

METABOLIC SYNDROME IN ISCHEMIC STROKE AND ITS CORRELATION WITH SERUM URIC ACID LEVELS IN A COSTAL TERTIARY CARE CENTRE OF SOUTH INDIA**H. Poornima^{1*} and Vosto Steny²**¹Additional Professor, Department of General Medicine, Government Medical College, Alappuzha, Kerala, India.²Resident, Department of General Medicine, Government Medical College, Alappuzha, Kerala, India.***Corresponding Author: Dr. H. Poornima**

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ABSTRACT

Background: Metabolic syndrome is often an underdiagnosed entity in patients with ischemic stroke and elevated serum uric acid level is a common association of metabolic syndrome. This study was designed to identify the frequency of metabolic syndrome in patients with ischemic stroke and to study the correlation between serum uric acid levels in stroke patients with metabolic syndrome. **Method:** 122 patients in the age group of 35-60 years who attended medicine department of a tertiary care centre in south India with ischemic stroke were included in the study. International Diabetes Federation criteria were used for diagnosis of metabolic syndrome. NIHSS score was used for assessing the severity of ischemic stroke. **Results:** 41% of study population met the criteria for diagnosing metabolic syndrome. In stroke patients with metabolic syndrome 24% had very high uric acid levels compared to 9.7% in those without metabolic syndrome. Low normal values of uric acid were associated with only 22% of those with metabolic syndrome whereas it was seen in 38.9% of those without metabolic syndrome. Both these values were statistically significant. **Conclusion:** The prevalence of metabolic syndrome in ischemic stroke patients in this study is 41%. Diabetes mellitus, hypertriglyceridaemia and hypertension were the more prevalent components. Ischemic stroke was found to be more severe in patients with metabolic syndrome as evidenced by the NIHSS scores. High serum uric acid levels were more commonly observed in ischemic stroke patients with metabolic syndrome.

KEYWORDS: Ischemic stroke, Metabolic syndrome, Serum uric acid.**INTRODUCTION**

Stroke or cerebrovascular accident, is defined by the abrupt onset of a neurologic deficit that is attributable to a focal vascular cause. Stroke is the leading cause of mortality and morbidity in developing countries and average age of presentation of patients with stroke is 15 years younger than that in developed countries. Approximately 15 million new acute onset stroke events occur every year in the world. Around two third of these individuals live in developing countries like India.

Metabolic Syndrome is also known as insulin resistance syndrome /syndrome X/'Reaven's syndrome. Metabolic syndrome has attracted tremendous attention in recent years. Studies have shown that prevalence of metabolic syndrome in developed countries is about 22-39% and India has strikingly high prevalence rates compared to rest of Asia.

Metabolic syndrome accounts for 30% of all ischemic strokes among women, compared to 4% among men. Elevated serum uric acid level is a common association of metabolic syndrome. Uric acid is the most abundant

aqueous antioxidant in humans and contributes as much as two-thirds of all free radical scavenging capacity in plasma. In a variety of organs and vascular beds, local uric acid concentrations increase during acute oxidative stress and ischemia and the increased concentrations might be a compensatory mechanism that confers protection against increased free radical activity. Evidence from epidemiological studies suggests that the elevated serum uric acid levels may predict an increased risk for cerebrovascular events including stroke.

This study is designed to identify the frequency of metabolic syndrome in patients admitted with ischemic stroke in a tertiary care centre and to identify particular clusters of metabolic syndrome components that carry the highest risk of stroke and to study the correlation between serum uric acid levels in stroke patients with metabolic syndrome.

MATERIALS AND METHODS

Patients with ischemic stroke of age more than 35 years & less than 60 years who were admitted in General Medicine wards in a tertiary care centre in South India

during the study period of twelve months were included in the study. Both male and female patients presenting with neuro-radiological features of ischemic stroke (clinically and CT/MRI Scan proven, including major and minor stroke) were included in the study. The NIHSS (National Institutes of Health Stroke Score) criterion was followed for diagnosis of stroke. Neurological deficit not fitting into above clinical / radiological criteria for stroke were excluded from the study. Patients with probable embolic foci in heart as evidenced by CVS examination or atrial fibrillation in ECG or a documented valvular heart disease were excluded. Patients on drugs which cause high uric acid levels (viz. Thiazide diuretics, immunosuppressants like cyclosporine) also were not included.

In those patients who satisfy the inclusion criteria, a detailed clinical history was taken and complete clinical examination was done, including waist circumference. Fasting plasma glucose, triglycerides, high density lipoproteins and serum uric acid were measured. Data was collected using a pretested proforma meeting the objectives of the study. The purpose of the study was explained to the patient and informed consent was taken. Data were analysed using SPSS version 17. To elucidate the associations & comparisons between different parameters, Chi square test, Student's t test and McNemar test were used. For all statistical evaluations a two tailed probability value, <0.05 was considered significant.

