Original Research Article

Clinical profile of ischemic stroke and its correlation with serum uric acid: a cross sectional study

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ABSTRACT

Background: Stroke is the third most common cause of mortality if considered separately from other cardiovascular diseases across the world. Uric acid also has neuro protective effect and has been postulated in increased risk of insulin resistance and cardiovascular risk. With this background, conducted a study to understand the clinical profile of ischemic stroke and its correlation with serum uric acid in setup.

Materials and Methods: A cross sectional study was carried out in a tertiary care hospital from October 2016 to September 2018. A total of 75 patients with history of acute stroke were included in the study after obtaining informed consent. Clinical data including demographic data, age and sex of the patients was taken. Also, history of diseases like diabetes mellitus, hypertension and Ischemic Heart Disease was noted. Relevant investigations were done and noted.

Results: The mean age of the study subjects was 57.53 ± 10.23 years with male preponderance. The mean body mass index was 26.58 ± 2.86 in our study. Risk factors like hypertension were present in 70.67%, TIA was present in 6.67%, 22.67% had diabetes mellitus and smoking was present in 48% of the patients. About 54.67% of the subjects had high uric acid levels in our study. Not found any significant relation between the uric acid levels and different risk factors.

Conclusion: The average age of the ischemic stroke incidence was between 5th to 6th decades in the present study. Males had higher risk when compared females which were consistent with various studies conducted across the world. Not found any significant association between the uric acid levels and various risk factors for ischemic stroke. Uric acid was found to higher among these patients.

Keywords: Ischemic stroke, Uric acid, Clinical profile

INTRODUCTION

Stroke is the third most common cause of mortality if considered separately from other cardiovascular diseases across the world. It is second most common cause of disability and dementia among ages more than or equal to 65 years of age. The estimated incidence rate of stroke is 119-145 per lakh based on the recent population-based studies. Uric acid is final catabolite of urine metabolism among humans. It usually exists as sodium urate and excreted through kidneys. Age and gender have a significant influence over the uric acid levels. Studies suggest that uric acid levels are associated with increased cardiovascular risk. The basic pathology postulated is elevation of serum triglyceride levels and cholesterol along with hypertension, insulin resistance and metabolic syndrome. Uric acid also has neuro protective effect due to its internal quality of being a free radical scavenger. Serum uric acid levels and its association with the ischemic stroke are poorly understood. Hence, conducted a study to understand the role of serum uric acid among...
the patients with ischemic stroke attending tertiary care hospital.

METHODS

A cross sectional study was carried out in a tertiary care hospital from October 2016 to September 2018. A total of 75 patients with history of acute stroke were included in the study after obtaining informed consent. Clinical data including demographic data, age and sex of the patients was taken. Also, history of diseases like diabetes mellitus, hypertension and ischemic heart disease was noted. Baseline blood pressure of the patients was recorded. Blood sample was taken from all patients with acute stroke on admission to check uric acid level, fasting blood sugar and lipid profile. Further, all patients were subjected to echocardiography and fundoscopy. A study conducted by Mehrpour M. et al inferred that the 47.3% of their subjects had hyperuricemia associated with ischemic stroke patients. Using this prevalence, with 95% confidence interval and 11% absolute error got the minimum sample size to be 71. Included 75 study subjects in this study. The patients with chronic kidney disease, chronic liver disease, malignancy, history of trauma and gout, history of drug intake like diuretics, antioxidants and anti-neoplastic drugs and recent history of myocardial infarction have been excluded from the study sample. The study has been approved by the institutional ethics committee of the tertiary care institute and the concerned university authorities.

Statistical analysis

Data was collected, compiled, and analysed using Epi Info version 7.2. The qualitative data was expressed using percentages. The quantitative data was expressed in terms of mean and standard deviation. The difference between the two proportions was analysed using fisher’s exact/ chi-square test. The difference between two means has been analysed using unpaired t test. All analysis was two tailed and the significance level was set at 0.05.

RESULTS

Included 75 cases of ischemic stroke in the present study.

The mean age of the study subjects was 57.53 ± 10.23 years with male preponderance. Majority of the subjects were in the range of 51 to 60 years. About 30.67% were normal body mass index, 54.67% were overweight and 14.67% were obese in the present study. The mean body mass index was 26.58 ± 2.86 in this study. Risk factors like hypertension were present in 70.67%, TIA was present in 6.67%, 22.67% had diabetes mellitus and smoking was present in 48% of the patients.

About 54.67% of the subjects had high uric acid levels in this study. The mean uric acid level was 6.30 ± 1.53 mg/dl.

