



HYPERURICEMIA AS A PROGNOSTIC MARKER IN ACUTE ISCHEMIC STROKE

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ABSTRACT Serum uric acid has also been linked to prognosis of patient with acute ischaemic stroke. Evidence suggests that increased level of uric acid is protective in patients with acute ischaemic stroke¹; although this issue has been debated, the neuroprotective role of uric acid in patient with acute ischaemic stroke is now established². So it could be marker of value in prognosis of patient with acute ischaemic stroke. The present study is designed to study the association between serum uric acid and stroke .the study is also intended to study the association between traditional risk factor for stroke and serum uric acid level in patients of acute ischaemic stroke.

KEYWORDS :

INTRODUCTION

Stroke entails a high socioeconomic burden due to increased mortality and morbidity .Early identification of individual at risk could be of help in designing primary prevention strategies³

The role of serum uric acid (SUA) level as an independent risk factor for stroke has been questioned for many years⁴. Evidence from epidemiological studies suggest that elevated SUA levels may predict an increased risk for stroke and cardiovascular events^{2,3} moreover therapeutic modalities with a SUA- lowering potential have been shown to reduce Cardiovascular disease morbidity and mortality. In this respect SUA levels could be as an 'easy to measure' serum marker in selecting and appropriately treating subjects at risk.

MATERIAL & METHODS

Population

The present study was carried out on 100 patients of acute ischaemic stroke admitted at KIMS NARKETPALLY.

Selection of Cases

Stroke or cerebrovascular accident was defined as rapidly developing clinical symptoms and signs of focal or global loss of cerebral function with symptoms lasting more than 24 hours or leading to death with no apparent cause other than that of vascular origin [WHO 1980]⁵. In each case, the diagnosis of recent ischaemic stroke was confirmed by CT scan of brain.

Exclusion Criteria

- Patients having disease known to increase serum uric acid or taking drugs which can cause hyperuricemia were excluded from study.
- Hemorrhagic stroke, Old case of Stroke were excluded from study.
- Patient admitted within 3 hours and had thrombolysis.

Method

On admission in hospital detailed history was taken and thorough physical examination was performed as per Proforma made. The severity of neurological deficit was recorded according to the scandinavian stroke scale (SSS).

Statistical tests

Chi square and student't' test were applied wherever appropriate. P value < 0.05 was considered significant.

REVIEW OF LITERATURE

Stroke or cerebrovascular accident is defined as rapidly developing clinical symptoms and signs of focal or global loss of cerebral function with symptoms lasting more than 24 hours or leading to death with no apparent cause other than that of vascular origin (WHO 1980)⁵

MECHANISM OF ACTION OF URIC ACID IN STROKE

Uric acid as a neuroprotective agent in patients with acute ischaemic stroke-

Uric acid is considered an effective antioxidant and high SUA levels could be a compensatory mechanism to counteract oxidative stress^{7,8} It

has been suggested that increased levels of SUA may be the result of the evolution of protective mechanisms in primates (including humans) against oxygen radicals⁷ It is well documented that uric acid lowers the rate of lipid peroxidation and stabilizes ascorbate due to its iron chelating properties^{7,9} In this way it may have protective role in patient with acute ischaemic stroke.

OBSERVATION

Distribution of cases according to Age & sex in patient with acute ischaemic stroke

S. No.	SSS	Level of Serum uric acid in male		Total
		SUA ≤7 mg%	SUA >7mg%	
1	<20	17(25%)	03(10%)	20
2	21-30	19(25%)	06(21%)	22
3	31-40	19(27%)	07(24%)	27
4	41-50	14(20%)	09(31%)	26
5	>51	02(3%)	04(14%)	05
6	Total	71	29	100

54% Patients were male and 46% patients were female, majority of patients (57%) were in the age group of 51 to 70 years

Correlation of Diabetes and serum uric acid in acute ischaemic stroke (Diabetics Vs Nondiabetics; Chi square test; p>0.05; Insignificant)

34% of patients with hyperuricemia were diabetic as compared to patient with normal serum uric acid in which only 24% patients were diabetic

Correlation of lipid profile and serum uric acid in acute ischaemic stroke

The incidence of dyslipidemia was almost equal amongst patient with hyperuricemia and without hyperuricemia

Correlation of serum uric acid and smoking in acute ischaemic stroke

Association of uric acid with smoking in acute ischaemic stroke patients was not significant.

Correlation of serum uric acid and SSS in acute ischaemic stroke (SSS ≤30 Vs >30; chi square test; p value<0.05; significant)

(Mean SSS Score in patient with elevated serum uric acid was 39.59 vs. 31.45 in patient with normal serum uric acid P value equals 0.0076. Which is statically significant).

