

ORIGINAL ARTICLE

Serum Uric Acid In Acute Ischaemic Cerebrovascular Stroke

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ABSTRACT

Background : There is evidence that high uric acid is a poor prognostic factor in patients with acute ischaemic cerebrovascular stroke. Our study showed a close correlation of serum uric acid and National Institutes Of Health Stroke Scale Score (NIHSS score) in patients of acute ischaemic cerebrovascular stroke.

Material and Methods : 50 indoor cases of acute ischemic cerebrovascular accidents were studied. All patients underwent serum Uric acid determination and the NIHSS score of all the patients at admission were calculated.

Results : Most patients with a better prognosis as determined by their lower NIHSS score had a lower serum uric acid level, and most with a worse prognosis as per their higher NIHSS score and a higher serum uric acid level.

Conclusion : Higher level of serum uric acid is associated with a poorer short term prognosis. Thus, it may act as an indicator of short term prognosis in acute ischaemic cerebrovascular stroke.

INTRODUCTION ¹⁻²³

Hypertension remains the most common cause of stroke, and there is increasing evidence that an elevation in uric acid may cause primary hypertension. Elevated serum uric acid is an independent predictor of hypertension and is present in the vast majority of adolescents with new onset, untreated primary hypertension. Experimentally induced hyperuricemia also causes hypertension in rats by a renal mechanism linked to inhibition of Nitric Oxide, activation at the renin -angiotensin system, and development of renal arteriosclerosis. Once the renal arteriosclerosis develops the kidney drives the hypertension. Prolonged hyperuricaemia in rats also causes progressive renal injury via a crystalline independent mechanism and can accelerate established renal disease; the mechanism is medical by an elevation in glomerular pressure and renal vasoconstriction.

Finally, uric acid stimulates synthesis of monocyte chemoattractant protein – 1 by rat vascular smooth muscle cells, which is known to have a key role in simulating macrophage infiltration in atherosclerotic vessels.

There is a potential pathogenesis mechanism to explain why an elevated serum uric acid at the time of stroke may be injurious. Recent evidence suggests that acute ischemic stroke results in generation of local oxidants that

augment local injury and increase infarct size. Acute stroke is associated with a rapid decrease in serum anti-oxidants that recover slowly over the subsequent week. Individuals with lower plasma antioxidants at the time of acute stroke have a poorer outcome. Uric acid is often considered an anti-oxidant and has been shown to scavenge hydrogen-peroxide and hydrogen radicals, to blow nitro-tyrosine formation from paroxy- nitrite, and to preserve extracellular superoxide dismutase. Several studies suggest that its antioxidant properties may have beneficial role in multiple sclerosis, Parkinson's disease, and Alzheimer's disease. One might therefore expect that having elevated uric acid during an acute stroke would be beneficial. However, only one small study has reported that elevated uric acid is associated with good outcome after ischemic stroke, whereas two other studies, including the large series reported in 2498 subjects, found the opposite.

One explanation is that uric acid, being an aqueous antioxidant, can become a pro-oxidant under certain circumstances, particularly if other anti-oxidants such as ascorbate are low.

This might thus suggest that, high levels of uric acid may function more as pro-oxidant to increase the predisposition for the development of hypertension and vascular disease.

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Thus, there seems to be a correlation between serum uric acid level with the prognosis of acute ischemic stroke, as higher level is associated with a poorer prognosis in animal studies.

We did this study to note if there is any relationship between serum uric acid level and the NIHSS score in patients of acute ischaemic cerebrovascular stroke

MATERIAL AND METHODS

In the present study, 50 indoor cases of ages more than 35 were studied who had acute ischemic cerebrovascular stroke within previous 72 hours as diagnosed by clinical examination and confirmed by either a CT Scan or by an MRI Scan.

Patients presenting with hemorrhagic stroke/ subarachnoid hemorrhage/ cerebral venous sinus thrombosis or presenting with ischemic stroke after 72 hours of onset were excluded. Also, Patients with other predisposing illnesses, other than classical risk factors for stroke (e.g. HT, DM, hyperlipidemia, IHD, previous TIA/ stroke) which may alter results of the study were excluded.

Detailed history of the patient included in the study was taken. They were asked in details about their symptoms, the onset, duration and progress of the same, as also associated other symptoms. They were specifically asked for symptoms of headache/ vomiting/ vertigo/ gait imbalance/ speech disturbances/ sensory symptoms/ visual complains among the other symptoms.

Past history regarding any illnesses was elicited. Especially history for risk factors for stroke, i.e. hypertension, diabetes, ischemic heart disease and previous TIA/stroke was asked as also about treatment of the same.

Complete CNS examination was done systematically along with examination of the other systems like respiratory, cardiovascular, gastrointestinal and musculoskeletal systems. After that, clinical diagnosis was made.

The NIHSS score of all the patients at admission were calculated.