### Table 1: Demographic particulars of the study sample.

| Demographic Parameters | Frequency | Percentage (%) |
|------------------------|-----------|----------------|
| **Age (in years)**     |           |                |
| <40                    | 2         | 2.67           |
| 41 to 50               | 22        | 29.33          |
| 51 to 60               | 24        | 32.00          |
| 61 to 70               | 22        | 29.33          |
| >70                    | 5         | 6.67           |
| **Gender**             |           |                |
| Females                | 33        | 44.00          |
| Males                  | 42        | 56.00          |
| **Body mass index**    |           |                |
| <18.5                  | 0         | 0              |
| 18.5 to 24.99          | 23        | 30.67          |
| 25 to 29.99            | 41        | 54.67          |
| >30                    | 11        | 14.67          |
| **Risk factors**       |           |                |
| Hypertension           | 53        | 70.67          |
| Transient ischemic attack | 5   | 6.67          |
| Smoking                | 36        | 48.00          |
| Diabetes mellitus      | 17        | 22.67          |

About 68% of the subjects had abnormal total cholesterol, 98.67% had abnormal LDL, about 13.33% had abnormal HDL and 68% had abnormal triglycerides. Based on 2D ECHO, 53% were abnormal and based on ECG, 53% had left ventricular hypertrophy. About 13.33% had retinopathy in this study. The CT findings suggested that 50.67% had right middle cerebellar, 48% had left middle cerebellar and 1.33% had other site involved.

The mean uric acid levels among the patients with hypertension were 6.31 ± 1.61 and without hypertension were 6.29 ± 1.38 and this difference was not significant. The mean uric acid levels among the patients with history of smoking were 6.27 ± 1.71 and without history of smoking were 6.24 ± 1.38 and this difference was not significant.
Table 2: Distribution of the study subjects based on the investigations.

| Lipid profile          | Normal          | Abnormal       |        |        |
|------------------------|-----------------|----------------|--------|--------|
|                        | Frequency       | Percentage (%) | Frequency | Percentage (%) |
| Total cholesterol      | 24              | 32.00          | 51     | 68.00          |
| LDL cholesterol        | 1               | 1.33           | 74     | 98.67          |
| HDL cholesterol        | 65              | 86.67          | 10     | 13.33          |
| Triglycerides          | 24              | 32.00          | 51     | 68.00          |
| Other investigations   | Frequency       | Percentage (%) |        |        |
| ECG                    |                 |                |        |        |
| LVH                    | 53              | 70.67          |
| Normal                 | 22              | 29.33          |
| Fundus                 |                 |                |        |        |
| Retinopathy            | 10              | 13.33          |
| Normal                 | 65              | 86.67          |
| 2D ECHO                |                 |                |        |        |
| Abnormal               | 53              | 70.67          |
| Normal                 | 22              | 29.33          |
| CT findings            |                 |                |        |        |
| Right middle cerebellar| 38              | 50.67          |
| Left middle cerebellar | 36              | 48.00          |
| Others                 | 1               | 1.33           |

Table 3: Distribution of the study subjects based on different parameters and uric acid levels.

| Different parameters  | Uric acid levels | P value |
|-----------------------|------------------|---------|
|                       | Mean             | SD      |         |
| Hypertension          |                  |         |         |
| Absent                | 6.29             | 1.38    | 0.9609  |
| Present               | 6.31             | 1.61    |         |
| Smoking               |                  |         |         |
| Absent                | 6.24             | 1.38    | 0.8002  |
| Present               | 6.27             | 1.71    |         |
| Diabetes mellitus     |                  |         |         |
| Absent                | 6.22             | 1.67    | 0.9167  |
| Present               | 6.28             | 1.78    |         |
| Obese/Overweight      |                  |         |         |
| Absent                | 6.13             | 1.48    | 0.1404  |
| Present               | 6.69             | 1.54    |         |
| LDL                   |                  |         |         |
| Normal                | 5.30             | ---     | --      |
| Abnormal              | 6.31             | 1.54    |         |
| HDL                   |                  |         |         |
| Normal                | 6.26             | 1.57    | 0.9303  |
| Abnormal              | 6.34             | 1.38    |         |
| TG                    |                  |         |         |
| Normal                | 6.15             | 1.63    | 0.5549  |
| Abnormal              | 6.37             | 1.50    |         |

The mean uric acid levels among the patients with diabetes mellitus were 6.28±1.78 and without diabetes mellitus were 6.22±1.67 and this difference was not significant. The mean uric acid levels among the patients with obesity/overweight were 6.69±1.78 and without obesity/overweight were 6.13±1.48 and this difference was not significant. The mean uric acid levels among the patients with normal HDL were 6.26±1.57 and with abnormal HDL were 6.34±1.38 and this difference was not significant. The mean uric acid levels among the patients with normal TG were 6.15±1.63 and with abnormal TG were 6.37±1.50 and this difference was not significant. The mean uric acid levels among the patients with normal LDL were 5.30±0.00 and with abnormal
LDL were 6.31±1.54 and this difference was not significant.

