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Research Article

Prevalence of microalbuminuria in patients with non-diabetic acute ischemic stroke

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ABSTRACT

Background: Microalbuminuria has been associated with clinical risk factors for stroke like diabetes, hypertension, aging, history of myocardial infarction, obesity, smoking and left ventricular hypertrophy. The present study is aimed to determine the potential use of microalbuminurea, as a marker of stroke risk and its outcome in non-diabetic population.
Methods: The present study was conducted in the department of internal medicine and department of neurology after the institutional ethical clearance and the informed consent from all the subjects. A total of 116 patients admitted with acute ischemic stroke presenting within 24 hours of stroke onset were recruited for the study. The microalbuminurea was assayed by immunoprecipitation. The stroke severity was assessed by NIH Stroke Severity Statistical Software Package. P value less than 0.05 was considered the level of significance.
Results: There was graded co-relation between NIHSSS score and urine albumin creatinine ratio with significant P value of <0.001 in group A, but no such co-relation was seen in group B (P value 0.2). This suggests more the elevated urine ACR more the neurodefecit implying its utility as prognostic marker in acute ischemic stroke.
Conclusion: Urine albumin excretion had the strongest correlation with the NIHSSS Score of the patient in acute ischemic stroke. Therefore, measurement of microalbuminurea may help to assess those who are at increased risk and to triage those who may need a more aggressive management protocol.

Keywords: Microalbuminurea, Acute ischemic stroke, NIHSSS score

INTRODUCTION

Stroke is one of the leading causes of mortality and morbidity in adults' worldwide, posing serious medical, socio-economic and rehabilitation problems. Stroke, also called 'Brain attack' because it involves an acute insult to the brain, is a major disabling disease. But, throughout the world, unfavorable trends in stroke risk factor profile, lack of prevention programs, lack of awareness of stroke risk factors and warning signals by the public and lack of emphasis on preventive training in medical schools, posed high stroke rates and serve to widen the stroke prevention gap.[1] This is unfortunate because stroke is well suited for prevention since it has high prevalence, high burden of illness and economic cost, well defined modifiable risk factors and effective prevention measures.[2]

Hence, there is growing interest in unifying mechanisms in ischemic stroke pathogenesis. Overtime, numerous risk factors have been found to be associated with increased occurrence of stroke. But, only one half of the

cerebrovascular disease risk could be explained by conventional risk factors. The realization that atherosclerosis is an inflammatory disease has led to a search for new stroke risk factors such as microalbuminurea and treatment.[3]

Microalbuminuria has been associated with many disease entities like diabetic nephropathy, hypertension with left ventricular hypertrophy and renal insufficiency, etc. Microalbuminuria has been associated with clinical risk factors for stroke like diabetes, hypertension, aging, history of myocardial infarction, obesity, smoking and left ventricular hypertrophy. But, there was little information regarding micro-albuminuria as an independent risk factor for stroke or as a predictor of stroke outcome. With the availability of sensitive and relatively inexpensive methods for detection of microalbuminurea, many studies has been conducted in different parts of the world to determine the potential use of microalbuminurea, as a marker of stroke risk and its outcome in non-diabetic population. Such reports are lacking from our country, hence an attempt has been made to study microalbuminurea in non-diabetic acute ischemic stroke patients.

METHODS

The present cross sectional study was conducted in the in-patient setting of department of internal medicine and department of neurology after the institutional ethical clearance and the informed consent from all the subjects. The male and female patients admitted within 24 hours of onset of acute ischemic stroke as confirmed by computed tomography/MRI brain and who were willing to participate were included.

The patients and attendants who doesn't give consent and those with established kidney disease, diabetes mellitus, chronic inflammatory disease, febrile patients, those with urinary tract infection, dyslipidemia, history of coronary artery disease, Transient Ischemic Attacks and suspected embolic stroke were excluded from the study. A total of 116 patients admitted with acute ischemic stroke presenting within 24 hours of stroke onset were recruited for the study.

Every patient had undergone electrocardiogram, NCCT brain on admission as per stroke protocol and in those with ischemic changes in brain and with 'no hemorrhagic changes' were be included in the study, if inconclusive then subjected for MRI brain.

Those with abnormal urine routine, and those with random blood sugar >200 or HbA_{1C} >6.5 were also dropped from the study. Hematocrit, WBC count, renal function test, liver function test and serum electrolytes and lipid profile of the patients were also noted. The albumin creatinine ratio was estimated in the spot sample of urine, next day morning in those who were not come under exclusion criteria. The microalbuminurea was assayed by immunoprecipitation. The stroke severity assessed by NIH Stroke Severity Scale.

