

ORIGINAL ARTICLE

Serum Uric Acid Levels and Serum Lipid Levels in Patients with Ischemic Cerebrovascular Accident

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Abstract

Background: Stroke is a growing disease and it is the second common cause of death in the world after coronary heart disease especially in the elderly. In patients with acute stroke hyperuricemia was significantly higher than normal population with associated dyslipidemia. Hyperuricemia has been associated with decreased amount of HDL cholesterol and increased amounts of triglycerides and LDL cholesterol.

Aim: Serum uric acid levels and serum lipid levels in patients with ischemic cerebrovascular accident.

Material and Methods: This was a cross-sectional study carried out between January 2015 - June 2016, which included 60 cases of acute ischemic stroke. Serum uric acid levels and serum lipid levels was done in all the patients and was statistically analyzed.

Result: A total of 60 patients with ischemic stroke were included in the study. Out of which 43 (71.7%) were males and 17 (28.3%) were females. The mean age of the patients was 63.2 ± 14.8 . Mean serum uric acid levels in the patients studied was 5.5 ± 1.7 , and 18 patients (30%) were hyperuricemic. Serum uric acid levels were significantly higher in females (6.2 ± 1.9) compared to the males (5.2 ± 1.6). It was predominant in the age group between 56-70 years. Dyslipidemia was seen in 49 (81.7%) patients (Males were 36 and females were 13).. More than one lipid parameter was seen to be deranged in 10 male patients and 4 female patients. Of them 87.75% of patients had low HDL levels, 36.73%, 10.20% and 8.16% patient had high cholesterol, triglycerides and LDL levels respectively. The study also showed that 15 patients had both hyperuricemia and dyslipidemia.

Conclusion: Hyperuricemia and its accompanying dyslipidemia can be considered as the risk factor for acute ischemic stroke.

Introduction

A stroke or cerebrovascular accident is defined as an abrupt onset of a neurological deficit that is attributable to a focal vascular cause. A definition of stroke is clinical and laboratory studies including brain imaging are used to support the diagnosis. The clinical manifestations of stroke are highly variable because of the complex anatomy of the brain and its vasculature. Cerebral ischemia is caused by reduction in blood flow that last longer than several seconds.¹

Stroke is the second leading cause of death worldwide and it is also one of the leading causes of adult disability.² Numerous risk factors are involved

in the development of stroke such as hypertension, smoking, dyslipidemia and diabetes mellitus. Hyperuricemia has been reported to be an independent predictor of stroke.³

There is a pressing need to identify these treatable risk factors that can be easily measured and are highly prevalent, in order to identify patients at high risk for stroke.

Hyperuricemia have also been suggested as one of the factors in the pathogenesis of an atheroma. Significant association was found

between serum uric acid and serum triglycerides. This implicates that a rise in serum uric acid and serum triglyceride may play some part in the etiology of ischemic cerebrovascular disease.⁴

Uric acid is the breakdown product of purines. Increased uric acid levels promote oxygenation of low-density lipoprotein cholesterol and facilitate lipid peroxidation. Uric acid may stimulate vascular smooth cell proliferation, and reduce vascular nitric oxide production. Moreover, higher uric acid levels may be associated with increased platelet adhesiveness predisposing to thrombus formation. SUA has also been found to stimulate the synthesis of pro-inflammatory factors like monocyte chemo attractant protein-1, interleukin- β , interleukin-6, and tumor necrosis factor- α . It has been suggested that serum uric acid may cause endothelial dysfunction. Even a mild elevation of serum uric acid was associated with cerebral ischemia in adults. It was suggested that impaired vascular tone and endothelial dysfunction could contribute to ischemic changes, because they permit cerebrospinal fluid to cross the blood-brain barrier and cause areas of edema.⁵⁻¹⁶

How dyslipidemia is related to atherosclerosis is well known but there is less data about hyperuricemia and atherosclerosis. We undertook this study to evaluate serum uric acid and serum lipid levels in patients with ischemic cerebrovascular stroke.

Materials and Methods

Study Design: Cross-sectional study.

Sample Size: 60 cases

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Duration of Study: 18 months (January 2015 - June 2016).

Inclusion Criteria

- All patients with Ischemic cerebrovascular accident identified based on clinical as well as laboratory and radiological evaluation (including CT/MRI) admitted in our hospital.

