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Original Research Article

Assessment of serum uric acid levels in patients with acute ischemic stroke

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Abstract: The involvement and role of serum uric acid as a risk factor for acute ischemic stroke is still controvertible. Evidences suggest that treatments with a hypo uraemic action have an effective role in cardiovascular risk prevention. In the present study association between serum uric acid and ischemic stroke was assessed. This hospital based case control analysis contain 50 acute ischemic stroke cases and age, sex matched 50 control subjects. Serum uric acid levels in the first 48 hours of admission were estimated with photometry method. The mean serum uric acid level in cases was 6.48 ± 1.92 mg/dl whereas it was 5.09±1.07 mg/dl in control subjects. The mean serum uric acid level was significantly higher in cases as compared to controls; this analysis shows that hypertension, smoking, and obesity were found to be independently associated with ischemic stroke. It was also found that serum uric acid was also independently associated with ischemic stroke. Elevated SUA is independently associated with acute ischemic stroke and significantly associated with hypertension, diabetes mellitus, smoking, obesity, metabolic syndrome and poor functional outcome after stroke.
Keywords: Acute ischemic stroke, Serum Uric acid, cardiovascular disease, Hypertension

INTRODUCTION

The role of Serum Uric acid in the development of cardiovascular disease has been debated for over few decades and is a third common cause of mortality among worldwide [1]. Globally, it has been reported that over 16 million people suffering with stroke, 5.7 million die and 5 million are permanently disabled per year [2, 3]. The role of serum uric acid levels as an independent risk factor for vascular disease has been questioned for decades [4]. Few epidemiological studies evidenced that elevated serum uric acid levels may helpful to identify the increased risk for ischemic stroke [5, 6]. Few studies including the National Health and Nutrition Examination Survey (NHANES) study concluded that uric acid is an independent risk factor for the development of cardiovascular and cerebrovascular diseases [7]. The role of Uric acid in the stroke development is still controvertible due to the outcome of various studies. In this respect SUA levels estimation could be used as serum marker in selecting and appropriately caring for subjects at risk. As there are few studies in India on the role of SUA in acute ischemic stroke, hence a study on this aspects likely to be fruitful.

MATERIALS AND METHODS

The present case control study was conducted in Maheshwara Medical College and Hospital during January 2016 to December 2016. A total 50 cases of ischemic stroke and 50 age, sex matched control subjects were considered for the study. A detailed clinical history of the patients was collected by prescribed questionnaire. Cases of acute ischemic stroke were included and cases with valvular heart disease, Angina, myocardial infarction, atrial fibrillation, renal & liver diseases, thyroid function and chronic pulmonary & bowel diseases were excluded from this study. Blood sample was collected from the cases and control subjects and serum uric acid was measured with the uricase method [7]. All other biochemical parameters were performed and NIH stroke scale score was calculated for all the cases while admission and discharge. Student t-test was used to compare continuous variables and chi-square test (χ^2) was used to compare variables.

RESULTS

Among 50 cases studied, 32 were male and 18 were female and with equal distribution of control subjects (Fig 1).

