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## A Study To Assess The Prevalence And Association Of Hyperuricemia In Patients Of Newly Diagnosed Essential Hypertension.

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### ABSTRACT

Hypertensive people with raised serum uric acid have a significantly higher relative risk for both heart attack and stroke. Hence this study was conducted with the objective to study the relationship between serum uric acid levels and essential hypertension. Case control study was conducted among 50 cases (Hypertensive) and 50 controls (Normotensives) at Department of General Medicine, at KIMS Hospital, Bangalore. Stage 1 and stage 2 Hypertension according to JNC-VII without any target end organ damage were cases. Pre structured questionnaire was used to collect the data related to demographic profile, examination profile and laboratory profile. Data was analyzed statistically Unpaired students t-test was the test of significance and correlations were assessed by Pearson coefficient. The mean age of the study group was  $52.96 \pm 10.27$  and in control group it was  $52.44 \pm 11.52$ . The Mean Serum Uric Acid was found to be  $6.1 \pm 1.38$  in study group and  $4.12 \pm 1.07$  in control group with significant statistical association. Hyperuricemia was seen in 20% of cases and in 4% of control group. Study concluded that Serum Uric Acid levels are increased in hypertensive compared to normotensives.

**Keywords:** Hyperuricemia, Hypertension, Case control Study

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## INTRODUCTION

Hypertension is a major contributing risk factor for cerebral, Coronary and Peripheral vascular disease [1-5]. Uric acid is considered to be one of the important biochemical marker which is end product of Purine metabolism [6-8]. Although the raised serum uric acid and episodes of gout are occasionally attributable to therapy, asymptomatic hyperuricemia not infrequently precedes the diagnosis and treatment of essential hypertension[9]. Hyperuricemia observed in untreated hypertension may reflect the decrease in renal blood flow and early hypertensive nephrosclerosis[10]. However, antihypertensive drug regimens, especially those including diuretics, do confound the link between hypertension-associated morbidity and mortality[11].

## MATERIALS AND METHODS

A Prospective study was conducted at KIMS Hospital BANGALORE, between Dec 2018-may 2020. The study subjects were grouped into two categories as Cases (Hypertensive subjects) and Control (Normotensive) and 50 study subjects were enrolled in each group for the purpose of the study. Controls were patients without hypertension or any other condition known to cause hyperuricemia and were matched for age and sex with that of the cases.

Cases were selected based on the Inclusion and Exclusion Criteria

### Inclusion Criteria

- Age group between more than 40 Years.
- Stage 1 and stage 2 Hypertension according to JNC-VII without any target end organ damage.

### Exclusion Criteria

- Patients below 40 years were excluded
- Patients with renal failure
- Patients with secondary hypertension.
- Patients whom consumes alcohol regularly
- Patients on chemotherapy and antimetabolites.
- Clinical Findings of gout or extra- articular manifestations of Hyperuricemia.
- History of intake of drugs causing hyperuricemia.
- Pregnancy

### Methodology

Participants willing to participate in the study were selected after getting an informed and written consent from them. Clinical examination consisted of medical history, physical examination, blood pressure measurement and anthropometric measurements. Laboratory data included measurement of fasting serum uric acid levels and other parameters like Blood hemogram, Renal function tests (blood urea, serum creatinine), Electrocardiogram, Chest X-ray, Lipid profile (Total cholesterol, triglycerides, cholesterol, LDL-cholesterol), urine for protein and sugar. The patients were asked to fast for 12 hours and to avoid smoking and heavy physical exercise for more than 2 hours before the examinations. After a 5 min rest in a quiet room, systolic and diastolic blood pressures were measured in the sitting position twice at an interval of a five minutes on the left arm with a standard mercury sphygmomanometer on three separate occasions. Anthropometric measurements included height and body weight, which were measured while the subject was wearing light clothing without shoes. The body mass index was calculated as the weight in kilograms divided by the height in m<sup>2</sup>.

Hypertension was defined according to the JNC VII classification of hypertension as those with SBP of < 120 mm hg and DBP of < 80 mm hg as normal, those with SBP of 120- 139 mm hg or DBP of 80 - 89 mm hg were labelled pre-hypertensive were not taken up for the study, those with SBP 140 - 159 mm hg or DBP of 90 - 99 mm hg were labeled as having Stage 1 hypertension, and those with SBP ≥ 160 mm Hg or DBP ≥ 100 mm hg were labeled as Stage 2 hypertension[12].