RESULTS

The observation was made in 122 patients who fulfilled the inclusion criteria. 55.7% of ischemic stroke patients in this study were in the age group of 51-60 years. Gender distribution was similar in stroke patients with or without metabolic syndrome. Weakness, deviation of angle of mouth and aphasia were the common symptoms at the time of presentation. Frequency of two lifestyle risk factors, smoking and alcoholism were similar in both groups. Serum triglyceride >150mg/dl was present in 38(76%) patients with metabolic syndrome while only 26(37%) in the other group.

According to NIHSS, mild stroke was found in 14% of patients with metabolic syndrome and 27.7% of patients without metabolic syndrome. Moderately severe stroke (5-14) was 30% in metabolic syndrome group and 33.3% in the other. Severe stroke (15-24) was 34% in metabolic syndrome group and 26.5% in the other. Very severe (>25) was found in 22% of patients with metabolic syndrome and 12.5% in the other group. Patients with metabolic syndrome tend to have more severe stroke as evidenced by NIHSS.

High serum uric acid levels were found in stroke patients with metabolic syndrome. In patients with metabolic syndrome 11(22%) belonged to category A, 27(54%) in category B and 12 (24 %) in C. It was 28 (38.9%) 37 51.4(%) 7(9.7%) in category A, B, and C respectively in those without metabolic syndrome.

Table 1: National institutes of health stroke score (NIHSS)

Instructions	Scale Definition	Score
1a, Level of Consciousness: (LOC)	Alert; keenly responsive.	0
	Not alert; but arousable by minor stimulation to obey, answer, or respond.	1
	Not alert; requires repeated stimulation to attend, or is obtunded and requires strong or painful stimulation to make movements (not stereotyped).	2
	Responds only with reflex motor or autonomic effects or totally unresponsive, flaccid, and areflexic.	3
1b. LOC The patient is asked the month and his/her age.	Answers both questions correctly.	0
	Answers one question correctly.	1
	Answers neither question correctly.	2
1c. LOC Commands The patient is asked to open and close the eyes and then to grip and release the non-paretic hand.	Performs both tasks correctly.	0
	Performs one task correctly.	1
	Performs neither task correctly.	2
2. Best Gaze	Normal.	0
	Partial gaze palsy; gaze is abnormal in one or both eyes, but forced deviation and total gaze paresis is not present.	1
	Forced deviation, or total gaze paresis not overcome by the oculocephalic maneuver.	2
3. Visual	No visual loss.	0
	Partial hemianopia.	1
	Complete hemianopia.	2
	Bilateral hemianopia (blind including cortical blindness).	3
4. Facial Palsy	Normal symmetrical movements.	0

	Minor paralysis (flattened nasolabial fold, asymmetry on smiling).	1
	Partial paralysis (total or near-total paralysis of lower face).	2
	Complete paralysis of one or both sides (absence of facial movement in the upper and lower face)	3
5. Motor Arm	No drift; limb holds 90 (or 45) degrees for full 10 seconds.	0
	Drift; limb holds 90 (or 45) degrees, but drifts down before full 10 seconds; does not hit bed or other support.	1
	Some effort against gravity; limb cannot get to or maintain (if cued) 90 (or 45) degrees, drifts down to bed, but has some effort against gravity.	2
	No effort against gravity; limb falls.	3
	No movement	4
	Amputation or joint fusion	5
	Left Arm	5a
	Right Arm	5b
6. Motor Leg	No drift; leg holds 30-degree position for full 5 seconds.	0
	Drift; leg falls by the end of the 5 second period but does not hit bed.	1
	Some effort against gravity; leg falls to bed by 5 seconds, but has some effort against gravity.	2
	No effort against gravity; leg falls to bed immediately.	3
	No movement.	4
	Amputation or joint fusion,	5
	Left Leg	5a
	Right Leg	5b
7. Limb Ataxia	Absent.	0
	Present in one limb.	1
	Present in two limbs.	2
	Amputation or joint fusion.	3
8. Sensory	Normal; no sensory loss.	0
	Mild-to-moderate sensory loss; patient feels pinprick is less sharp or is dull on the affected side; or there is a loss of superficial pain with pinprick, but patient is aware of being touched.	1
	Severe to total sensory loss; patient is not aware of being touched in the face, arm, and leg.	2
9. Best Language	No aphasia; normal.	0
	Mild-to-moderate aphasia.	1
	Severe aphasia	2
	Mute, global aphasia; no usable speech or auditory comprehension	3
10. Dysarthria	Normal.	0
	Mild-to-moderate dysarthria; patient slurs at least some words and, at worst, can be understood with some difficulty.	1
	Severe dysarthria; patient's speech is so slurred as to be unintelligible in the absence of or out of proportion to any dysphasia, or is mute/anarthric.	2
	Intubated or other physical barrier	3
11. Extinction and Inattention (formerly Neglect)	No abnormality.	0
	Visual, tactile, auditory, spatial, or Personal bilateral simultaneous stimulation in one of the sensory modalities.	1
	Profound hemi-inattention or extinction to more than one modality; does not recognize own hand or orients to only one side of space inattention	2

