

Association of serum uric acid level in acute ischaemic stroke patients on antiplatelet therapy compared to those who are not on antiplatelet therapy

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ABSTRACT

Background

Elevated level of serum uric acid (SUA) is frequently considered as one of the risk factor for ischaemic stroke. Hyperuricemia has been shown to have a positive association with CV morbidity and mortality.

Materials and methods

60 cases of both the sexes with acute ischemic stroke were recruited in this study. 30 patients had anti-platelet therapy and 30 didn't have anti-platelet therapy. Serum uric acid levels were correlated with the anti-platelet therapy in these patients.

Results

After eliminating the confounders, the patients who were on anti-platelet therapy had reduced uric acid levels and it was found to be statistically significant ($p=0.000$).

Conclusion

Serum uric acid is elevated in acute phase of ischaemic stroke patients and it is associated with mortality in all patients even after adjusting the confounders. In this present study, it has been found that patients who were on anti-platelet therapy have normal uric acid levels.

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INTRODUCTION

Stroke is the most frequent reason of mortality worldwide. It accounts for 11% of deaths and is a major cause of disability worldwide (1). Ischemic stroke (IS) is the commonest stroke which occupies 60% to 80%. It has a poor outcome and is associated with high mortality rate. Ischaemic stroke is stated as the neurological loss due to abrupt stoppage of blood circulation to the brain. Past studies have suggested that there is a positive link between serum uric acid and ischaemic stroke (2, 3). Uric acid is the end product of purine metabolism catalyzed by xanthine oxidase. Several population based studies have shown that the uric acid levels are correlated with increased risk of hypertension, myocardial infarction, stroke and sudden cardiac death (4, 5).

Earlier studies have reported that both excessive and deficient SUAs are closely related to cardiovascular and cerebrovascular diseases (6, 7). In acute ischemia, poor prognosis is noted among the patients with elevated serum uric acid levels (8, 9). It has been stated that hyperuricemia is linked with reduced platelet inhibition by thienopyridines (10) and there exists a lacunae in finding out whether lowering uric acid increases the antiplatelet effects of drugs or not. So the present study is undertaken to evaluate the serum uric acid levels in patients with acute ischemic stroke who were on anti-platelet therapy.

Materials and Methods

Cross sectional study conducted including 60 patients in both the sexes who had acute ischemic stroke . The institutional ethical committee clearance was obtained .30 patients had anti-platelet therapy and 30 patients didn't have anti-platelet therapy. Serum uric acid levels were measured in all the subjects. Study was undertaken from October 2022 to April 2024 & data collected from Saveetha medical college & hospital data record system.

Inclusion criteria

Patient with recurrent stroke with those who were on antiplatelets & those who were not on antiplateletes

Exclusion criteria

- Patients who were on thiazide diuretics & cytotoxic drugs, Pyrazinamide, Ethambutol, Nicotinic acid ,levodopa, probenecid,allopurinol,losartan, gout,alcohol abuse ,chroniuc renal insufficiency
- CT scan shows haemorrhages or other space occupying lesions
- Patients who were known cases of cardiac diseases which could be the sources of emboli or whose echocardiogram shows evidence of emboli, patients with malignancy, hypothyroidism,active infection, chronic IBD

Results

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Table 1: Comparison of demographic and co-morbid status in acute ischemic stroke patients with and without anti-platelet therapy by chi-square test

Demographic data/ Co –morbid status	Anti platelet therapy			X ² -Value	p- value
	Yes N (%) N =30	No N(%) N =30	Total N(%) N =60		
Age distribution					
≤60	17 (56.7)	16 (53.3)	33 (55.5)	0.067	0.795 (ns)
>60	13 (43.3)	14 (46.7)	27 (45)		
Gender					
Male	24 (80)	22 (73.3)	46 (76.7)	0.373	0.542 (ns)
Female	06 (20)	08 (26.7)	14 (23.3)		
Hypertension					
Yes	26 (86.7)	22 (73.3)	48 (80)	1.667	0.184 (ns)
No	04 (13.3)	08 (26.7)	12 (20)		
Diabetes Mellitus					
Yes	16 (53.3)	21 (70)	37 (61.7)	1.763	0.117 (ns)
No	14 (46.7)	09 (30)	23 (38.3)		
Smoker					
Yes	10 (33.3)	11 (36.7)	21 (35)	0.073	0.787 (ns)
No	20 (67.3)	19 (63.3)	39 (65)		
Renal diseases					
Yes	08 (26.7)	01 (3.3)	09 (15)	6.405	0.01**
No	22 (73.3)	29 (96.7)	51 (85)		

*p<0.05- ***p<0.001- statistically significant, ns- not significant,

Table 1 shows the comparison of demographic and co-morbid status of the subjects. Among 60 subjects, 30 had anti-platelet therapy and 30 didn't have anti-platelet therapy. In both the groups males were predominant and majority was hypertensive subjects.

