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MICROALBUMINURIA AS A PREDICTOR OF ON EARLY NEUROLOGICAL DETERIORATION IN ACUTE ISCHEMIC STROKE

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ABSTRACT

Background: Stroke is a major cause of long-term disability among patients. Early Neurological Deterioration (END) has serious consequences on the short term (morbidity and death) and long term (recovery from stroke) outcomes in patients with acute ischemic stroke (AIS). Studies have shown a higher prevalence of microalbuminuria in those patients with AIS (1). This study was done to evaluate microalbuminuria as a predictor of END in acute ischemic stroke. **Methods:** An observational prospective study was conducted among AIS patients who presented to the department of General medicine, R L Jalappa Hospital (RLJH) from march 2018 to august 2019. 73 patients with first episode of acute ischemic stroke presenting within first 24 hours after onset of symptoms were enrolled in the study. The neurological status and the severity of stroke were assessed by applying the NIHSS (National Institute of Health Stroke Scale) score on day 1 and day 3 on all patients. END was diagnosed if there was an increase in the NIHSS score by 3 or more from day 1 to day 3 of admission. Presence of microalbuminuria in patients were assessed by calculating UACR at presentation. Microalbuminuria was then correlated with END in these patients. **Results:** Microalbuminuria was present in 80% of patients whereas in group without END, 18.86% had microalbuminuria.($p < 0.001$). The presence of microalbuminuria was significantly more among patients who developed END. It was also found that patients with severe stroke (75%) were more in the group with END compared to those without (37.73%) with p value of <0.001, which was statistically significant. **Conclusion:** Results of our study suggests that presence of microalbuminuria can predict development of early neurologic deterioration in acute ischemic stroke patients and hence to be treated aggressively.

KEYWORDS: Acute ischemic stroke, Early Neurologic Deterioration, Microalbuminuira.

INTRODUCTION

Cerebrovascular accident is the third most leading cause of death worldwide after coronary heart disease and cancer, especially ischemic stroke.[1] It is more often disabling than fatal and could be a major cause for long-term disability among patients and has vast emotional and socio-economic consequences. In 20-40% of patients with acute ischemic stroke, neurological symptoms progress especially during the first few hours,[2] Early Neurological Deterioration (END) has potentially serious consequences on the short term (morbidity and death) and long term (recovery from stroke) outcomes for the patients of acute ischemic stroke. Therefore, attempts to predict and prevent END should be made promptly and aggressively.

Various studies have reported the following factors to be predictors of END, which include clinical variables like stroke severity at the time of presentation,[3] history of diabetes mellitus,[3] hypertension,[3,4] and laboratory variables like elevated markers of coagulation (PT, aPTT), markers of inflammation(ESR,CRP) and serum glucose levels at the time of admission,[3,4] but most of these factors are either not reversible or difficult to be assessed.

The recent realization that atherosclerosis is disease of inflammation has led to a research for new stroke risk factors. Microalbuminuria is known to be associated with multiple risk factors for stroke such as obesity, aging, diabetes, hypertension, ischemic heart disease, smoking and left ventricular hypertrophy. Studies have shown a higher prevalance of microalbuminuria in those patients with acute ischemic stroke.[1] However, there is very little information concerning microalbuminuria as an independent risk factor for stroke and as a prognostic indicator of stroke severity and outcome and hence the requirement for the study.

METHODS AND MATERIALS

A total of 73 patients presented with acute ischemic stroke were included in this observational prospective

study after considering inclusion and exclusion criteria. Inclusion criteria: 1. All the patients of acute ischemic stroke who are more than 18 years of age. 2. Patients with a first episode of acute ischemic stroke presenting within the first 24 hours after onset of symptoms.

Exclusion criteria: 1. Patients with evidence of hemorrhagic stroke. 2. Patients with a transient ischemic attack. 3. Patients with co-morbid conditions like a congestive cardiac failure (CCF), renal failure and decompensated cirrhosis of the liver.

A detailed history was taken and a thorough general physical and systemic examination was performed. The following details were noted: age; sex; presenting complaints; a history of any comorbidities and signs on examination. Urine albumin creatinine ratio of all the patients was estimated from the urine sample collected at the time of presentation.

The neurological status of the patients and the severity of stroke was assessed by using the NIHSS scoring system NIHSS (National Institute of Health Stroke Scale). NIHSS score was calculated immediately at the time of admission, then subsequently after 24 after the onset of symptoms and on day 3 of admission. Patients for whom the NIHSS score returned to zero within the initial 24 h will be classified as having a transient ischemic attack (TIA) and were excluded from the study. Early Neurological Deterioration was diagnosed if there was an increase in the NIHSS score by 3 or more than 3 points from day 1 to day 3 of admission.

At the end of the study, the study population was divided into two groups based on their neurologic outcome. One group included acute ischemic stroke patients who developed END and the second one included patients without END. In each group, the proportion of patients with microalbuminuria at the time of presentation was estimated. The correlation between microalbuminuria at the time of presentation and development of END was assessed.

