

Study of Relationship between Acute Ischemic Non-embolic Stroke and Serum Uric Acid

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Abstract:

Background: Impact of high level of uric acid on stroke is still controversial. We conducted this study to investigate the relationship between acute ischemic non-embolic stroke and serum levels of uric acid. The goal was to look into the connection between serum uric acid and acute ischemic non-embolic stroke.

Methods: Present study was conducted at Atal Bihari Vajpayee Institute of Medical Sciences and Ram Manohar Lohia Hospital, New Delhi, treated 100 patients who had their first acute ischemic stroke ever. Blood samples were taken and CT scans were done within 24 hours of the stroke's onset. To conduct a 2D ECHO and a biochemical analysis, blood samples were given. It was also determined whether the people had any extra risk factors like hypertension, diabetes, a bad lipid profile, smoking, and intoxication.

Results: There were 32 women and 68 men among the 100 patients. Uric acid levels in 49% of participants were higher than 8 mg/dl. 53% of them had hypertension, and 35% of them had diabetes. 21% of people consumed alcohol, and 24% of people smoked.

Conclusion: According to this study, there is a strong link between high uric acid levels and a greater chance of having an acute ischemic stroke. Lowering blood uric acid levels might be considered one of the stroke prevention techniques for treating high risk groups.

Keywords: Serum Uric Acid, Acute Ischemic Stroke.

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Introduction

All neurological illnesses that affect adults most commonly and significantly are cerebral vascular disorders. These neurological conditions account for at least 50% of patients in general hospitals. A stroke is the third most common cause of death, after cancer and heart disease. All clinicians can help prevent strokes by encouraging the lowering of risk factors[1]. Because of the increased morbidity and mortality caused by stroke, a high socioeconomic burden is also linked to the disease[2]. Ischemic strokes account for more than 80% of all stroke cases. Early identification of persons at risk may be advantageous for primary prevention efforts[3].

The most common aqueous antioxidant in humans is uric acid, which contributes to up to two thirds of plasma's overall capacity to scavenge free radicals. By avoiding lipid peroxidation, it may play a biologically

protective role. It is particularly effective at squelching hydroxyl, superoxide, and peroxy nitrite radicals.

Increased SUA levels have been linked to an increased risk of cerebrovascular (CV) events, including stroke, according to epidemiological studies[5-7].

Additionally, it has been shown that therapeutic strategies with the ability to reduce SUA reduce the morbidity and mortality associated with CV disease[8]. In this way, SUA levels could be used as a quick serum test to spot at-risk people and give them the care they need.

SUA and insulin resistance have recently been connected [10]. Despite the fact that high SUA levels have been identified as a significant risk factor for stroke in unselected populations in a number of epidemiological studies, it is unclear whether they promote or protect against the development of CV disease or merely act as

a passive or circumstantial marker of increased risk. Aim of this study to study the association between serum uric acid and independent risk factors leading to acute ischemic stroke.

Material and Methods

100 patients with acute ischemic stroke who underwent a CT scan within 24 hours of the stroke's onset and were admitted to the medicine department at Atal Bihari Vajpayee Institute of Medical Sciences and Ram Manohar Lohia Hospital, New Delhi, were included in this prospective study. The study was conducted from September 2022 to April 2023. Patients with acute ischemic strokes were identified using neuroimaging, laboratory tests, and a comprehensive clinical evaluation.

Everyone who responded gave their voluntarily supplied consent. Blood was taken within 24 hours of the stroke's onset and sent for biochemical evaluation. The analysis was conducted at our biochemical laboratory using standard analyzers.

The patients exposure to additional risk variables was also evaluated. The study excluded patients with a history of TIA or CVA, known cases of gout, chronic renal failure, cardiac issues, haematological abnormalities, use of thiazide diuretics, chemotherapy, or uricosuric medications, as well as those whose CT scans revealed hemorrhage or other space-occupying lesions.

Results

Table 1: Age distribution among the study population

Age distribution in years	Frequency	Percentage
<40	7	7%
41-49	12	12%
50-59	27	27%
60-69	37	37%
70-79	15	15%
>80	2	2%
Total	100	100%

According to Table 1, 37% of respondents were between the ages of 60 and 69, 27% were between the ages of 50 and 59, and 15% were between the ages of 70 and 79.

Table 2: Gender distribution among the study population

Gender	Frequency	Percentage
Male	68	68%
Female	32	32%

Table 2 shows the study population's gender distribution, with 68% men and 32% women.

