

**To Study the Serum Uric Acid Levels in Hemorrhagic Stroke Patients**Anand Keshav Awasthy<sup>1</sup>, Priyanka Joshi<sup>2</sup><sup>1</sup>Assistant Professor, Department of Neurology, Shree Jagannath Pahadiya medical College and attached Hospital, Bharatpur, Rajasthan, India<sup>2</sup>Assistant Professor, Department of Obstetrics and Gynaecology, Shree Jagannath Pahadiya medical College and attached Hospital, Bharatpur, Rajasthan, India

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Conflict of interest: Nil

**Abstract:****Background:** Cerebrovascular diseases include some of the most common and devastating disorders. Stroke is the main cause of disability and mortality among the ageing population, and about 87% of all cases are ischemic stroke while 15% are hemorrhagic stroke.**Methods:** Our study was conducted on 50 patients studied, 25 were males and 25 were females. Male: female ratio was 1:1. The controls were appropriately age and sex matched.**Results:** Mean SUA level in cases was  $6.02 \pm 1.19$  mg/dl whereas it was  $5.11 \pm 1.30$  mg/dl for controls. Mean SUA level was significantly higher in cases as compared to controls ( $P=0.009244$ ).**Conclusion:** Our study shows significantly higher uric acid level in cases as compared to control population. Also, serum uric acid level has significant association with smoking, significant positive correlation with total cholesterol and significant inversely correlated with HDL cholesterol.**Keywords:** Serum uric acids, HDL, Stroke.**DOI:** 10.25258/ijcpr.18.3.118

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**Introduction**

Cerebrovascular diseases include some of the most common and devastating disorders [1]. Stroke is the main cause of disability and mortality among the ageing population, and about 87% of all cases are ischemic stroke while 15% are hemorrhagic stroke [2,3]. Stroke is a major public health problem. According to the Global Burden of Diseases (GBD) study in 1990, reported 4.66 million stroke deaths globally, and nearly 5.87 million deaths in 2010, which indicated 26 per cent increase in global stroke deaths during the past two decades. With the rising proportion of mortality, stroke still remains the second leading cause of death worldwide [4-6]. The Global Burden of Disease 2010 Study showed a 47% increase in the absolute number of hemorrhagic stroke (including ICH and subarachnoid hemorrhage) worldwide between 1990 and 2010. The largest proportion of ICH incident cases (80%) and deaths (63%) occurred in low- and middle-income countries such as Sub-Saharan Africa, Central Asia and South east Asia. During the two decades, the age-adjusted incidence rate of hemorrhagic stroke reduced by 8% (95% confidence interval [CI]: 1-15) in high-income countries (HICs), whereas it increased by 22% (95% CI: 5-30) in the low- and middle-income countries (LMICs) [7]. Each year in the United States,

approximately 795,000 people experience new or recurrent stroke. Of these, approximately 610,000 represent initial attacks, and 185,000 represent recurrent strokes in which approximately 87% of strokes are ischemic, 10% are secondary to intracerebral hemorrhage, and another 3% may be secondary to subarachnoid hemorrhage [8,9]. In India, stroke prevalence is 90-222 per 100 000 people at all ages [10] and every Year 1.44-1.64 million new cases of acute stroke occur [11]. About 12.0% of strokes occur in the population aged less than 40 years [12,13]. Prevalence of stroke in rural or in urban areas in our country per one million people was estimated to be 84-262 and 334-424 cases respectively [14]. As per government reports (2011) the total number of stroke cases in our country are about 9.3 million with about 0.3 million deaths & total DALYs lost 6.36 million in 2004 [15].

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. It is particularly effective in quenching hydroxyl, superoxide and peroxynitrite radicals, and may serve a protective physiological role by preventing lipid peroxidation [16-19]. It is the final catabolite of purine metabolism in humans and other higher primates [20]. It exists in extra cellular compartment

as sodium ureate. It is cleared from the plasma through the kidney [21]. Uric acid levels are influenced by age and sex. Prior to puberty, the average serum uric acid is 3.6 mg/dl for males and females. Following puberty, value rises to adult levels with women typically 1 mg/dl less than men. This lower level in women apparently reflects estrogen related enhancement of renal ureate clearance [20].