Table: 2 Total NIHSS Score Severity

>25	Very severe neurological impairment
15-24	Severe neurological impairment
5-14	Moderately severe neurological impairment
<5	Mild neurological impairment

We studied serum uric acid levels as three categories.

Category A - Low normal (3.1-5 mg/dL in males and 2.5-4 mg/ dL in females)

Category B - High normal (5.1-7 mg/dL in males and 4.1-5.6 mg/ dL in females)

Category C - Very high (>7 mg/dL in males and >5.6 mg/ dL in females)

DISCUSSION

The study was conducted in 122 cases of ischemic stroke who had been admitted to a rural tertiary care centre in South India during the period of one year. Males predominated in patients of both stroke with metabolic syndrome and stroke without metabolic syndrome when compared to other studies conducted by Rodriguez-Colon *et al.*^[1] and Boden-Albala *et al.*^[2] where females predominated. In the present study stroke with metabolic syndrome was more in the age group of 51-60 years. Weakness, deviation of angle of mouth and aphasia were the common symptoms at the time of presentation comparable to studies conducted by Rodriguez-Colon *et al.*^[1] and Simon-Cronin *et al.*^[3] Prevalence of smoking and alcohol consumption is seemingly less when compared to studies conducted by Rodriguez-Colon *et al.*^[1] and Kazunori Kayaba *et al.*^[4], probably because these habits are uncommon among females in our area. Family history of stroke was more common compared to other studies conducted by Rodriguez-Colon *et al.*^[1] and Kazunori Kayaba *et al.*^[4] All the components of metabolic syndrome were more common in patients of stroke with metabolic syndrome and were statistically significant. (p value <0.05). Raised HDL and triglyceride components were more common when compared with studies conducted by Rodriguez-Colon *et al.*^[1], Simon-Cronin *et al.*^[3], Kim JW *et al.*^[5]

The studies conducted by Rodriguez-Colon *et al.*^[1] and Simon-Cronin *et al.*^[3] had diabetes mellitus and hypertension as the more common components. In our study diabetes mellitus and hypertriglyceridaemia were the more prevalent components.

NIHSS >25 was seen in 22% of those with metabolic syndrome whereas it was 12.5% in those without metabolic syndrome. NIHSS 15-24 was seen in 34% of those with metabolic syndrome compared to 26.5% of those without metabolic syndrome. Low NIHSS of <5% was seen in 14% of those with metabolic syndrome whereas it was seen in 27.7% in the other group. The relation was statistically significant. From these observations it can be inferred that ischemic stroke in patients with metabolic syndrome tend to be comparatively more severe.

In stroke patients with metabolic syndrome 24% had very high uric acid levels compared to 9.7% in those without metabolic syndrome. Low normal values of uric acid were associated with only 22% of patients with

metabolic syndrome whereas it was seen in 38.9% of those without metabolic syndrome. Both these values were statistically significant (p value <0.05). Hence high serum uric acid levels were more commonly observed in patients with metabolic syndrome and ischemic stroke.

CONCLUSION

This descriptive study included 122 ischemic stroke patients admitted in a rural tertiary care centre in South India during the period of one year. Patients were studied for metabolic syndrome using the International Diabetes Federation definition. NIHSS was used for diagnosing and assessing the severity of ischemic stroke. The prevalence of metabolic syndrome in ischemic stroke in this study was 41%. Stroke with metabolic syndrome was more in the age group 51-60 years. Study population was predominantly males. Weakness, deviation of angle of mouth and aphasia were the common symptoms at the time of presentation. All the components of metabolic syndrome were more common in patients of stroke with metabolic syndrome and were statistically significant. Diabetes mellitus, hypertriglyceridaemia and hypertension were the three more prevalent components. Ischemic stroke in patients with metabolic syndrome tend to be comparatively more severe as evidenced by the NIHSS. High serum uric acid levels were more commonly observed in patients with metabolic syndrome.

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