Statistical analysis

Data were represented as Mean ± SD. The statistical analysis was done using a SPSS Statistical Software Package. P value less than 0.05 was considered the level of significance. In the present study, the patients were grouped into group A (Patients with microalbuminuria) and group B (Patients without microalbuminuria) and then correlated with NIHSSS score (NIH stroke severity scale score).

RESULTS

The numbers of stroke patients with microalbuminurea are 47.92% and 52.08% stroke patients were without microalbuminurea (Figure 1). Mean age of patients in group A was 63.96 ± 11.53 years and mean age of patients in group was 54.28 ± 10.86 years. The difference between two groups was found to be statistically significant with P value 0.31 (Table 1).

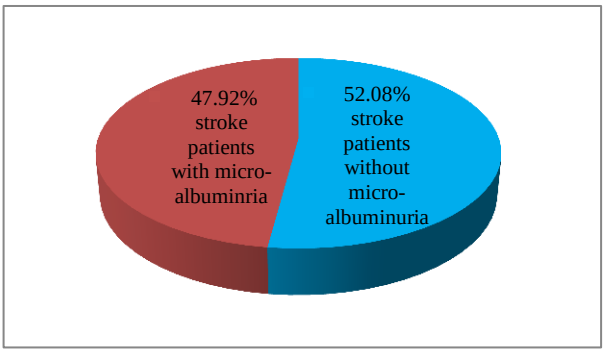

Figure 1: Sector chart showing prevalence of microalbuminurea in patients with acute ischemic stroke.

Table 1: Baseline characteristics and outcome in patients with (Group-A) and without microalbuminuria (Group-B).

Category	Group A	Group B
No. of cases	23	25
Mean age (years)	63.96 ± 11.93	54.28 ± 10.86
Sex		
Male	73.91%	60%
Female	26.08%	40%
Mean systolic BP (mmHg)	157.83 ± 16.01	150.56 ± 11.50
Mean diastolic BP (mmHg)	94.26 ± 13.27	90.72 ± 9.76
Smokers	57.14%	42.86%
NIHSSS score	16.08 ± 5.4	9.64 ± 2.76
ECG with LVH	30%	16%
Urine albumin excretion	78.17 ± 31.02 mg/g	17.01 ± 5.69 mg/g

Among study sample 66.56% were males and 33.44% were females. Among males 53.12% were microalbuminurics and among females 37.5% were microalbuminurics. In group A i.e., microalbuminurics 73.91% were males compared to 26.08% females the mean ACR was higher in females (80.00 ± 24.73 mg/g) compared to males (77.53 ± 33.62 mg/g) and mean age of females (73.33 ± 13.66 years) in group A was higher than males (60.65 ± 8.93 years), advanced age could explain the higher prevalence of Micral in females than males (Table 2).

Table 2: The association of sex with microalbuminuria.

Sex	MA positive	ACR (Mean ± SD)	MA negative	ACR (Mean ± SD)	Total
Male	53.12%	77.53 ± 33.62	46.88%	17.60 ± 6.05	66.56%
Female	37.5%	80.00 ± 24.73	62.5%	16.30 ± 5.33	33.44%

Chi square = 1.043, df = 1, P value = 0.307

Based on NIH SSS Score cases were categorized into 3 levels. Those with score <7 level 1 (mild neuro-deficit), 7-14 into level 2 (moderate neuro-deficit) and ≥15 into level 3 (severe neurodeficit). In group A, 4.3% were in level 1 with mean ACR 144 ± 18.5, 25.8% were in level 2 with mean ACR 103.5 ± 19.7 and 68.85% were in level 3 with mean ACR 62.2 ± 29.3, there was graded co-relation between NIHSSS score and urine albumin creatinine ratio with significant P value of <0.001 in group A, but no such co-relation was seen in group B (P value 0.2). This suggests more the elevated urine ACR more the neurodefecit implying its utility as prognostic marker in acute ischemic stroke (Table 3).

Table 3: NIHSSS in relation to ACR in both the groups.