**Materials and Methods**

**Study Population:** This study is conducted among 50 patients of acute stroke with CT scan evidence of hemorrhage (ICH and SAH) and CT scan showing no evidence of ischemia. A total of 50 subjects age and sex matched controls (who do not have acute stroke) were also selected

**Design of Study:** single center (hospital based) observational case control study

**Inclusion Criteria**

1. Patients presented within 48 hours of onset of stroke with CT-scan evidence of hemorrhage (intra cerebral hemorrhage and subarachnoid hemorrhage)

2. Both sex (male and female) greater than 18 years of age, who has given informed consent to participate in the study.

**Exclusion Criteria**

1. Patients who NCCT-scan show ischemic-infarct or other space occupying lesions other than hemorrhage.
2. Patients with history of TIA.
3. Patients with EDH/SDH/ RTA.
4. Patients who were known cases of gout or show clinical evidences of gout.
5. Patients who were alcoholics.
6. Patients taking drugs causing hyperuricemia (Eg. loop diuretics/thiazides/anti-cancer drug eg. cisplatin, cyclophosphamide, cyclosporin, ATT eg. pyrazinamide and ethambutol, l-dopa, isotretinoin and clofibrate, aspirin, pentamidine, theophylline, ketaconazole)
7. Patients with previous history of coronary vascular event and known cardiac disease
8. Patient with Chronic renal failure (CRF).
9. Patients with known hematological malignancy (leukemia or lymphoma) or myeloproliferative disorder (eg polycythemia).

**Observation and Results**

**Table 1: Age Distribution of the groups According to the Sex of Cases and controls**

Age group	Cases (n=50)		Control(n=50)		Total
	Male	Female	Male	Female	
>18 to 40	5	1	4	4	14
41 to 60	9	4	6	10	29
>60	11	20	15	11	57
<b>Total</b>	25	25	25	25	100

Maximum proportion was observed in >60 yrs of age groups followed by 41 to 60 years age groups.

Over all mean age of the study population (combined for cases and controls) was 60.09 ± 14.87 years.

The mean age of the cases was 61.38 ± 13.33 years, whereas the mean age of the controls was 58.80 ± 16.30 years. The difference between the two groups was not statistically significant [P=0.59611(NS)].

**Table 2: Association of SUA level with Sex**

	Serum Uric Acid level		
	≤ 6.8 mg/dl	>6.8 mg/dl	
<b>Male</b>	40	10	50
<b>Female</b>	42	8	50
<b>Total</b>	82	18	100

Chi. Square= 0.271 with 1 degree of freedom  
P= 0.60266 (NS)

Mean Serum Uric Acid level in male 5.602 ± 1.361mg/dl. Mean Serum Uric Acid level in female 5.532 ± 1.302 mg/dl. Higher level of Serum Uric Acid level in male is not statistically significant.

**Table 3: Association of Risk factor of Hemorrhagic stroke and S. Uric acid level**

Risk factor		Serum uric acid level		Total	Mean SUA level	S.D.	p value
		≤ 6.8 (mg/dl)	>6.8 (mg/dl)				
Hypertension	Present	27	12	39	6.08	1.18	0.41 (NS)
	Absent	9	2	11	5.8	1.27	
Diabetes mellitus	Present	11	8	19	6.16	1.32	0.08 (NS)
	Absent	25	6	31	5.93	1.12	
Dyslipidemia	Present	11	6	17	6.024	1.31	0.41(NS)
	Absent	25	8	33	6.021	1.15	
H/o Smoking	Yes	11	9	20	6.36	1.2	0.029 (S)
	No	25	5	30	5.79	1.15	
Positive family h/o stroke	Yes	8	5	13	6.1	1.34	0.33 (NS)
	No	28	9	37	5.99	1.16	
Previous h/o stroke	Yes	9	6	15	6.35	1.02	0.216(NS)
	No	27	8	35	5.88	1.25	

### Discussion

Stroke can occur to any one at any time, regardless of age, sex or race. It is a major cause of mortality and morbidity in among worldwide. The well recognized risk factors like age, sex, hypertension, diabetes, dyslipidemia, smoking, family history of stroke and previous history of stroke explain only a part of the cases. Hence a search for other risk factors is the need of the hour. Many studies have found conflicting role of uric acid in patients with stroke and cardiovascular disorders; this study was conducted to study the role of serum uric acid in hemorrhagic stroke.

In our study, the serum uric acid (SUA) levels increased with increasing age but the difference was statistical not significant ( $P=0.5154$ ). Similar results were obtained in the study of Ramesh K et al [21].

In our study there was a positive correlation between the age of patients and their serum uric acid levels but this correlation was not statistically significant ( $=1.4374$ ,  $p>0.05$ ). This result in contrast to the study by Conen et al [21] there was a weak but significant positive association between age of patients and their serum uric acid levels. Kotwal et al [22] observed was negative correlation between the age of patients and serum uric acid level ( $r=-0.19$ ,  $p=0.18$ ).

### Conclusion

Our study shows significantly higher uric acid level in cases as compared to control population. Also, serum uric acid level has significant association with smoking, significant positive correlation with total cholesterol and significant inversely correlated with HDL cholesterol. S. uric acid level increases with age, in males, hypertension, diabetes, dyslipidemia, positive family history and positive previous history of stroke but not statically significant. So higher Serum uric acid level can be considered as a contributor to hemorrhagic stroke but more large scale scientific and clinical research is needed before the role of uric acid as a risk factor in hemorrhagic

stroke can be established. We also propose large scale prospective study in future to establish serum uric acid as an independent predictor for increased risk of hemorrhagic stroke in normal population.

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