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WORD COUNT 2050
TIME SUBMITTED 26-JUN-2024 10:20AM
PAPER ID 109865509

Word count – 2,050

Prognostic significance of microalbuminuria in non-diabetic patients with acute ischemic stroke

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ABSTRACT:

Microalbuminuria is a strong predictor of ischemic stroke, independent of other risk factors. We investigate MA in acute ischemic stroke without diabetes and its relationship with stroke severity This study is a prospective observational investigation that enrolled 50 patients who experienced ischemic stroke without a history of diabetes, with the aim of observing and analyzing their outcomes Patient's history, clinical examination, biochemical and radiological investigations were collected and assessment by NIHSS for grading the harshness of ischemic stroke with the measurement of microalbuminuria.

Cases with a mean NIHSS of 26±11.418 were positive for MA, while cases with a mean NIHSS of 12.85±9.06 were negative for MA, indicating that higher NIHSS were positive for MA. The relationship between MA and NIHSS was statistically significant ($p<0.0001$). At admission, the mean NIHSS Score for Minor stroke patients was 3.55556± 0.527, while 14.3125±0.4787 for moderate stroke cases, 19.0769±1.605 for moderate to severe stroke, and 38.4545±0.478 for severe stroke patients. The correlation between microalbuminuria and NIHHS score is 0.650, with a significant p value of 0.0001.MA was associated with the severity of cerebral infarction at admission and clinical outcomes 1 month after onset, and it could be used as a potential indicator of poor prognosis in patients with stroke.

Keywords: microalbuminuria, NIHSS, ischemic stroke

INTRODUCTION

Stroke – A condition of sudden development of cerebral insufficiency lasting for one day or leading to death with no obvious reason except the vascular one. A stroke is a rapid loss of brain activity due to the disruption of circulation in brain. About 800,000 persons have a stroke per year, about one person in every 40 seconds. Stroke is the world's second-leading killer, responsible for a substantial number of deaths globally [1]. Prevalence of stroke in India is about 1.54 per 1000 [2]. Strokes are categorized into three primary types: ischemic strokes, which result from blocked blood vessels; hemorrhagic strokes, which occur when blood vessels rupture; and transient ischemic attacks, also known as 'mini-strokes', which are temporary and reversible.

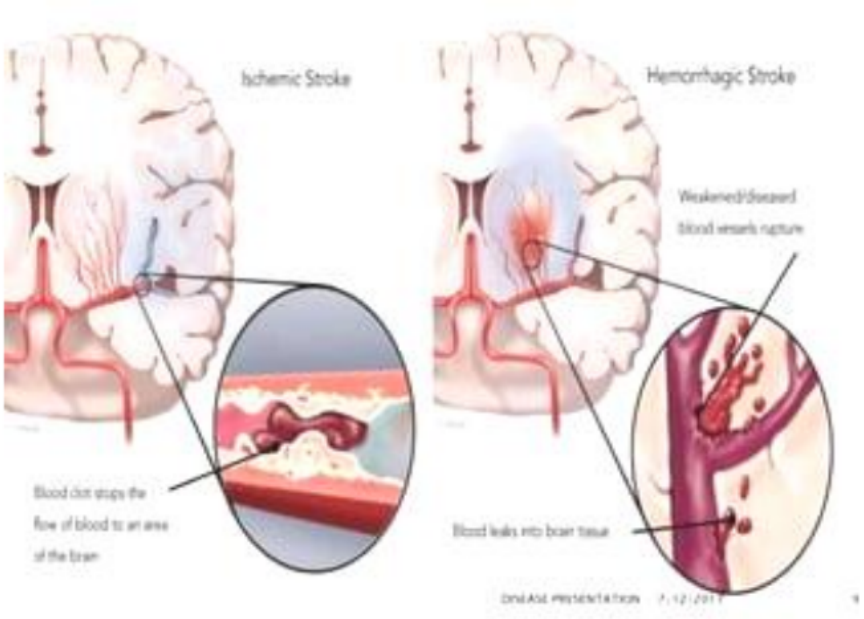

Fig No.1 Types of stroke

In about 80-85 % of cases, extracranial or intracranial thrombosis or cardio emboli results in ischemic stroke. In India, the leading cause of Acute Ischemic Stroke is large vessel atherosclerosis. Management of risk factors may help to avoid stroke. The treatment for stroke includes antiplatelet drugs, intravenous thrombolysis, endarterectomy and intracranial artery stenting, as well as blood pressure and intracranial pressure control. Several factors, namely severity of stroke, type, geriatrics, gender, vascular risk factors,

and consciousness impairment, have been identified as predictors of mortality and morbidity following an acute stroke. Researchers are increasingly focused on uncovering the underlying mechanisms that contribute to the development of ischemic stroke, in order to better understand this complex condition and identify potential targets for prevention and treatment. Cerebrovascular ischemic stroke, C reactive protein, lipoprotein A, lipoprotein phosphatase A2, increased leukocyte count, pro inflammatory interleukins, endothelial, nitric oxide, tissue factors, Intracellular adhesion molecules, homocysteine, and plasma fibrinogen were identified as the risk factor. Microalbuminuria has been identified as the emerging risk factor for ischemic stroke [3].