The Sample for uric acid estimation was unhemolyzed serum or plasma separated from the cells as soon as possible. Uric acid is stable in serum or urine for 3 days at 20 – 25° C[13-15]. The intensity of chromogen (Quinonimine) formed is proportional to the uric acid concentration in the sample when measured at 510 nm (510 -550nm) on biochromatic analyzers against reagent blank. Reference Values for SUA levels - In Males: 3.4 - 7.0 mg/dL in females: 2.4 - 6.0 mg/Dl

**RESULTS AND DISCUSSION**

A total of 50 study subjects were analyzed in each group and comparison was drawn between the two groups.

The mean age of the study group was 52.96 ± 10.27 and in control group it was 52.44 ± 11.52. The Mean Serum Uric Acid was found to be 6.1 ± 1.38 in study group and 4.12 ± 1.07 in control group with significant statistical association between both the groups for uric acid. (TABLE 1).

**Table 1: Comparison of different parameters between hypertensive (cases) and normotensives (controls)**

	Group		p value
	Hypertensive Cases(n= 50)	Normotensive controls (n=50)	
Age(years)	52.96 ± 10.27	52.44 ± 11.52	0.812
Uric Acid (mg/dl)	6.1 ± 1.38	4.12 ± 1.07	< 0.001*
SBP	161.52 ± 5.74	112.94 ± 16.24	< 0.001*
DBP	101.44 ± 3.21	75.72 ± 2.39	< 0.001*
BMI	28.96 ± 29.75	22.11 ± 0.59	0.106
Hemoglobin	14.81 ± 17.46	11.84 ± 0.74	0.232
Sr. Creatinine(mg/dl)	2.73 ± 0.03	0.72 ± 0.23	0.279
RBS (mg/dl)	99.22 ± 14.53	97.55 ± 20.16	0.635
Female	20(40%)	20(40%)	NS
Male	30(60%)	30(60%)	NS
Dyslipidemia	25(50%)	13(26%)	NS
Proteinuria	12(24%)	6(12%)	NS
CRP	7(14%)	4(8%)	NS

NS – Not significant

The Systolic, Diastolic Blood pressure was found to be more among cases when compared with control with significant statistical association between both the group (TABLE 2). BMI was found to be more among subjects who had hypertension when compared with normotensive group with no significant statistically association.

**Table 2: Correlation between Blood pressure and serum uric acid among cases**

Correlations		
	R	P value
S. uric acid v/s SBP	0.166	0.249
S. uric acid v/s DBP	-0.96	0.506
'r' → Pearson's correlation coefficient.		

On Applying Pearson Correlation test between Serum Uric Acid levels and Systolic blood pressure it was found to be positively correlated with statistically insignificant p value of 0.249.(TABLE 3) Similarly, the diastolic blood pressure was negatively correlated with Serum uric acid with statically insignificant p value of 0.506.

**Table 3: Strength of association between hypertension and serum uric acid**

		Group			
		Cases		Controls	
		Count	%	Count	%
Hyperuricemia	Present	10	20.00%	2	4.0%
	Absent	40	80.00%	48	96.00%

$$\chi^2 = 6.061, df = 1, p = 0.014^*$$

In the present study hyperuricemia was seen in 20% of cases and in 4% of control group.

Elevated Uric acid levels have been associated with an increased risk for cardiovascular disease [1]. The potential mechanisms by which uric acid may directly because cardiovascular risk include enhanced platelet aggregation and inflammatory activation of the endothelium [1]. Hence in the present study the association and correlation between serum uric acid and hypertension was evaluated.

The Mean Serum Uric Acid levels was found to be  $6.10 \pm 1.38$  among the study subjects which was higher than the control group value of  $4.12 \pm 1.07$  and the difference of mean serum uric acid value was statistically significant. But overall 10 subjects (20%) of the subjects in study group had hyperuricemia and in control group 4% had hyperuricemia. In our study serum uric acid levels showed positive correlation with hypertension.

### CONCLUSION

The prevalence of Serum Uric Acid in our study was 20% in newly detected hypertensive patients. The study showed the Serum Uric Acid levels are increased in hypertensive compared to normotensives. With the results based on the study carried out we conclude that there is positive association between hyperuricemia and hypertension.

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