{Majority of patients 20 (69%) with elevated serum uric acid) were having SSS score >30 as compared to patients with normal serum uric acid who in whom only 35 (49%) were having SSS score >30

Correlation of serum uric acid and outcome by modified Rankin' scale in acute ischaemic stroke

S. No.	mRS	Level of Serum uric acid in male		Total
		SUA ≤7mg% N=71	SUA >7mg% N=13	
1	1	04(06%)	00(00%)	04
2	2	08(11%)	09(31%)	17
3	3	16(23%)	08(28%)	24
4	4	20(28%)	06(21%)	26
5	5	15(21%)	03(10%)	19
6	6	08(11%)	03(10%)	10
7	Total	71	29	100

{Mean mRS score in patients with normal serum uric acid 3.82 mg/dl Vs 3.41mg/dl in patient with hyperuricemia; student t test P>0.05 statistically insignificant}

DISCUSSION

The study was conducted in 100 patients of acute ischaemic stroke admitted to KAMINENI hospital marketpally. A Detailed history and systemic examination was carried out in every patient. In each case the diagnosis was confirmed by CT scan brain. On admission patients neurological status was assessed by the Scandinavian stroke scale (SSS) and outcome was graded by using modified Rankin's scale. Serum uric acid was measured within 24 hours of onset of stroke and value >7mg/dl was considered hyperuricemia.

Distribution of cases according to Age & sex in patient with acute ischaemic stroke.

The present study included total 100 patients with new onset of acute ischaemic stroke. Out of 100 patients 54% patients were male and 46% patients were female. Majority of patients (57%) were in the age group of 50 to 70 years. 6 patients were below the age of 40 years and 2 patients were above the age of 80 years.

Correlation of hypertension and serum uric acid in acute ischaemic stroke.

In present study overall 56% patients were hypertensive and 28% patients were prehypertensive. Out of 29 hyperuricemic patients 18(62%) patients were hypertensive, whereas in patients with normal level of serum uric acid 38(54%) out of 71 were hypertensive. Mean serum uric acid amongst hypertensive was 6.30±2.71mg/dl and in non hypertensive it was 6.19±2.72mg/dl. There was significant positive relationship was found in between hypertension and hyperuricemia (P<0.05)

*Chamorro et al 2002*¹ showed a positive relationship in between Hypertension and serum uric acid in patient with acute ischaemic stroke (p<0.05) with the mean serum uric acid of 5.35±1.88mg/dl amongst hypertensive stroke patients and 4.83±1.56mg/dl amongst non hypertensive stroke patients.

So our finding is consistent with the finding of above mentioned studies although we found higher incidence of hypertension 56% as compared to study done by *Jiunn-Horng Chen et al 2009*¹⁰ possible reason is lack of awareness regarding hypertension among the patient in our study in whom hypertension present with its complication viz. stroke.

Correlation of Diabetes and serum uric acid in acute ischaemic stroke.

In present study out of 29 hyperuricemic patient 10(34%) patients were diabetic as compared to patient with normal serum uric acid in whom only 14(20%) patients were diabetic. Mean serum uric acid amongst diabetic was 6.90±2.75mg/dl as compared to nondiabetics in whom it was 6.05±2.72mg/dl. we didn't found any significant relation in diabetic Vs nondiabetics with serum normal and elevated serum uric acid level.(p>0.05)

*Chien Kl et al 2008*¹¹ conducted a community-based prospective cohort study of 2690 participants (35-97 years) in the Chin-Shan Community Cardiovascular Cohort Study, and they reported modest positive association between plasma uric acid concentration and the incidence of diabetes in Chinese individuals. (p<0.05)

*Chamorro et al 2002*¹ showed lower uric acid level in diabetics 4.98±1.76mg/dl vs. 5.20±1.78 mg/dl in nondiabetics with a significant association in between hyperuricemia and diabetes in patient with acute ischaemic stroke.

Our finding is consistent with the findings that diabetics were having higher level of serum uric acid but contrary to the findings of *Chamorro et al 2002* as we are not getting significant relationship between diabetes and hyperuricemia. Possibly due to small sample size.

Correlation of lipid profile and serum uric acid in acute ischaemic stroke.

