

Role of biochemical markers in cerebro vascular accident

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Abstract

Introduction: Serum uric acid is a biochemical marker in number of diseases, this study is to evaluate association of serum uric acid in acute ischemic stroke. Among all the neurological diseases of adult life, the cerebrovascular ones clearly rank the first in frequency and importance. At least 50% of the neurological disorders in a general hospital are of this type. Stroke, after heart disease and cancer is the most common cause of death. **Aims and Objectives:** To Study association between Serum Uric Acid (SUA) and acute ischemic stroke. **Methodology:** A total of 60 patients of either sex were enrolled for the above study. The study was cross sectional. Approval of ethical committee was obtained. Study was carried in Aarupadai Veedu Medical College and hospital, Pondicherry during the period of September 2013 – September 2015. A total of 60 patients (30 males and 30 females) with acute stroke who met the criteria, admitted in Dept. of Medicine, Aarupadai Veedu Medical College, Puducherry were included in this study. All subjects gave informed consent and the study protocol was approved by the Ethical Committee. **Result:** Majority of this stroke population are between 50 to 69 years old, (61 % of the population) with 20 Males and 17 females. The elderly population, above 70 years old constitutes 20 % of the population with 5 males and 5 females. Hypertension constitutes the major risk factor in this stroke population as 65 % of the population is hypertensive. 20 males and 19 females are hypertensives and form 68 % and 62 % in their respective population. Diabetes mellitus ranks second as a risk factor, constitute 51% of the study population with 14 (46 %) males and 16 (56 %) females. Coronary Artery Disease is associated in 32 % of the population with 9 (30 %) males and 10 (34 %) females. 34 % of the stroke population has adverse lipid profile and both sexes share equal number of hyperlipidemics (10 each). Among the male population, 20 (68 %) are smokers and 10 (32 %) are alcoholics. As per this study; Serum Uric Acid were; Less than 5 mg / dl – 49 % (15 males and 14 females) Between 5 – 6.9 mg / dl - 26 % (8 males and 8 females) Above and equal to 7 mg / dl - 25 % (7 males and 8 females). **Conclusion:** This study shows that elevated SUA is strongly associated with an increased risk for the development of acute ischemic stroke in this study population.


Key Words: Serum Uric Acid (SUA), acute ischemic stroke.

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INTRODUCTION

Among all the neurological diseases of adult life, the cerebrovascular ones clearly rank the first in frequency

and importance. At least 50% of the neurological disorders in a general hospital are of this type. Stroke, after heart disease and cancer is the most common cause of death. In the developed countries among 700000 cases of stroke, roughly 600000 are ischemic lesions. All the physicians have a role to play in the prevention of stroke by encouraging the reduction in risk factors¹. Stroke also entails a high socio economic burden due to increased morbidity and mortality². Ischemic strokes account for > 80% of total stroke events. Early identification of individuals at risk could be of help in primary prevention strategies³. UA is the most abundant aqueous antioxidant in humans, and contributes as much as two-thirds of all free radical scavenging capacity in plasma. It is particularly effective in quenching hydroxyl, superoxide

and peroxynitrite radicals, and may serve a protective physiological role by preventing lipid peroxidation⁴. In a variety of organs and vascular beds, local UA concentrations increase during acute oxidative stress and ischaemia, and the increased concentrations might be a compensatory mechanism that confers protection against increased free radical activity⁵. In animal models, local UA concentrations significantly increase in acute brain Injury⁶. For example, in the rat, middle cerebral artery occlusion causes a significant increase. Among all the neurological diseases of adult life, the cerebrovascular ones clearly rank the first in frequency and importance. At least 50% of the neurological disorders in a general hospital are of this type. Stroke, after heart disease and cancer is the most common cause of death. In the developed countries among 700000 cases of stroke, roughly 600000 are ischemic lesions. All the physicians have a role to play in the prevention of stroke by encouraging the reduction in risk factors¹. Stroke also entails a high socio economic burden due to increased morbidity and mortality². Ischemic strokes account for > 80% of total stroke events. Early identification of individuals at risk could be of help in primary prevention strategies³. UA is the most abundant aqueous antioxidant in humans, and contributes as much as two-thirds of all free radical scavenging capacity in plasma. It is particularly effective in quenching hydroxyl, superoxide and peroxynitrite radicals, and may serve a protective physiological role by preventing lipid peroxidation⁴. In a variety of organs and vascular beds, local UA concentrations increase during acute oxidative stress and ischaemia, and the increased concentrations might be a compensatory mechanism that confers protection against increased free radical activity⁵. In animal models, local UA concentrations significantly increase in acute brain Injury⁶. For example, in the rat, middle cerebral artery occlusion causes a significant increase in cerebral UA concentrations, which can persist for several days after the injury¹¹. These observations have prompted interest in the potential impact of raised local UA concentrations in the setting of acute ischaemic stroke. The role of serum uric acid (SUA) levels as an independent risk factor for vascular disease has been questioned for decades⁷. Evidence from epidemiological studies suggest that the elevated SUA levels may predict an increased risk for cerebrovascular (CV) events including stroke⁷⁻¹⁰. Moreover therapeutic modalities with a SUA lowering potential have been shown to reduce CV disease morbidity and mortality. Subjects with NIDDM have a twofold to four fold greater risk of all manifestations of atherosclerotic vascular disease including stroke. The increased risk of stroke is only partly explained by the adverse effects of NIDDM on classic risk factors or risk

factors clustering with hyperinsulinemia. One study indicates that hyperuricemia is a strong predictor of stroke events in middle aged patients with NIDDM independent of other CV risk factors. SUA has been recently associated with insulin resistance. Although high SUA levels have been identified as an important risk factor for stroke in unselected populations in a number of epidemiological studies⁷⁻¹⁰, it is unclear whether high SUA levels promote or protect against the development of CV disease or simply acts as a passive or circumstantial marker of increased risk¹⁵. However data from larger studies (NHANES I) have established an independent association in subjects older than 13, regardless of confounding factors such as sex, menopausal status, diuretic use, presence of CV disease or race¹⁶.