Table 2: Comparison of serum uric acid level in acute ischemic stroke patients with and without anti platelet therapy among gender and age distribution by student t test

Demographic data	Serum Uric acid level	
	Group 1 Mean ± SD N =30	Group 2 Mean ± SD N =30
Gender		
Male	4.32 ± 1.03	7.25 ± 2.63
Female	2.80 ± 1.79	9.82 ± 4.08
t- value	2.382	- 2.028
p- value	0.024**	0.02**
Age distribution		
≤60	4.50 ± 1.00	7.48 ± 3.74
>60	3.39 ± 1.84	8.47 ± 2.54
t- value	2.103	- 0.835
p- value	0.045*	0.411 (ns)

*p<0.05- ***p<0.001- statistically significant, ns- not significant, Group 1: Acute ischemic stroke patients patient with Anti – platelet therapy, Group 2: Acute ischemic stroke patients patient without Anti – platelet therapy

Table 2 demonstrates the comparison of serum uric acid level in acute ischemic stroke patients with and without anti platelet therapy. The mean level of serum uric acid in group 1 male is 4.32 ± 1.03 and female is 2.80 ± 1.79 whereas, in group 2 male, the serum uric acid is 7.25 ± 2.63 and in female it was 9.82 ± 4.08 and the difference between two groups is statistically significant p=0.024.

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Table 3: Comparison of serum uric acid level in acute ischemic stroke patients with and without anti-platelet therapy among co – morbid status by student t test

Co-morbid status	Serum Uric acid level	
	Group 1 Mean ± SD N =30	Group 2 Mean ± SD N =30
Diabetes mellitus		
Yes	4.13 ± 0.99	7.94 ± 3.5.
No	3.88 ± 1.98	7.93 ± 2.53
t- value	0.449	0.011
p- value	0.657 (ns)	0.991 (ns)
Hypertension		
Yes	4.01 ± 1.62	8.70 ± 3.44
No	4.05 ± 0.33	5.84 ± 0.781
t- value	-0.092	2.297
p- value	0.967 (ns)	0.029**
Renal diseases		
Yes	4.10 ± 2.35	8.40 ± 0
No	3.99 ± 1.13	7.92 ± 3.2
t- value	0.172	0.142
p- value	0.865 (ns)	0.88 (ns)
Smoking habit		
Yes	3.51 ± 2.14	9.442 ± 3.13
No	4.25 ± 1.05	5.35 ± 0.913
t- value	-1.32	4.195
p- value	0.196 (ns)	0.000***

p<0.05- ***p<0.001- statistically significant, ns- not significant, Group 1: Acute ischemic stroke patients patient with Anti – platelet therapy, Group 2: Acute ischemic stroke patients patient without Anti – platelet therapy. The level of uric acid in group 1 in patients with all co-morbidities is less when compared to group 2.

Table 3 illustrates the comparison of serum uric acid level in acute ischemic stroke patients with and with anti-platelet

Table 4: Comparison of serum uric acid level in acute ischemic stroke patients with and with anti-platelet therapy by Student t test

Parameter	Anti platelet therapy		t- value	p- value
	Yes N (%) N =30	No N (%) N =30		
Uric acid	4.02 ± 1.51	7.94 ± 3.22	-6.034	0.000***

*p<0.05- ***p<0.001- statistically significant, ns- not significant, therapy. The serum uric acid in group 1 is very less when compared to group 2, it is 4.02 ± 1.51 and group 2 is 7.94 ± 3.22 and it is statistically significant p=0.000.

Table 4 describes the comparison of serum uric acid level in acute ischemic stroke patients with and with anti-platelet

*Author for Correspondence:

Figure 1: Comparison of serum uric acid level in acute ischemic stroke patients with and without anti-platelet therapy