In our study we found that there was no significant difference in prevalence of dyslipidemia in patient with hyperuricemia and normal uric acid level. Among hyperuricemic group 22(76%) of patient were dyslipidemic as compared to patient with normal serum acid in which only 39(55%) of patient were dyslipidemic. Overall 61% patient were dyslipidemic in which 15% patients were having elevated cholesterol, 29 %were having elevated triglycerides and 17 %were having combined dyslipidemia. There was also no statistically significant relationship was found in between hyperuricemia and cholesterol and triglycerides.(chi square test P>0.05)

*K Sreedhar et al 2010*¹² studied Total of 100 patients of which 80 were cases of completed stroke and the remaining 20 were controls. They reported that 32 patients had elevated serum total cholesterol levels, of which 81.3% had ischaemic stroke and the rest hemorrhagic stroke. 10 patients had elevated serum triglyceride levels, of which 80% had ischaemic stroke and the rest hemorrhagic stroke.

*Chamorro et al 2002*¹ showed insignificant relationship between dyslipidemia and serum uric acid in patient with acute ischaemic stroke. They reported mean serum uric acid value of 5.21±1.70mg/dl amongst dyslipidemic patient as compared to 5.11±1.81mg/dl in non dyslipidemic.

Our finding is similar to finding of *Chamorro et al 2002*, but in comparison to study by *K Sreedhar et al 2010*¹² we found higher incidence of Hypertriglyceridaemia and lower incidence of hypercholesterolemia.

Correlation of serum uric acid and smoking in acute ischaemic stroke.

Mean serum uric acid level amongst smoker was 6.40 ±2.75mg/dl as compared to non smoker in which its value was 6.16±2.72mg/dl. Overall prevalence of smoking was 38%.smoking was prevalent exclusively amongst male. The prevalence of smoking was less 10(34%) in patient with hyperuricemia as compared to patient with normal serum uric acid level 28(39%).there is no significant relationship in between smoking and serum uric acid level. (Chi square test; P>0.05)

*Jiunn-Horng Chen et al 2009*¹⁰ done a cohort study and shown prevalence of 37.7% amongst 15,784 acute ischaemic patients.

*Chamorro et al 2002*¹ reported that relation between uric acid and smoking in acute stroke patient is not significant (p = 0.17) similar finding was reported by *Weir et al 2003*(p=0.60)¹³

So our finding is consistent with finding of *Jiunn-Horng Chen et al 2009*¹⁰, *Chamorro et al 2002*¹ & *Weir et al 2003*.¹³

Correlation of serum uric acid and SSS in acute ischaemic stroke.

Mean SSS Score in hyperuricemic patients was 38.90 vs. 30.27 in patient with normal serum uric acid. (Chi square test; P value<0.05; stastically significant) Majority of hyperuricemic patients (20 patient; 69%) were having SSS score >30 as compared to patients with normal serum uric acid who in whom only (35; 49%) were having SSS score >30.

*Chamorro et al 2002*¹ showed higher Mathew score on admission (P±0.001) in patients with acute ischaemic stroke with higher uric acid level at the time of admission higher Mathew score depict a better clinical condition.

Our finding is consistent with the finding of above study.

Correlation of serum uric acid and outcome by modified Rankin's scale in acute ischaemic stroke

In present study at the time of outcome mean modified Rankin's scale in patient in hyperuricemic patient was 3.82mg/dl Vs 3.41mg/dl in patient with normal level of serum uric acid. There was no significant difference between these two groups. (Student t test;p>0.05).

Poor outcome was defined as modified Rankin's scale 3 or more than 3. there was also no significant difference was found amongst hyperuricemic patient and patient with normal level of serum uric acid in terms of good outcome or bad outcome. (chi square test $P > 0.05$)

Weir *et al* 2003 who studied 3731 patients and measured serum urate in 2498 reported that elevated urate level predict a lower chance of good 90-day outcome independent of stroke severity and other prognostic factors.

Chamorro *et al* 2002⁴ reported in 881 patients with acute ischaemic stroke, there is a 12% increase in the odds of good clinical outcome for each milligram per deciliter increase of serum uric acid. This finding reinforces the relevance of oxidative damage in ischaemic stroke.

Our finding is contrary to both the above study as there is no relation in between outcome and level of serum uric acid.

Possible reasons are small sample size and follow up only during the hospital stay. Large trials are required to provide definite answers in clinical practice

CONCLUSION

1. The prevalence of hyperuricemia in acute ischaemic stroke patients in present study was 29%.
2. Out of all the Traditional risk factors for stroke analyzed, age hypertension and alcoholism amongst male showed statistically significant positive correlation with hyperuricemia in patient with acute ischaemic stroke.
3. Patient with hyperuricemia were having better neurological status as compared to patients without hyperuricemia when assessed at the time of admission but there was no statistically significant relationship was found in between outcome of patient and hyperuricemia in patient with acute ischaemic stroke.

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