Exclusion Criteria

- Age < 18 years
- Patients with chronic intake of hyperuricemic drugs
- Patients with conditions which alter serum uric acid levels (lymphoproliferative diseases, polycythemia, myeloproliferative disorders, diabetic ketoacidosis, lactic acidosis)

Statistical Analysis

- All characteristics were summarized descriptively. For continuous variables, the summary statistics of N, mean, standard deviation (SD) were used. For categorical data, the number and percentage were used in the data summaries. Chi-square (χ^2)/Fisher exact test was employed to determine the significance of differences between groups for categorical data. The difference of the means of analysis variables was tested with the unpaired t-test. If the p-value was < 0.05, then the

results will be considered to be significant. Data were analyzed using SPSS software v.23.0.

Results

In present study, 60 patients of ischemic cerebrovascular accident are considered, out of which 43 were males and 17 were females. Mean age of patient was 63.2 ± 14.8 .

Table 1 and Figure 1 shows the distribution of cases according to age and it was predominant in the age group 56 – 70 years.

Table 2 and Figure 2 shows mean distribution of uric acid according to sex and p value <0.05 was considered significant.

Table 3 and Figure 3 shows hyperuricemia and sex distribution and p value <0.05 was considered significant.

Table 4 and Figure 4 shows relation between abnormal lipid profile and hyperuricemia and p value <0.05 was considered significant.

uric acid and lipid levels may reduce the incidence of the disease.¹⁷

In our study a total of 60 patients with ischemic stroke were included. Out of which 43 (71.7%) were males and 17 (28.3%) were females. The mean age of the patients was 63.2 ± 14.8 . Mean serum uric acid levels in the patients studied was 5.5 ± 1.7 , and 18 patients (30%) were hyperuricemic. Serum uric acid levels were significantly higher in females (6.2 ± 1.7) compared to the males (5.2 ± 1.6).

A study by Mehrpour et al.¹⁸ was done in 55 patients with acute ischaemic stroke. Of which, 25 of were females and 30 were males. The mean age of the patients was 67 ± 14 years. Mean serum uric acid level was 5.94 ± 1.70 mg/dl. 47.3% of patients were hyperuricemic. Uric acid levels were significantly higher in males than females. Hyperuricemia was associated with increase in levels of triglycerides and LDL-C.

Bhadra J et al.¹⁹ evaluated 38 patients with mean age 59.28 ± 12.31 . Serum uric acid levels were significantly higher in study subjects and statistically significant correlation was seen with TG and VLDL and inverse association with HDL in the cases.

Study by Biyani VV et al.²⁰ studied 100 patients among which 68 were males and 32 females. The patients with hyperuricemia were mostly in the age group of 60-69 years. 49% of the

Table 1: Distribution of cases according to age (yrs)

Age (yrs)	N (%)
25-40	6 (10)
41-55	10 (16.7)
56-70	32 (53.3)
71-85	10 (16.7)
>85	2 (3.3)
Total	60

Table 2: Mean distribution of serum uric acid according to sex

Sex	Serum uric acid			p value
	Range	Mean	SD	
Male	3-10	5.2	1.6	0.047 (Sig)
Female	2.3-9.9	6.2	1.9	
Total	2.3-10	5.5	1.7	

Table 3: Hyperuricemia and sex

Sex	Hyperuricemia present	Hyperuricemia absent	Total N
	N (%)	N (%)	
Male	7 (38.9)	36 (85.7)	43
Female	11 (61.1)	6 (14.3)	17
Total	18	42	60

P <0.001 (significant)

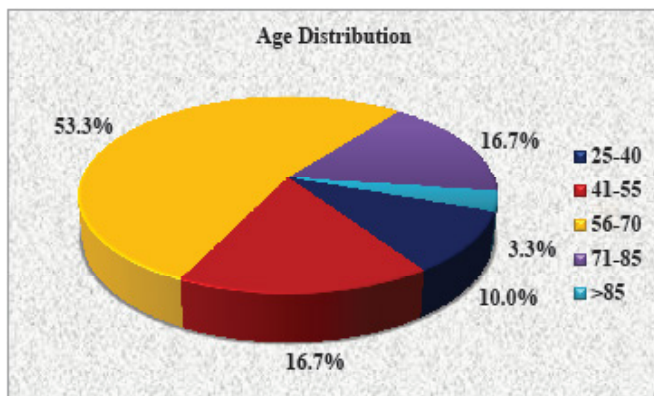


Fig. 1: Distribution of cases according to age (yrs)