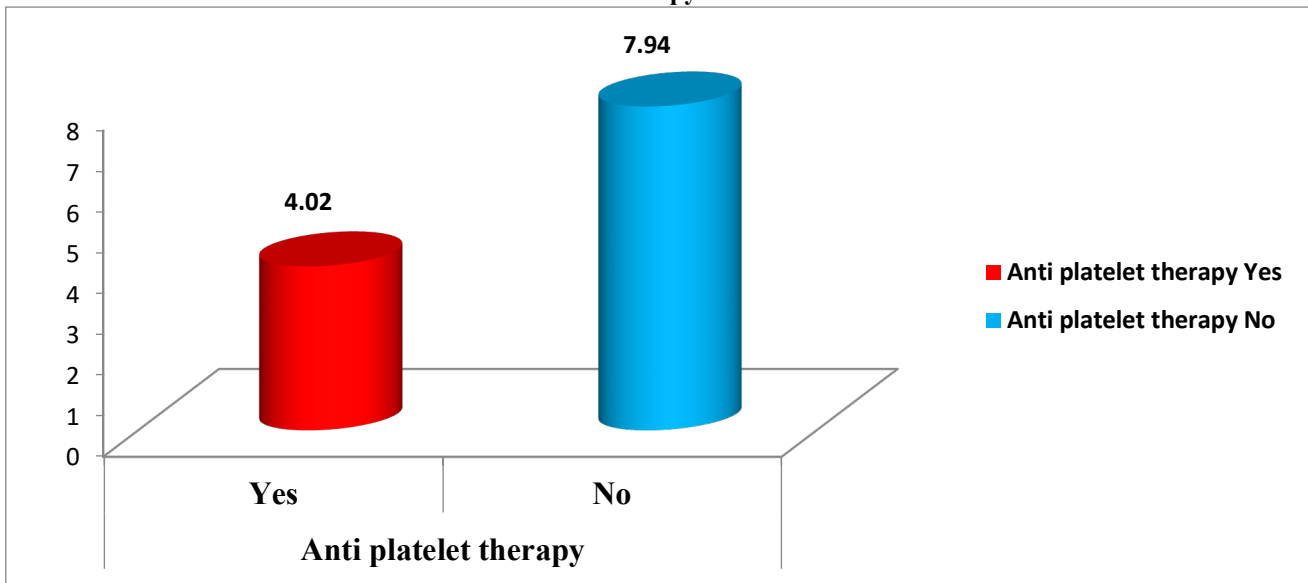


Table 5: Comparison of serum uric acid level in acute ischemic stroke patients with and with anti platelet therapy by chi- square test

Uric acid	Anti platelet therapy			X ² -Value	p- value
	Yes N (%) N =30	No N (%) N =30	Total N (%) N =30		
Normal	23 (76.7)	14 (46.7)	37 (61.7)	25.189	0.000***
Hyperuricemia	0	16 (53.3)	16 (26.7)		
Hypouricemia	07 (23.3)	0	07 (11.7)		

*p<0.05- ***p<0.001- statistically significant, ns- not significant

Table 5 illustrates the comparison of serum uric acid in both groups. In group 1 with anti-platelet therapy, 23 had normal level of uric acid, 7 had hypouricemia and none had

hyperuricemia. In group 2, around 53.3% had hyperuricemia (p=0.000). This shows that anti-platelet therapy is useful in bringing down the uric acid level in ischemic stroke patients.

Figure 4: Comparison of serum uric acid level in acute ischemic stroke patients with and without anti-platelet therapy