An independent sample t-test was used to assess statistical significance. The association between explanatory variables and categorical outcomes was assessed by cross-tabulation and comparison of percentages. Univariate logistic regression was done to assess the factors associated with the occurrence of END. Unadjusted odds ratios along with their 95% CI were presented. P-value < 0.05 was considered statistically significant. IBM SPSS version 22 was used for statistical analysis.[5]

RESULTS AND OBSERVATION

Data were collected from 73 patients out of 95 patients who had presented with ischemic stroke with in 24 hrs of onset of symptoms after due consideration to all relevant inclusion and exclusion criteria. There were 48(65.75%) were males and 25(34.24%) constitute females, ranging from 48 years to 92 years in age. The mean age of the patients was 68.89 ± 8.92 years. Both males and females were almost equal in number48(65.75%) were males and 25(34.24%) constitute females. Among the study population, 28(38.35%) had hypertension, Smoking and alcohol consumption was present in 36(49.31%) and 31(42.26%) respectively.

The mean NIHSS score on day 1 was 22.5± 5.92 and on day 3 was 25.36 ± 5.91. Based on NIHSS score on Day 1 of admission, majority of the patients had severe stroke-35(47.94%), 18 (24.65%) patients had moderate to severe stroke and 20(27.39%) had mild stroke. Among the total study population, early neurologic deterioration was developed in 20(27.39%) patients and 53 (72.6%) patients did not develop early neurologic deterioration. Among patients without END, 18.86% i.e., 10 had microalbuminuria on presentation whereas among patients who developed END, out of 20, 16 had microalbuminuria on presentation that constitutes 80%.

DISCUSSION

In our study, a total of 73 patients were included after considering all the inclusion and exclusion criteria. Patients were evaluated for correlation between UACR levels and development of END in patients with acute ischemic stroke. 27.39% of patients enrolled in the study developed END. These findings were similar those found in a study done by Kunal Bhatia.[6] Among patients without END, 18.86% i.e., 10 had microalbuminuria on presentation whereas among patients who developed END, out of 20, 16 had microalbuminuria on presentation that constitutes 80%. P value for microalbuminuria was <0.001which shows the difference as statistically significant. A recent study by Anupa Thampy et al has also shown that microalbuminuria is a predictor of early neurological deficit in ischemic stroke even when adjusted for NIHSS score at admission.[7,8] A study done by Chen CH et al. also predicted that proteinuria independently predicts unfavorable outcome of ischaemic stroke patients receiving intravenous thrombolysis.[9] Study by Umemura T et al. implied that the lesion volume expansion was more in those patients with higher microalbuminuria and also correlated with early neurological deterioration.[10]

There was significant difference in the microalbuminuria status between patients with and without END. The patients who had microalbuminuria are 11.4 times at risk of developing early neurologic deterioration compared to who did not have. Therefore, early detection of patients with microalbuminuria and aggressive treatment can prevent END and eventually improve their neurological status.

TABLE 1: Comparison of early neurologic deterioration with microalbuminuria of study population (N=73).

MICROALBUMINURIA	EARLY NEUROLOGICAL DETERIORATION		CHI SQUARE	P VALUE
	YES(20)	NO(53)		
YES(26)	16(80%)	10(18.86%)	23.664	<0.001
NO(37)	4(20%)	43(81.14%)		

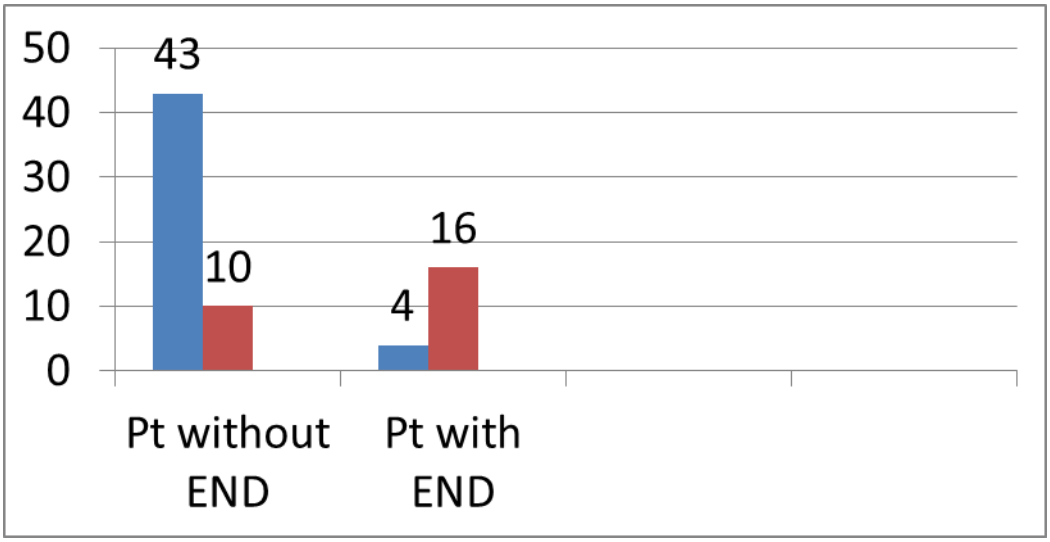


Figure 1: Bar chart of early neurologic deterioration with microalbuminuria status in study population (N=73).