METHODOLOGY

A total of 60 patients of either sex were enrolled for the above study. The study was cross sectional. Approval of ethical committee was obtained. Study was carried in AarupadaiVeedu Medical College and hospital, Pondicherry during the period of September 2013 – September 2015 based on following criteria. All adult patients with acute ischaemic stroke with or without CT Scan of infarction within 24 hrs. of onset of Stroke attending Dept. of Medicine and Emergency Medicine, AVMC, Puducherry included into study while ; Previous history of TIA / CVA, CT scan showing haemorrhage or other space occupying lesions other than infarct, On thiazide diuretics, Uncontrolled systemic, hypertension, Known cases of gout or show clinical evidences of gout, Chronic renal failure patients, Haematological abnormalities like leukemia or other myeloproliferative disorders were excluded from study. A total of 60 patients (30 males and 30 females) with acute stroke who met the criteria, admitted in Dept. of Medicine, AarupadaiVeedu Medical College, Puducherry were included in this study. All subjects gave informed consent and the study protocol was approved by the Ethical Committee.

RESULT

Table 1: Distribution of the Patients as per the Age

Age in Years	Cases	
	No	%
Less than 40	-	-
41-49	11	19
50-59	16	26
60-69	21	35
70-79	10	16
80 and above	2	4
Total	60	100
Mean	59.8 yrs.	
SD	10.6	

Majority of this stroke population are between 50 to 69 years old, (61 %) of the population) with 20 Males and 17 females. The elderly population, above 70 years old constitutes 20 % of the population with 5 males and 5 females.

Table 2: Distribution of Patients as per Risk factors

Risk Factor	No	%
Hypertension		
Present	39	65
Absent	21	35
DM		
Present	30	50
Absent	30	50
Smoking (among males)		
Present	20	68
Absent	10	32
CAD		
Present	19	32
Absent	41	68
Hyper lipid		
Present	20	34
Absent	40	66
Alcoholism		
(among males)	19	32
Alcoholic	7	62
Non Alcoholic	4	6
Occasional Drinker		

Hypertension constitutes the major risk factor in this stroke population as 65 % of the population is hypertensive. 20 males and 19 females are hypertensives and form 68 % and 62 % in their respective population. Diabetes mellitus ranks second as a risk factor, constitute 51% of the study population with 14 (46 %) males and 16 (56 %) females. Coronary Artery Disease is associated in 32 % of the population with 9 (30 %) males and 10 (34 %) females. 34 % of the stroke population has adverse lipid profile and both sexes share equal number of hyperlipidemics (10 each). Among the male population, 20 (68 %) are smokers and 10 (32 %) are alcoholics.

Table 3: Distribution of patients as per the Uric acid levels and their association with risk factors

	No.	%
Less than 5 mg / dl	29	49 %
Between 5 – 6.9 mg / dl	16	26 %
Above and equal to 7 mg / dl	15	25 %

The distribution of uric acid levels in the study population are as under:

Less than 5 mg / dl – 49 % (15 males and 14 females)
 Between 5 – 6.9 mg / dl - 26 % (8 males and 8 females)
 Above and equal to 7 mg / dl - 25 % (7 males and 8 females).

DISCUSSION

Stroke is defined as rapid onset of focal neurological deficit, resulting from diseases of cerebral vasculature and its content. In India, community surveys have shown a crude prevalence rate for hemiplegia is in the range of 200 per 100, 000 persons, nearly 1.5% of all urban hospital admissions, 4.5% of all medical and around 20% of Neurologic case(66). The mortality rate of stroke in the acute phase is as high as 20% and it remains higher for several years after the acute event in stroke population than the general population(67). Stroke is the second cause of disability and dementia in adults > 65years worldwide; close to 25% stroke survivors develop dementia¹⁷. Stroke is also an important cause of morbidity and long term disability; upto 40% survivors are not expected to recover their independence with self care and 25% unable to walk independently.¹⁶ In our study we have found that Majority of this stroke population are between 50 to 69 years old, (61 %) of the population) with 20 Males and 17 females. The elderly population, above 70 years old constitutes 20 % of the population with 5 males and 5 females. Hypertension constitutes the major risk factor in this stroke population as 65 % of the population is hypertensive. 20 males and 19 females are hypertensives and form 68 % and 62 % in their respective population. Diabetes mellitus ranks second as a risk factor, constitute 51% of the study population with 14 (46 %) males and 16 (56 %) females. Coronary Artery Disease is associated in 32 % of the population with 9 (30 %) males and 10 (34 %) females. 34 % of the stroke population has adverse lipid profile and both sexes share equal number of hyperlipidemics (10 each). Among the male population, 20 (68 %) are smokers and 10 (32 %) are alcoholics. As per this study ; Serum Uric Acid were; Less than 5 mg / dl – 49 % (15 males and 14 females) Between 5 – 6.9 mg / dl - 26 % (8 males and 8 females) Above and equal to 7 mg / dl - 25 % (7 males and 8 females) . Millinois *et al* and warning *et al* found high levels of SUA in males, which is not seen in our study.¹⁸,¹⁹ However, in elderly population both sexes show high levels of SUA which has statistical significance. Our study is consistent with Milinois *et al* who found elevated SUA in individuals older than 70 years.¹⁸

CONCLUSION

This study shows that elevated SUA is strongly associated with an increased risk for the development of acute ischemic stroke in this study population.

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