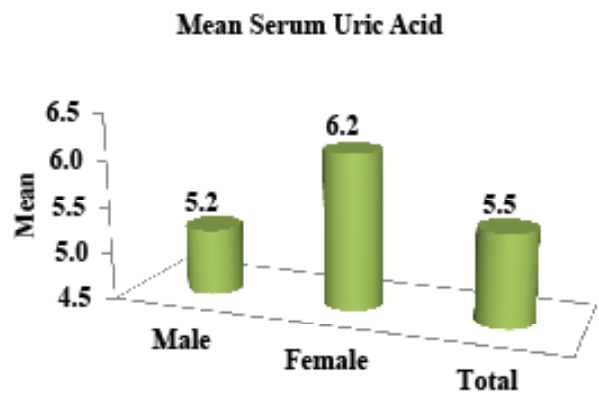


Fig. 2: Mean distribution of serum uric acid according to sex

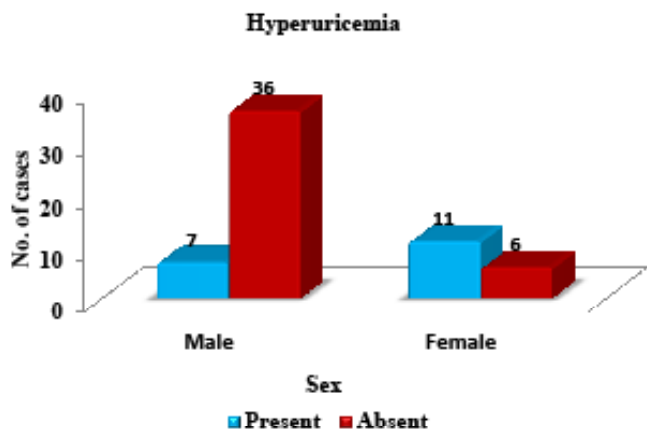


Fig. 3: Hyperuricemia and sex

Table 4: Abnormal lipid profile and hyperuricemia

Lipid profile	Hyperuricemia			p value
	Present	Absent	Total	
	N (%)	N (%)	N	
Increased TC	3 (16.7)	15 (83.3)	18	0.140
Increased TG	2 (40)	3 (60)	5	0.610
Decreased HDL	16 (37.2)	27 (62.8)	43	0.049 (Sig)
Increased LDL	2 (50)	2 (50)	4	0.366
Increased VLDL	2 (33.3)	4 (66.7)	6	0.851

patients had hyperuricemia. Similar results were concluded in studies by Millinois et al and Patil T et al.

In the present study dyslipidemia was seen in 49 (81.7%) patients (Males were 36 and females were 13). It was predominant in the age group between 56-70 years. More than one lipid parameter was seen to be deranged in 10 male patients and 4 female patients. Of them 87.75% of patients had low HDL levels, 36.73%, 10.20% and 8.16% patient had high cholesterol, triglycerides and LDL levels respectively. The study also showed that 15 patients had both hyperuricemia and dyslipidemia.

Baluch U et al²¹ studied 53 patients of which 32 were males and 21 were females. 28% of patients were in age group of 61-70 years. 19% patient had dyslipidemia of them, 18% had low HDL, while high LDL, cholesterol and triglycerides were observed in 26%, 24% and 32% respectively.

Albucher JF et al²² concluded that low HDL cholesterol was the only serum lipid index to be associated to an increased risk of stroke in the population as seen in our study.

Sarmah D et al²³ proved a significant

correlation between uric acid and TC, TG and LDL, and a significant negative correlation between uric acid and HDL. The similar findings were seen in our study.

Conclusion

The study concludes that hyperuricemia and dyslipidemia can lead to acute ischemic stroke and they both are modifiable risk factors. Hyperuricemia and its accompanying dyslipidemia can be considered as the risk factor for acute ischemic stroke.

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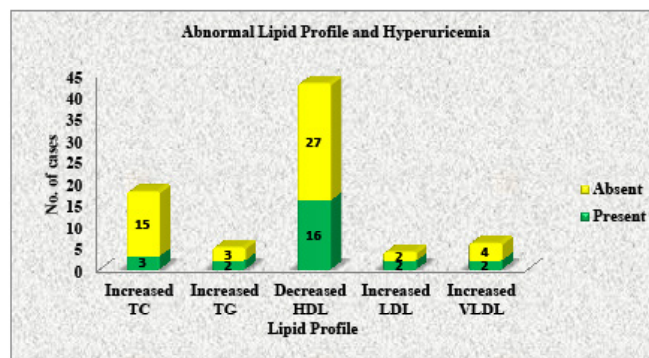


Fig. 4: Abnormal lipid profile and hyperuricemia

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