TABLE 2: Comparison of early neurologic deterioration with NIH stroke score group of study population (N=73).

NIHSS	EARLY NEUROLOGICAL DETERIORATION		CHI SQUARE	P VALUE
	YES(20)	NO(53)		
MILD(20)	1(5)%)	19(35.84%)	15.155	<0.001
MODERATE(18)	4(20%)	14(26.41%)		
SEVERE(35)	15(75%)	20(37.73%)		

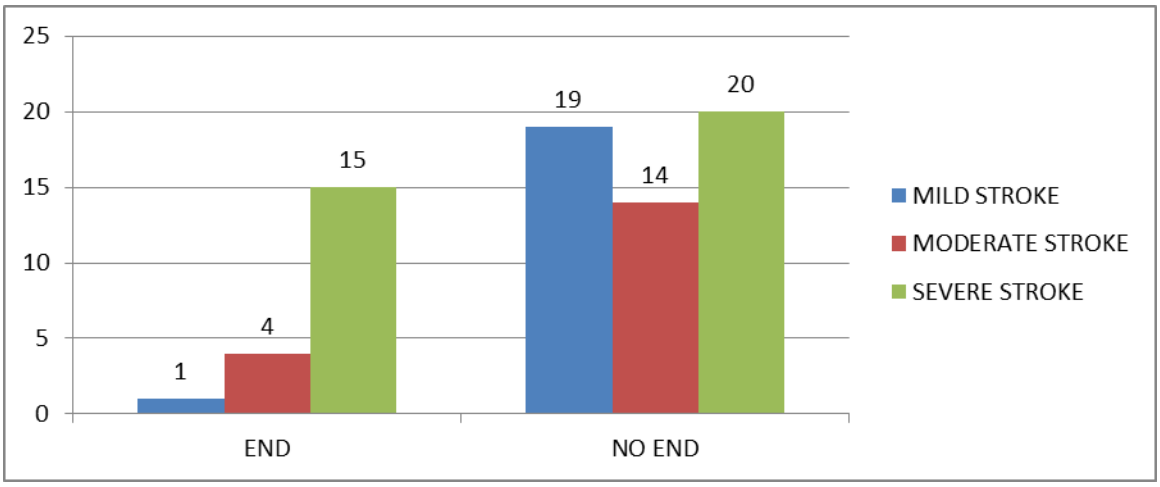
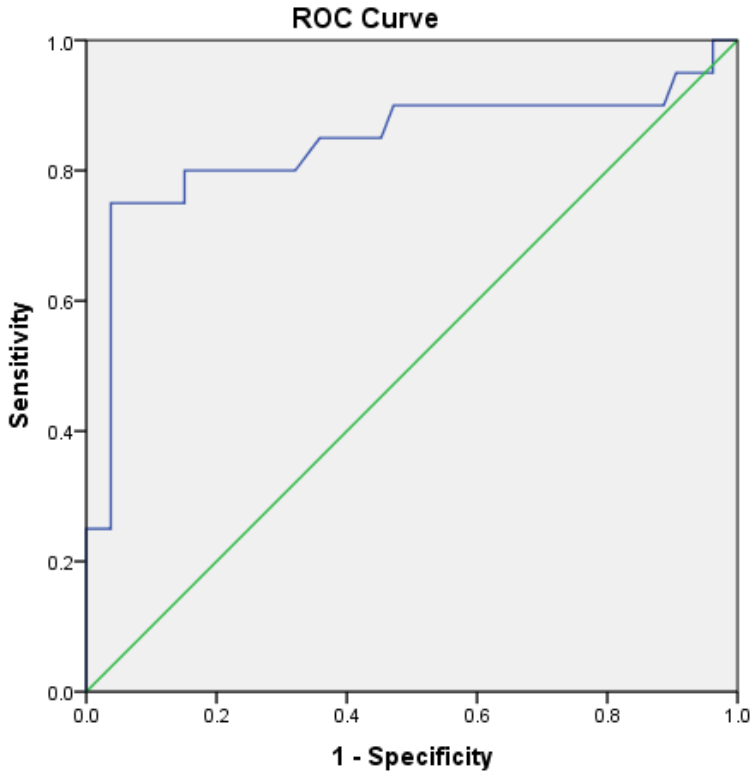


Figure 2: Bar chart of early neurologic deterioration with NIH stroke score in study population (N=73).

ROC CURVE:



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