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Internal Medicine

ASSOCIATION OF SERUM URIC ACID LEVELS WITH ISCHEMIC STROKE AND ITS SEVERITY: A HOSPITAL-BASED OBSERVATIONAL STUDY

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ABSTRACT **Background:** Ischemic stroke remains a major cause of mortality and long-term disability worldwide. Besides traditional vascular risk factors, serum uric acid (SUA) has emerged as an important metabolic marker implicated in endothelial dysfunction, oxidative stress, inflammation, and thrombogenesis [1,2]. The role of hyperuricemia in ischemic stroke severity and outcomes remains controversial [5]. **Aim:** To study the association between serum uric acid levels and ischemic stroke, with particular emphasis on stroke severity. **Methods:** A hospital-based observational study was conducted on 110 patients with acute ischemic stroke. Serum uric acid levels were measured within 24 hours of admission. Stroke severity was assessed using the National Institutes of Health Stroke Scale (NIHSS). **Results:** Elevated serum uric acid levels were observed in a significant proportion of ischemic stroke patients. Higher uric acid levels showed a statistically significant association with increased stroke severity as assessed by NIHSS scores. **Conclusion:** Elevated serum uric acid is commonly observed in patients with acute ischemic stroke and is significantly associated with greater stroke severity.

KEYWORDS :

INTRODUCTION

Ischemic stroke accounts for approximately 80–85% of all stroke cases and represents a leading cause of death and long-term disability globally [1,4]. In India, the burden of stroke is increasing rapidly, with patients presenting at a younger age compared to Western populations. Despite advances in acute stroke management, identification of modifiable and non-modifiable risk factors remains crucial for prevention and prognostication.

Uric acid is the final oxidation product of purine metabolism in humans. Serum uric acid levels are determined by the balance between endogenous production and renal excretion. While uric acid exhibits antioxidant properties under physiological conditions, elevated levels exert pro-oxidant effects and contribute to vascular injury [1].

Hyperuricemia has been associated with endothelial dysfunction, smooth muscle cell proliferation, platelet activation, increased oxidative stress, and impaired nitric oxide bioavailability, all of which promote atherosclerosis and thrombosis [1,2,5]. These mechanisms significantly increase the risk of ischemic stroke.

Several studies have demonstrated a positive association between elevated serum uric acid levels and stroke incidence, severity, and poor functional outcomes, although conflicting evidence regarding its neuroprotective role has also been reported [2,3,5,6]. The present study was undertaken to evaluate the association between serum uric acid levels and ischemic stroke, with particular emphasis on stroke severity assessed by NIHSS.

MATERIALS AND METHODS

A prospective hospital-based observational study was conducted in the Department of General Medicine at a tertiary care teaching hospital from January 2023 to December 2024.

Study Population

A total of 110 patients diagnosed with acute ischemic stroke were included.

Inclusion Criteria

- Patients aged ≥18 years
- Acute ischemic stroke confirmed by CT or MRI brain
- Admission within 48 hours of symptom onset

Exclusion Criteria

- Hemorrhagic stroke
- Chronic kidney disease
- Chronic liver disease
- Malignancy
- Recent myocardial infarction
- Patients on uric acid-lowering therapy

Data Collection

Detailed demographic data, clinical history, and vascular risk factors such as hypertension, diabetes mellitus, dyslipidemia, smoking, alcohol consumption, and ischemic heart disease were recorded.

Stroke severity was assessed using the **National Institutes of Health Stroke Scale (NIHSS)** at admission. Serum uric acid levels were measured within 24 hours of admission using standard enzymatic methods.

Statistical Analysis

Data were analyzed using SPSS version 26. Quantitative variables were expressed as mean ± standard deviation, and qualitative variables as percentages. Chi-square test and Student's t-test were used where appropriate. A p-value <0.05 was considered statistically significant.

RESULTS

Distribution of Serum Uric Acid Levels

A significant proportion of ischemic stroke patients had elevated serum uric acid levels.

Serum Uric Acid Level	Number of Patients	Percentage (%)
Normal	38	34.5%
Elevated	72	65.5%

Relation Between Serum Uric Acid and Stroke Severity (NIHSS)

Patients with elevated serum uric acid levels had significantly higher NIHSS scores compared to those with normal levels, indicating more severe neurological deficits.

NIHSS Category	Normal UA	Elevated UA	p-value
Mild (0–4)	18	14	<0.05
Moderate (5–15)	14	34	
Severe (>15)	6	24	

Association with Vascular Risk Factors

Hyperuricemia was more frequently observed in patients with hypertension, diabetes mellitus, and ischemic heart disease, though not all associations reached statistical significance.

DISCUSSION

In the present study, elevated serum uric acid levels were observed in a substantial proportion of patients with acute ischemic stroke, and a statistically significant association was found between higher uric acid

levels and increased stroke severity as assessed by NIHSS scores [3,5,7]. This supports the hypothesis that hyperuricemia contributes not only to stroke occurrence but also to worse neurological outcomes. The pathophysiological mechanisms linking uric acid to ischemic stroke are multifactorial. Elevated uric acid promotes endothelial dysfunction by reducing nitric oxide bioavailability and increasing oxidative stress. It also induces inflammatory cytokine release and enhances platelet aggregation, thereby accelerating atherosclerosis and thrombosis [1,4].

Our findings are consistent with several Indian and international studies that have demonstrated a positive correlation between serum uric acid levels and stroke severity, infarct size, and mortality [2,5,6,7]. However, some studies have proposed a potential neuroprotective antioxidant role of uric acid in acute ischemic settings, highlighting its complex and dual nature [5].

The association between hyperuricemia and traditional vascular risk factors such as hypertension and diabetes mellitus observed in this study further emphasizes its role as a marker of metabolic and vascular dysfunction [1,6].

CONCLUSION

Elevated serum uric acid levels are commonly observed in patients with acute ischemic stroke and are significantly associated with greater stroke severity. Serum uric acid may serve as a simple, inexpensive, and readily available biomarker for risk stratification and prognostication in ischemic stroke patients. Further large-scale prospective studies are needed to clarify the therapeutic implications of uric acid-lowering strategies in stroke prevention and management.

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