**DISCUSSION**

Stroke is the third most common cause of death in the world after coronary artery disease and cancer. Uric acid levels have been postulated in various studies to have been associated with metabolic syndrome, insulin resistance and stroke. With this background conducted a study to understand the clinical profile of ischemic stroke patients and their correlation with various risk factors. The mean age of the study subjects was 57.53±10.23 years with male preponderance. Similar inferences were drawn by studies conducted by Wang et al, Paranthakan et al, Kaur et al, Koppula et al, Patil et al and Suman et al.

The most common risk factor associated with ischemic stroke in the present study was hypertension among 70.67% of cases, 48% had history of smoking and 22.67% had history of diabetes. A study done by Wang YF et al reported that about 35% of their study had history of smoking, 58.7% had hypertension and 17.5% had history of alcohol consumption. Paranthakan et al reported that 30% of their study subjects had hypertension as a risk factor and 26% had diabetes mellitus.

Milionis et al inferred that the rates of hypertension in their study was 47.2%, the proportion of smoking was 26.4% in their study. Patil TB and workers reported that the proportion of hypertension was 51%, smoking history was present in 20%, 23% had diabetes mellitus and obesity was present in 44% of their study subjects. Charan Reddy et al reported that 28% were hypertensives, 24% had smoking history and 16% were dyslipidemic in their study.

Did not find any significant difference of uric acid levels among the different risk factors for ischemic stroke. Chamorro et al inferred that the mean uric acid levels in hypertensive and non-hypertensive in their study were 5.35±1.88 and 4.83±1.56 respectively and this difference was statistically significant. Further, among smokers and non-smokers the uric acid levels were 5.24±1.72 and 5.10±1.80 and this difference was not significant. Among the dyslipidemic patients the uric acid levels were 5.21±1.70 and among those who did not have dyslpidemia the levels were 5.11±1.81 and this difference was not statistically significant.

Paranthakan et al reported that the uric acid levels were significantly higher in hypertensives, with history of CVD, dyslipidemia and smoking when compared to their counterparts. Strohaug et al reported that as the different parameters like body mass index, systolic blood pressure, diastolic blood pressure, triglycerides, total cholesterol and LDL levels increases the uric acid levels also increased significantly and this trend was statistically significant. It implies higher body mass index, systolic blood pressure, diastolic blood pressure, triglycerides, total cholesterol and LDL levels has higher uric acid levels in their body.

Milionis et al reported the mean uric acid levels among patients with hypertension and without hypertension were 5.4±1.6 and 5.00±1.6 levels respectively and this difference was statistically significant. Further, the mean uric acid levels in overweight patients were higher when compared to normal weight patients but this difference was not significant. They also reported that the mean uric acid levels in patients with metabolic syndrome were 5.6±1.7 and without metabolic syndrome it was 5.0±1.6 levels and this difference was not significant. Kaur et al reported that they found a non-significant difference between the serum uric acid levels hypertensive and dyslipidemic patients when compared with their counterparts.

Mehpour et al reported that the uric acid levels were significantly higher in abnormal triglyceride levels and abnormal LDL level when compared to the respective lower levels. Tripathi VD and colleagues reported that uric acid levels were significantly higher in hypertensives when compared to non-hypertensives in their study. Mangal AC et al reported that the mean uric acid levels in hypertensive patients was 6.30 ± 2.64 and among non-hypertensives was 6.19 ± 2.85 levels and this difference was not significant. The proportion of hyperuricemia in patients with hyperlipidaemia was higher when compared to normal lipid levels and no statistical difference was found in their study. Behera et al reported a significantly higher uric acid levels in hypertensives, overweight and smokers in their study.

The present study had some limitations. It was a single center cross sectional study prospective analytical studies would have yielded better results. Nonetheless, this is one of the studies which adds to the knowledge of role of uric acid in ischemic stroke in this region.

**CONCLUSION**

The average age of the ischemic stroke incidence was between 50th to 60th decades in the present study. Males had higher risk when compared females which were consistent with various studies conducted across the world. Hypertension was most common risk factor present in the present study. Did not find any significant association between the uric acid levels and various risk factors for ischemic stroke. Uric acid was found to higher among these patients. With this can infer that uric acid levels have to be monitored among the patients with ischemic stroke patients.

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