All patients also underwent serum Uric acid determination. A serum uric acid level above 7mg/dL was considered as significant.

Patients also underwent the following investigations : Hb, TC, DC, Urine examination, RBS, FBS, PP2BS, S. Cholesterol, blood urea, serum creatinine, serum electrolytes, Liver function test, E.C.G., Fundus examination, C.T./ M.R.I. Scan examination, Lipid profile,

X-ray chest PA view, 2D- ECHO, USG- KUB in certain cases.

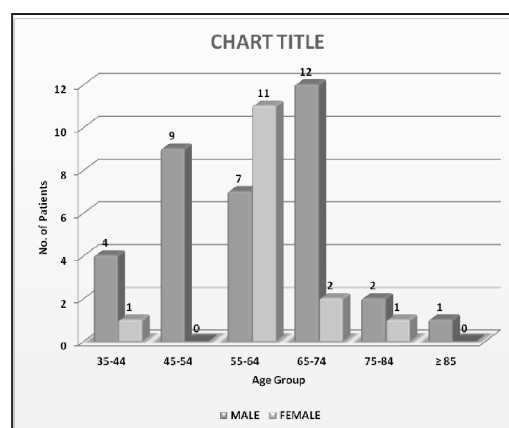
RESULTS AND DATA ANALYSIS ²⁴⁻³³

In the current study, most of the patients (36%) were belonging to the age group 55-64 years, followed by 28% in 65-74 years, 18% in 45-54 years, 10% in 35-44 years, 6% in 75-84 years and 2% aged \geq 85 years. The youngest patient was 35 years old, and the oldest patient was 85 years old. The mean age of the patients was 59.4 years. In the present study 70% of the patients were males and 30% were females. Males are more frequently affected than females. In the present series, the ratio is 2.3 : 1 in favour of males, which confirms to that of other workers (Table I and Chart I).

Table I: Age and Sex distribution in the study

AGE GROUP	MALE No. of Patients	FEMALE No. of Patients	TOTAL
35-44	4	1	5
45-54	9	0	9
55-64	7	11	18
65-74	12	2	14
75-84	2	1	3
85	1	0	1
TOTAL	35	15	50

Chart I : Age and Sex distribution in the study



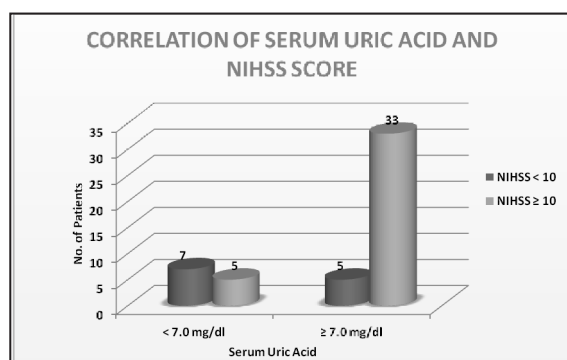
5 patients with NIHSS score more than or equal to 10 had their serum uric acid less than 7.0 mg/dl, while 33 patients had it at serum uric acid levels more than 7.0 mg/dl.

Likewise, 7 patients with NIHSS score less than 10 had their serum uric acid less than 7.0 mg/dl, while only 5 patients had it at serum uric acid levels more than 7.0 mg/dl (Table II and Chart II).

Table II : Correlation of Serum Uric acid level and NIHSS score.

Serum Uric Acid	NIHSS < 10	NIHSS ≥ 10
< 7.0 mg/dl	7	5
≥ 7.0 mg/dl	5	33

Chart II : Correlation chart of Serum Uric acid level and NIHSSscore



Thus, most patients with a better prognosis as determined by their lower NIHSS score had a lower serum uric acid level, and most with a worse prognosis as per their higher NIHSS score and a higher serum uric acid level.

The p value was < 0.01. Thus, there was a highly significant correlation between serum uric acid level and a better prognosis at the time of admission.

This correlates with most of the previous studies (Table III and IV).

Table III: Mean Uric acid level in various other studies and current study.

STUDY	No. of Patients	Mean Uric Acid
Karagianis	435	7.8
Seppo et al	1017	5.0
Milioniis et al	163	5.5
Present Study	50	7.60

Table IV: P values of various other studies and current study

STUDY	P Value	Significance
Karagianis et al	= 0.001	Highly Significant
Seppo et al	= 0.001	Highly Significant
Milioniis	< 0.0001	Highly Significant
Kurzepa	< 0.01	Highly Significant
John Kanellis	< 0.0001	Highly Significant
Present Study	< 0.01	Highly Significant

CONCLUSION

Patients with a lower NIHSS score on admission, and thus a better prognosis, had lower levels of serum Uric Acid and those with a higher NIHSS score had higher Uric Acid levels.

P value < 0.01 (Highly Significant)

Our results thus indicate that higher levels of serum uric acid is associated with a poorer short term prognosis in patients of acute ischaemic cerebrovascular stroke

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