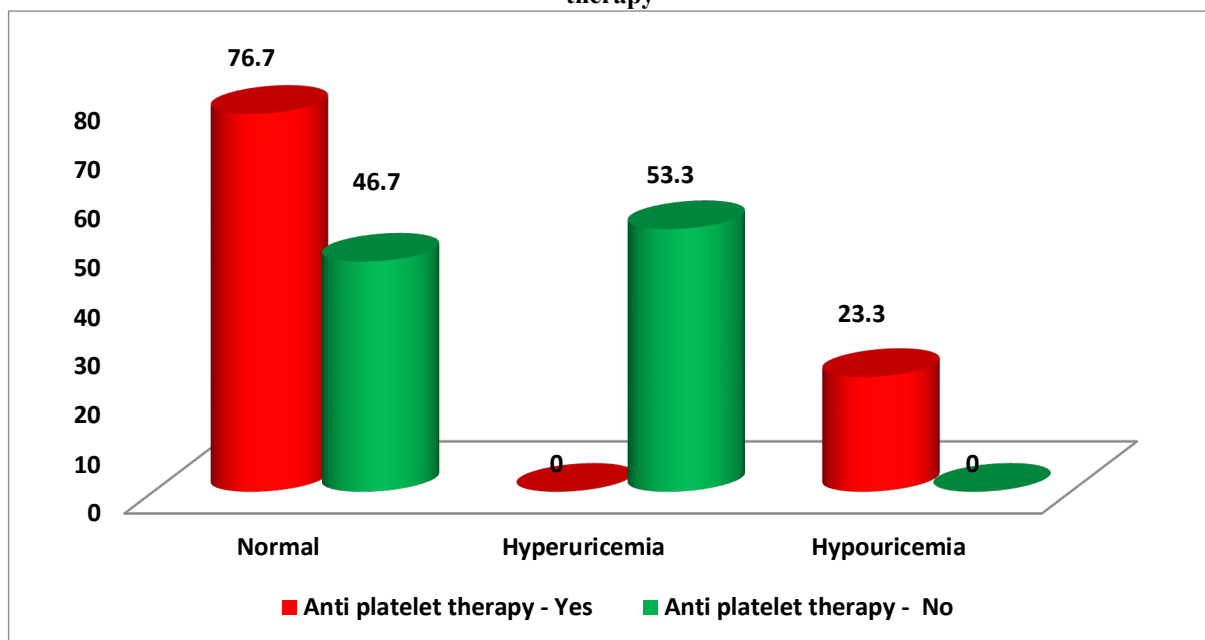


Table 6: Multiple regression analysis with demographic, co-morbid status, uric acid distribution (Independent variable) and uric acid (dependent variable) in acute ischemic stroke patients with and without anti-platelet therapy

Independent variable	With anti-platelet therapy				Without anti-platelet therapy			
	β (95% CI*)	Std β coefficient	-	p value	β (95% CI*)	Std β coefficient	-	p value
Age	.195	.065		.689	-1.774	-.279		.248
Gender	-1.310	-.353		.011**	-2.193	-.306		.172
Diabetes mellitus	-.672	-.154		.258	1.546	.216		.251
Hypertension	-.042	-.014		.919	.172	.025		.895
Smoker	-.390	-.124		.375	2.115	.322		.285
Renal Disorder	-.400	-.119		.326	4.234	.240		.178
Uric acid Distribution	-1.461	-.832		.000***	5.684	.894		.002**

p<0.05- ***p<0.001- statistically significant, ns- not significant,

A multiple regression was run to predict uric acid level in acute ischemic stroke patients with anti-platelet therapy from age, gender, Hypertension, Diabetes mellitus, Smoker, Renal disorder and uric acid distribution. These variables statistically significant predicated uric acid, $F(7, 22) = 8.558, p = 0.000***$. All these variables added statistical significant to the predicated $p = 0.000***$. Eliminating all confounders, uric acid is correlated well with anti-platelet therapy and it is statistically significant ($p = 0.002$).

Discussion

The link between serum uric acid and ischemic stroke has been established in previous studies (11). It has been advocated that serum uric acid may have harmful effects on platelet function and cause endothelial dysfunction (12). Chiquete E et.al, showed that low SUA level is associated with a very good short-term outcome (13). Increased SUA level in ischemic stroke reveals the accretion of other cardiovascular risk factors such as hypertension, diabetes, metabolic disorder etc (14). In the

present study, out of 60 patients, 48 had hypertension, 37 had diabetes, 21 were smokers and 9 had renal disease. In acute ischemia, poor prognosis is noted among the patients with elevated serum uric acid levels (8, 9).

In the present study, the mean level of serum uric acid in group 1 (anti-platelet therapy) male is 4.32 ± 1.03 and female is 2.80 ± 1.79 whereas, in group 2 male, the serum uric acid is 7.25 ± 2.63 and in female it was 9.82 ± 4.08 and the difference between two groups is statistically significant $p=0.024$.

Anti-platelet drugs such as aspirin are widely used to prevent and treat CVD by inhibiting platelet thromboxane A₂ production (15). The effect of anti-platelet therapy on SUA remains controversial. According to Caspi et al, SUA levels were slightly increased after taking aspirin for one week (16) and it may be due to the inhibition of uric acid excretion by aspirin. Nevertheless, Akinwusi et al, showed that aspirin treatment for two weeks did not affect SUA levels (17).

In the present study, after anti-platelet therapy, 23 had normal level of uric acid, 7 had hypouricemia and none had hyperuricemia. In group 2, around 53.3% had hyperuricemia ($p=0.000$). This shows that anti-platelet therapy is useful in bringing down the uric acid level in ischemic stroke patients.

Our findings were similar to Zhang P et.al, they showed that serum uric acid levels were decreased in subjects with hyperuricemia, whereas those with normal SUA levels had no significant changes after taking low-dose aspirin. They didn't have any deleterious effects with short-term use of low-dose aspirin on SUA levels (18).

In the present study, a multiple regression was run to predict uric acid level from Anti platelet therapy, age, gender, Hypertension, Diabetes mellitus, Smoker, Renal disorder. Anti-platelet therapy correlated well negatively with the uric acid level and it was found to be statistically significant ($p=0.002$).

Conclusion

Serum uric acid is elevated in acute ischemic stroke and the prognosis in hyperuricemic patients was not good. This study concludes that anti-platelet therapy was found to be beneficial in patients with acute ischemic stroke by reducing the serum uric acid levels, thereby improving the prognosis of the patient

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