Microalbuminuria, a condition characterized by moderate levels of albumin in the urine, has been linked to an increased risk of diabetic nephropathy in diabetic patients [4-5]. Microalbuminuria has been identified as a potential predictor of ischemic stroke in both diabetic and non-diabetic populations [6,7]. Research by Mykkanen et al. has demonstrated a link between intima-media thickness in carotid arteries, a marker of atherosclerosis, and the presence of microalbuminuria (MA) [8]. Furthermore, a study by Beamer et al. found that patients who had experienced a recent stroke had a threefold higher prevalence of microalbuminuria compared to age- and sex-matched controls [9].

Therefore, the purpose of this study was to investigate the predictive value of microalbuminuria (MA) in patients who have experienced acute stroke and do not have diabetes, in order to determine its potential as a prognostic indicator in this specific population.

MATERIALS AND METHODS

"This prospective observational study was conducted at Department of General Medicine and Neurology, Narayana Medical College & Hospital, Nellore, A.P. Institutional Ethical Committee approved for this study. All participants in the study provided informed consent. Non-diabetic patients with acute ischemic stroke, who were satisfies inclusion and exclusion criteria, presenting to OP or wards of department of General Medicine and department of Neurology, Narayana medical college and hospital, Nellore". The study was conducted in 18 months duration from January 2021 to June 2022.

Sample size: It was computed in accordance with the previous publications.

The sample size was determined based on previous research.

Calculating sample size

UsingtheformulaZ^2xS^2/d^2

For 95% confidence interval,

Where=1.96, S =17.23anddas5,

5% significance level, d=0.05=Allowableerror. Therefore,

required sample size, with $n = \{Z^2XS^2\}/d^2$ was 50.

Randomization: Simple random.

INCLUSIONCRITERIA:

This study included patients with acute ischemic stroke confirmed by non-contrast CT or MRI scans of the brain, after excluding those who met the exclusion criteria and obtaining informed consent from each participant.

EXCLUSION CRITERIA:

- (1)Known Diabetic and hypertensive patients
- (2)Intra cranial hemorrhage
- (3)Patients with CKD and AKI
- (4)Patients with UTI
- (5)Patients with Neoplasm
- (6)Coronary artery disease

Within 24 hours of admission, acute ischemic stroke patients' urine samples were tested for the presence of Microalbuminuria. The severity of the stroke was determined by the NIHSS score at the time of admission and again after one month.

NIHSS

"Stroke	**Stroke severity**
0	No stroke symptoms
1-4	Minor stroke

5-15	Moderate stroke
16-20	Moderate to severe stroke
21-42	Severe stroke”

RESULTS

The data was entered into an Excel spreadsheet before being transferred to the Windows version of SPSS 18.0. (SPSS Inc., Chicago, IL, USA). The quantitative variables' mean and standard deviation are displayed. Descriptive statistics were used to describe numeric variables like mean and standard deviation, as well as qualitative categorical variables like count and percent. The relationship between the two numerical variables was investigated using Spearman's correlation. P values of 0.05 were considered significant for all tests, and 0.001 was considered highly significant.

Table1.Association between stroke size and spot microalbuminuria

			Spot microalbuminuria		Total	P value
			-Ve	+Ve		
Stroke size	SI	Frequency (n)	22	7	29	0.0014
		% within Spot microalbuminuria	78.57%	31.81%	58%	
	LI	Frequency (n)	6	15	21	
		% within Spot microalbuminuria	21.42%	68.18%	42%	
Total		Frequency (n)	28	22	50	