NIHSSS	Group A		P value	Group B		P value
	No. of cases	ACR (Mean ± SD)		No. of cases	ACR (Mean ± SD)	
<7	01	76.28 ± 0.00	<0.001	04	15.00 ± 8.56	0.2
7-15	12	58.46 ± 9.34		19	17.89 ± 9.32	
>15	10	98.9 ± 12.68		02	17.01 ± 5.69	

DISCUSSION

Microalbuminuria signifies abnormal vascular permeability and its presence may be considered as kidney's notice for markedly enhanced cerebrovascular risk.[4] The importance of microalbuminurea was first appreciated in the early 1980s when two landmark studies in London and Denmark independently reported that it was predictive of development of overt diabetic nephropathy and progressive renal failure.[5,6]

Although microalbuminurea is associated with clinical risk factors for stroke including diabetes, hypertension, aging, history of myocardial infarction and left ventricular hypertrophy there was little information regarding microalbuminurea as being an independent risk factor for stroke or as predictor of stroke outcome. But, in recent times, several studies have been conducted to ascertain any relationship between microalbuminurea and ischemic stroke.

The association of microalbuminuria in cerebrovascular diseases has been confirmed in a few western studies. this study was undertaken to analyze 'Microalbuminuria in acute cerebral ischemic events' in our context. After analysis of 116 patients with reference to inclusion and exclusion criteria, 48 patients were selected for the study. In the present study, microalbuminuria was present in 23 of 48 subjects, which amounted to prevalence of 47%. This was similar to the past studies in acute cerebrovascular accidents, conducted by Wojciech Turaj,[7] where 52 patients with 37 subjects in control group where the prevalence was 46% with P value <0.05.

In another study Nancy B. Beamer et al.[8] reported microalbuminuria in 97 acute ischemic stroke patients with 51 controls, prevalence was 29% with significant P value <0.001. N Segura Bruve et al. reported in 88 patients were prevalence was 48.8% which was published in 16th meeting of European Neurological Society. Prevalence rate of microalbuminuria in stroke is similar to that reported in other conditions. In diabetes the reported prevalence of microalbuminuria was 3 to 40%. Hypertensive's had a reported prevalence of 3 to 37%. This study showed a relatively high prevalence of microalbuminuria in acute phase of stroke.

In India, study conducted by PC Mathur et al.[9] showed that, advanced age in microalbuminurics with stroke than normoalbuminurics (P value <0.05). An intra-group analysis was also done to find a graded correlation i.e. by grouping the patients less than 60 years and more than 60 years. But, urine albumin excretion and age defined a significant graded correlation. We infer that urine albumin excretion might be much more dependent on the severity of the stroke process than age as evidenced by its significant correlation with NIH SSS Score in acute stroke victims in microalbuminuria.

In the present study, 2/3rd of the sample were males and 1/3rd females, among males 53.12% were microalbuminurics and among females 37.5% were microalbuminurics. The relation between sex and microalbuminuria was not statistically significant. This is in line with the earlier study conducted by J. Chowdary et al. in patients of acute ischemic stroke.[10] Female patients were older in our study. The mean age of female patient with microalbuminurea was 73.33 years while that of male patients was 60.65 years. The mean urine albumin excretion was slightly more in female subjects, which may be probably due to their advanced age. Blood pressure is a confounding factor in stroke. In our study, patients with past history of hypertension came under exclusion criteria. But an elevated blood pressure is a frequent accompaniment in stroke. Hypertension was present in 70% of patients in group A and 68% of patients in group B. Both mean systolic and diastolic blood pressure of these 2 groups matches. There was no statistically significant difference in blood pressure in microalbuminurics and normoalbuminurics in our study.

There was also no correlation between blood pressure and urine albumin excretion in patients with or without microalbuminurea. Studies have reported higher graded prevalence of microalbuminuria in hypertensives.[11,12] The plausible explanation is that there is a certain degree of acute dysautonomia in acute stroke events that may not reflect the actual blood pressure of the patient. In the present study, the correlation of microalbuminuria with stroke severity was assessed using NIH SSS score. Based on NIH SSS Score cases were sub-grouped into 3 levels. Those with score <7 level 1(mild neuro-deficit), 7-14 into level 2 (moderate neuro-deficit) and ≥15 into level 3 (severe neuro-deficit). In the present study, we found that higher the NIH SSS score, more the urine albumin excretion and vice versa. Hence microalbuminuria may be an important prognostic marker in acute ischemic stroke. Therefore measurement of microalbuminurea may help to assess those who are at increased risk and to triage those who may need a more aggressive management protocol.

CONCLUSION

Urine albumin excretion had the strongest correlation with the NIHSSS Score of the patient in 'Acute ischemic stroke'. Those with a higher NIHSSS Score had a higher rate of urine albumin excretion and vice versa. Acute ischemic stroke patients with microalbuminuria were significantly older than normoalbuminurics but there was no significant graded correlation of age with urine albumin excretion in inter-group and intra-group studies.

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