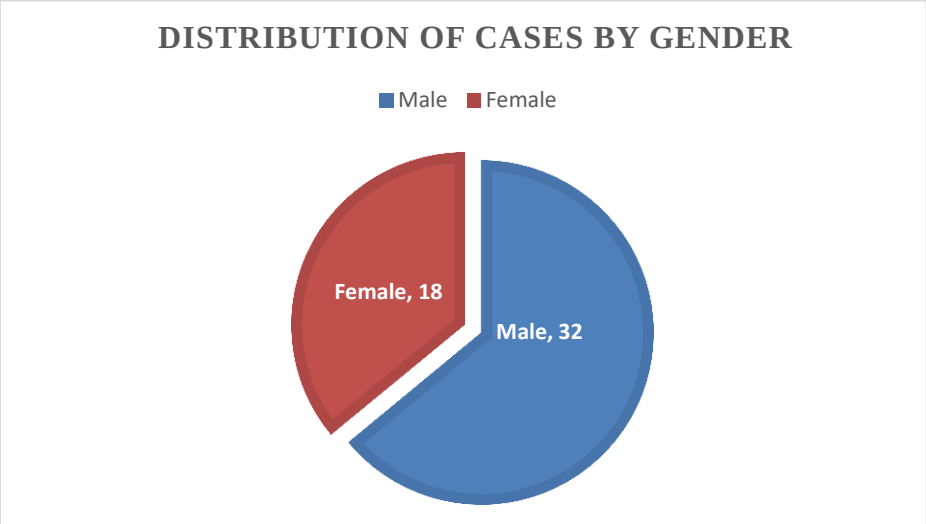

Fig 1: Distribution of cases by gender

Table 1: Age distribution of cases and controls

Age	Cases (n=50)		Controls (n=50)	
	Male	Female	Male	Female
<50	6	2	4	3
51-60	10	5	11	5
61-70	8	7	10	6
>70	8	4	7	4
Total	32	18	32	18

Table 2: Conventional risk factors Comparison for ischemic stroke in cases and controls.

Risk factors		Patients	Controls	Total	p-value	χ^2 - value
Hypertension	Positive	25	5	30	P=0.001	36.98
	Negative	25	45	70		
Diabetes mellitus	Positive	12	5	17	P=0.021	5.31
	Negative	38	45	83		
Metabolic syndrome	Positive	20	4	24	P=0.001	26.24
	Negative	30	46	76		
Obesity	Positive	22	4	13	P=0.018	6.52
	Negative	28	36	87		
Smoking	Positive	10	3	26	P=0.001	40.08
	Negative	40	37	74		

Table 3: Comparison of serum uric acid levels in cases and controls

	Patients	Controls	p-value
Mean serum uric acid	6.74± 2.10	5.66 ± 1.38	P=0.001
Range	2.8-12	2.8-10	
Median	7.3	6.3	

In the present study, mean serum uric acid (SUA) level in cases was 6.74±2.10 mg/dl whereas it was 5.66 +1.38 mg/dl for controls. This shows that the mean serum uric acid level was significantly higher in cases

as compared to controls and this difference was statistically significant (p = 0.001).

