; 83:1357–60
10. Chowdhury J, Sultana N, Ahmed S, Rahman MM, Akter M, Rafique T. Microalbuminuria as a predictor of short-term mortality in acute ischemic stroke Bangladesh J Med Biochem. 2012; 5:16–9
11. Das S, Yadav U, Ghosh KC, Panchadhyayee S, Kundu SS, Ganguly PK. A clinical study of ischaemic strokes with micro-albuminuria for risk stratification, short-term predictive value and outcome J Indian Med Assoc. 2012;110:908–10 10
12. Gaurav, Dhiraj Kumar1; Malik, Rupali1; Rani, Anita2; Dua, Abha1. Study of Microalbuminuria in Acute Ischemic Stroke and its Correlation with Severity. Indian Journal of Medical Specialities 11(4): p 212-216, Oct–Dec 2020. | DOI: 10.4103/injms.injms_108_20.