Table 3: Uric acid level (mg/dL)

Uric acid level (in mg/dL)	Frequency	Percentage
<2	25	25%
2-8	26	26%
>8	49	49%

The majority of patients (49%), followed by 26% with levels between 2 and 8, and 25% with levels less than 2, are shown in Table 3 by their uric acid levels.

Table 4: Association of age and mean uric acid levels among the study population

Age distribution/uric acid	Mean	SD
<40	4.0	1.0
41-49	4.2	1.2
50-59	4.9	1.5
60-69	5.3	1.53
70-79	6.7	1.68
>80	6.3	2.1
P value	<0.05	

The mean uric acid levels of the study population are associated with age in Table 4, with a p value of <0.05 suggesting significance.

Table 5: Association between hypertension and uric acid levels

Uric acid level/hypertension	Present	Absent	Total
<2	5	20	25
2-8	14	12	26
>8	34	15	49
Total	53	47	100

Chi square = 16.22, df=2, p=0.0003

The correlation between uric acid and hypertension is demonstrated in Table 5, which lists 34 of the total 49 individuals with uric acid levels higher than 8 mg/dl as also having hypertension. Hypertension was seen in 14 out of the 26 patients with uric acid levels between 2 and 8. Of the 25 patients, 5 had hypertension and had uric acid levels less than 2 mg/dl. The chi square test revealed high significance with a p value of <0.005.

Table 6: Association between uric acid and Diabetes Mellitus

Uric acid level/Mellitus	Present	Absent	Total
<2	3	22	25
2-8	10	16	26
>8	22	27	49
Total	35	65	100

According to Table 6, which demonstrates the connection between uric acid and diabetes mellitus, 22 of the total 49 people with uric acid levels higher than 8 mg/dl also had the condition. Diabetes was present in ten of the 26 patients with uric acid levels between 2 and 8.

Diabetes was present in three of the 25 patients with uric acid levels under 2 mg/dl. Chi square test: p <0.01 indicates significance.

Discussion

37% of respondents to the current survey were between the ages of 60 and 69, 27% were between the ages of 50 and 59, and 15% were between the ages of 70 and 79. There are 12 men and 13 women among the patients in this study who are above 65 years old. In the current experiment, comparable outcomes were seen. According to Millinois et al.[9], SUA is associated with an increased risk for acute ischaemic/non-embolic stroke in elderly patients, regardless of the existence of concurrent metabolic abnormalities. The current investigation provides evidence that uric acid and hypertension are related. 34 patients out of the 49 with uric acid levels higher than 8 mg/dl also had hypertension. 14 of the 26 patients with uric acid levels between 2 and 8 had hypertension.

Five of the 25 patients with uric acid levels less than 2 mg/dl had hypertension. Similar findings are shown by Tushar Patil et al.[12] and Millinois et al. [9].

The population of the present study has DM, according to 35% of respondents. According to this study, there is a substantial relationship between SUA and DM, with the mean SUA levels in diabetics being 5.98 mg/dl and in non-diabetics being 4.88 mg/dl. The current study's link between uric acid and diabetes mellitus (DM) investigation included 35 participants, the majority of whom had DM, proving that as blood uric acid levels climbed, so did the prevalence of stroke in DM patients. In the study by Tushar Patil et al., there was a statistically significant difference in SUA levels be-

tween patients with diabetes and those without diabetes[12].

Both the DM and SUA were equally significant in the current investigation. The current study showed that the majority of patients (30%) had symptoms in the MCA territory, while 26% had symptoms in the PCA territory, followed by 18% in the thalamus, 10% in the internal capsule, 7% in the caudate nucleus, 5% in the corona radiata, 3% in the centrum semi ovale, and only 1% in the hemisphere. Uric acid also had a negative link with neurological impairment at the time of admission (P=0.001) and the size of the ultimate infarction on CT/MRI (P=0.01), according a study by Chamorro A et al. [13].

Conclusion

According to this study, there is a direct link between higher SUA and a higher chance of having an acute ischemic stroke. The relationship between high SUA and ischemic stroke may need to be considered while treating diabetics and elderly patients.

Elevated SUA is one of the risk factors for acute ischemic stroke and the metabolic diseases it is associated with, such as hypertension and diabetes.

Lowering the SUA level could be considered one of your preventative stroke treatment options if you are treating a high-risk population. More research is required to discover whether lowering SUA levels through dietary modifications, way of life adjustments,

and medication can ultimately reduce the incidence of ischemic stroke.

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