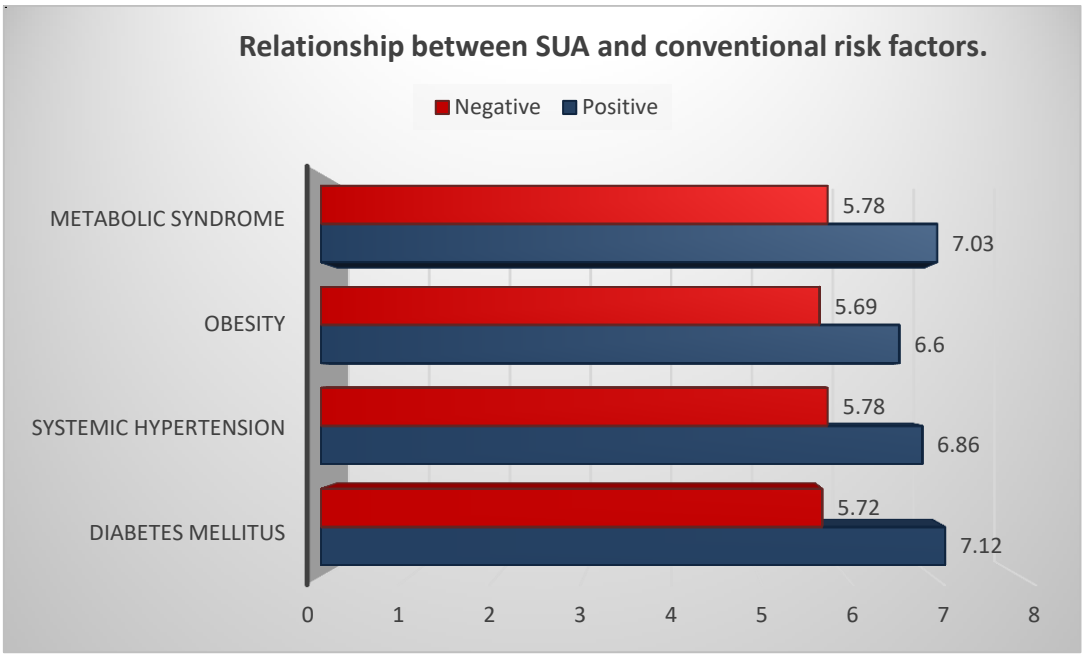

Fig 2: Relationship between Serum uric acid levels and conventional risk factors

DISCUSSION

Stroke can occur to any one at any time, regardless of age, sex or race. It is a major cause of mortality and morbidity in among worldwide. The well recognized risk factors like age, smoking, diabetes, hypertension, metabolic syndrome explain only a part of the cases. Many studies have found conflicting role of uric acid in patients with stroke and cardiovascular disorders, this study was conducted to study the role of serum uric acid in acute ischemic stroke and its effect on stroke outcome.

In the present study the serum uric acid (SUA) levels increased with increasing age but the difference was statistically not significant. The mean SUA levels were higher among males as compared to females but this difference did not attain statistical significance. Pearce and Aziz *et al.;* in 1969 [8] observed higher SUA values in males as compared to females (5.28 + 0.66 vs. 4.47 +0.78 mg/dl). B. Longo-Mbenza *et al.;* [9] found significantly higher SUA level in males (6.6 + 7 vs. 5.8 +6 mg/dl, p<0.01). Similar results were obtained in the study by Milionis *et al.;* [10] and in the Rotterdam study [11] (348 vs. 302µmol/L). Study by Karagiannis *et al.;* [12] also showed significantly higher levels of SUA among males as compared to females (5.8 mg/dl vs. 5.2 mg/dl, p<0.05).

We compared the SUA levels between the cases of ischemic stroke and healthy controls with no previous history of stroke. We found that stroke patients had a significantly higher SUA levels when compared to the controls (6.74 ± 2.10 mg/dl and 5.66 +1.38 mg/dl, p<0.005). Srikrishna R and Suresh DR found that serum uric acid levels were significantly higher in cases as compared to controls (6.56 +0.73 vs. 4.66 + 0.47, p<0.05) [13]. Milionis *et al.;* in his Study, relationship between uric acid and stroke showed that SUA is an independent risk factor for the occurrence of stroke [10]. Rotterdam in his study High serum uric acid levels were associated with the risk of stroke; age- and sex-adjusted hazard ratios for the highest versus the lowest quintile of uric acid were 1.57 (95% C.I. = 1.11 to 2.22) for all strokes, 1.77 (95% C.I. = 1.10 to 2.83) for ischemic strokes, and 1.68 (95% C.I. = 0.68 to 4.15) for hemorrhagic strokes. Thus the uric acid is an independent risk factor for stroke [11].

In our study, we used National Institute of Health Stroke Scale (NIHSS) to quantify stroke severity. It has been proved in earlier studies that higher NIHSS score portends poor prognosis following stroke [14, 15]. In the present study there was a significant correlation between SUA level and NIHSS score on admission (r = 0.428, p<0.001). NIHSS scores on discharge also correlated significantly with SUA levels (r = 0.402, p<0.001).

CONCLUSION

The present hospital based case control study carry out to find the role of serum uric acid in acute ischemic stroke. There was statistically non-significant correlation between SUA and age. SUA levels did not correlate significantly with gender. Elevated SUA is independently associated with acute ischemic stroke. Elevated SUA is significantly associated with hypertension, diabetes mellitus, smoking, obesity and metabolic syndrome. Elevated SUA is associated with poor functional outcome after stroke. Elevated SUA is significantly associated with increased chances of stroke mortality.

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