Table 2.Basic characteristics of stroke patients

Variable	Spot microalbuminuria	N	Mean ± SD	P value
SBP mmHg	With MA	22	117.6818182±11.32795263	0.9898
	Without MA	28	117.6428571±10.11128554	
DBP mmHg	With MA	22	75.90909091±5.3622054	0.2648
	Without MA	28	74.21428571±5.202258362	
BI (Barthel index)	With MA	22	61.59090909±5.645555276	0.5242
	Without MA	28	63.46428571±12.72641506	
T Chol (mg/dL)	With MA	22	180.8636364±45.96302391	0.4964
	Without MA	28	172.6071429±39.17703341	
HDL (mg/dL)	With MA	22	36±4.375255095	0.8609
	Without MA	28	36.25±5.406614604	
LDL (mg/dL)	With MA	22	111.1818182±49.06131864	0.8160
	Without MA	28	108±46.6761895	
TGL	With MA	22	162.4545455±68.27586011	0.1170
	Without MA	28	138.25±37.53775877	
Age	With MA	22	49.95454545±8.493567722	0.9795
	Without MA	28	49.89285714±8.265677744	
UREA	With MA	22	32.36363636±7.524850605	0.6486
	Without MA	28	31.25±9.224062735	
CREATININE	With MA	22	1.245454545±0.248284155	0.0902
	Without MA	28	1.121428571±0.254379627	
RBS	With MA	22	107.5±11.55834063	0.3333
	Without MA	28	104.5±10.12331376	
NIHSS	With MA	22	26±11.4184479	<0.0001
	Without MA	28	12.57142857±9.122331457	

Table 3.CorrelationbetweenspotMicroalbuminuriaandNIHSSstrokescale

NIHSS Scale At admission		microalbuminuria		Total	Pvalue
		+ve	-ve		
No stroke	Frequency(n)	0	1	1	0.65576.
	% within Spot microalbuminuria	0%	3.57%		
Minor stroke	Frequency(n)	0	9	9	
	% within Spot microalbuminuria	0%	32.14%		
Moderate stroke	Frequency(n)	6	10	16	
	% within Spot microalbuminuria	27.27%	35.71%		
Moderate to severe	Frequency(n)	7	6	13	
	% within Spot microalbuminuria	31.8%	21.42%		
Severe	Frequency(n)	9	2	11	
	% within Spot microalbuminuria	40.90%	7.14%		
Total		22	28		
%		44%	56.0%		

The correlation between urine microalbumin and NIHHS score is 0.650, with a p value of 0.0001.

DISCUSSION

MA has been identified as a new marker for monitoring diabetes mellitus. In this study we assessed the predictive significance of MA in non-diabetic acute stroke patients. Microalbuminuria has been linked to various risk factors for stroke, including diabetes, hypertension, advanced age, history of myocardial infarction, obesity, smoking, and left ventricular hypertrophy. Notably, a study by Nancy B. Beamer et al. found that microalbuminuria was more common in patients with recent stroke (29%) than in those with traditional stroke risk factors (10%), and was absent in healthy individuals [10]. In our study, we found that patients with a mean NIHSS of 26±11.418 were positive for MA, while cases with a mean NIHSS of 12.85±9.06 were negative for MA, indicating that higher NIHSS were positive for MA. The relationship between MA and

NIHSS was statistically significant (p<0.0001).

Research by Gumbinger et al. revealed that microalbuminuria is a common finding in patients with acute ischemic stroke, and is associated with more severe neurological symptoms on admission and poorer functional outcomes at discharge, serving as a strong predictor of unfavorable outcomes in the acute phase [13].

A study by Słowik et al. investigated patients hospitalized within 24 hours of their first ischemic stroke, with neurological deficit assessed using the Scandinavian Stroke Scale (SSS). The results showed that microalbuminuria was present in nearly half (46.7%) of the patients with acute stroke, and its presence was strongly associated with more severe neurological symptoms.

In our study we found that at admission, the mean NIHSS Score for Minor stroke patients was 3.55556± 0.527, while 14.3125±0.4787 for moderate stroke cases, 19.0769±1.605 for moderate to severe stroke, and 38.4545±0.478 for severe stroke patients. The correlation between microalbuminuria and NIHHS score is 0.650, with a significant p value of 0.0001.MA was associated with the severity of cerebral infarction at admission and clinical outcomes 1 month after onset, and it could be used as a potential indicator of poor prognosis in patients with ischemic stroke.

CONCLUSION

Microalbuminuria results in higher NIHSS score and the poorer the outcome. We demonstrated that measuring microalbuminuria after a non-diabetic ischemic stroke was a reliable predictor of stroke outcome. We concluded that microalbuminuria was found to be an independent marker of acute ischemic stroke. MA was also associated with the clinical severity of a stroke. Microalbuminuria measurement helps in identifying the patients at increased risk and aid in providing more aggressive management protocol.

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