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RESEARCH ARTICLE

TO STUDY AND CORRELATE THE LEVELS OF SERUM URIC ACID IN PATIENTS WITH PRIMARY HYPERTENSION

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ABSTRACT

Introduction: The association between arterial hypertension (HT) and hyperuricemia is very common. It has been reported that 25-40% of patients with untreated HT and more than 80% of patients with malignant HT have high SUA levels. Hypertension has itself been recognized as an independent risk factor for cardiovascular mortality and morbidity. Normal values of serum uric acid for women are 2.5 to 7.5 milligrams/deciliter (mg/dL) and for men 4.0 to 8.5 mg/dL. SUA and blood pressure are such two indicate to a possible correlation between them which further needs to be elaborated in Indian scenario.

Materials and methods: This was a cross-sectional, observational, comparison study in the normotensive and hypertensive patients visiting medicine outpatient department at a tertiary healthcare setup. A total of 100 patients were studied. Patients were enrolled into two groups,

Group 1: Hypertension and group 2: Normal control. Each group was allotted 50 participants. The patients were included if they satisfied the JNC VII criteria for hypertension. They were excluded if they were having any other condition known to cause raised serum uric acid levels and secondary hypertension.

Results: With the result based on the study carried out we concluded that there can be a direct relation between hyperuricemia and hypertension. Also the study showed that the SUA levels were significantly increased in patient with stage 2 hypertension in comparison with those with stage 1 hypertension, showing that the severity of hypertension also related to the SUA levels.

Conclusions: Based on the study carried out we concluded that SUA can be used as an early biochemical marker to determine the severity and duration of hypertension.

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INTRODUCTION

The association between hyperuricemia and HT was more common in young people. The high SUA was observed in nearly 90% of adolescents with primary HT and the SUA level correlates with both systolic and diastolic HT. Factor Intervention (MRFIT) study, in normotensive men with the SUA level greater than 7 mg/dl there was an 80% increased risk for the development of HT. A robust evidence for the relationship between SUA and hypertension is deficient in Indian scenario and with this background we conducted a study to understand this relationship further in a tertiary healthcare setup in India. Hyperuricemia would become then a meaningful target for the prevention and treatment of cardiovascular disease.

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Aims and Objectives

- To study the levels of serum uric acid in primary hypertensive patients and compare with normal population.
- To correlate serum uric acid levels with severity and duration of primary hypertension
- To assess complications of hyperuricemia in primary hypertension compared to normal population

METHODS

Study design: This was a cross-sectional, observational, comparison study in the normotensive and hypertensive patients visiting medicine outpatient department at a tertiary healthcare setup. The study was conducted after the formal approval from institutional ethics committee and were carried out in compliance with ICH-GCP guidelines.

Study population: The patients were screened at the outpatient department. Patients were enrolled into two groups, Group 1: Hypertension and group 2: Normal control. Each group was allotted 50 participants.

Inclusion criteria: The patients for group 1 (hypertension) were selected based on following criteria.

- Age between 18-65 years of age
- Diagnosed cases of primary hypertension currently on or without antihypertension treatment

Exclusion criteria

- Current/ past history of renal disorders
- Current/ past history of gout
- Current/ past history of comorbid conditions of diabetes, other cardiovascular or neurovascular events
- Patients with known history of alcoholism, renal disease and pre-eclampsic toxemia
- Present or past history of autoimmune diseases
- Patients consuming concomitant medications known to affect serum uric acid levels (e.g. thiazide diuretics)
- Pregnant and lactating females

Study Procedures

- Patients providing informed consent for participation were enrolled and allotted Group 1 or Group 2 based on eligibility
- A demographic profile of patients was obtained based upon age, gender, year since diagnosis of hypertension (group 1), history of any medical or surgical illness in past, laboratory abnormalities, history of arthritis and obstetric history.

Statistical analysis

- The Odds Ratio was calculated for the risk factors for comparison between two groups. Chi Square test was performed for the comparison of proportions between two groups.
- Unpaired t test was used for comparison of parametric variables between the two groups.
- For correlation analysis of blood pressure with serum uric acid in group 1, coefficient (Spearman's) was calculated. The strength of correlation was decided based on correlation coefficient as : 1) >0.75 : Strong 2) 0.5 to 0.75: Moderate 3) 0.25 to 0.5: Mild
- p value of less than 0.05 was considered significant.

RESULTS

After obtaining the informed consent and reviewing the study enrollment eligibility criteria, we recruited a total of 50 patients each in Group 1 (hypertension) and group 2 (Control). The baseline demographic characteristics of the study population are described in the Table1. The mean serum uric acid level in hypertension (group 1) group was 6.1 ± 1.8 mg/dl compared to a mean of 4.5 ± 1.1 mg/dl in the control group. The p value for this comparison was 0.0102 suggesting statistical significance Table 2 & Figure1. There were a total of 13 patients in Group 1 and 4 patients in Group 2 with serum uric acid levels more than the laboratory specified normal reference range. The Odds ratio for this relationship was 4.02.

Table 1. Demographic profile of the study groups

	Group 1 (Hypertension)	Group 2 (Control)
Gender	Male: 31 (62%) Female: 19 (38%)	Male: 28 (56%) Female: 22 (44%)
Mean Age	50.2 ± 16.4 years	44.5 ± 12.9 years

The group 1 included 62% males and 38% female patients while group 2 included 56% male and 44% female patients.

Serum Uric acid Profile in the study groups

Table 2. Serum Uric acid profile of the study population

	Group 1	Group 2
Mean Serum Uric Acid	6.1 ± 1.8 mg/dl	4.5 ± 1.1 mg/dl
95% Confidence interval	2.5 to 9.7 mg/dl	2.3 to 6.7 mg/dl
p value (Unpaired t test)	0.0102	

The mean serum uric acid level in hypertension (group 1) group was 6.1 ± 1.8 mg/dl compared to a mean of 4.5 ± 1.1 mg/dl in the control group. The p value for this comparison was 0.0102 suggesting statistical significance.

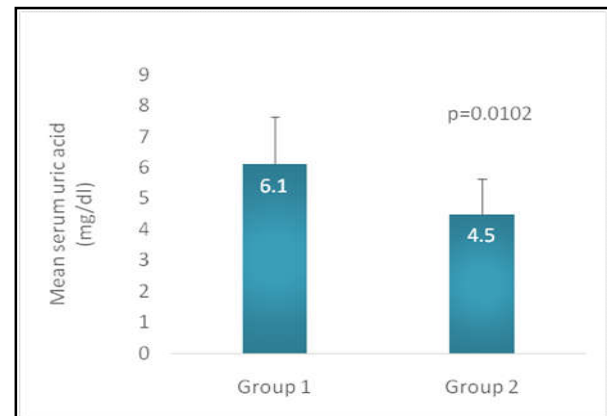


Figure 1. Serum uric acid levels (mean) in study population

There were a total of 13 patients in Group 1 and 4 patients in Group 2 with serum uric acid levels more than the laboratory specified normal reference range. The Odds ratio for this relationship was 4.02.

Table 3. Incidence of hyperuricemia in study population

	Group 1	Group 2
Normal SUA	37 (74%)	46 (92%)
Hyperuricemia	13 (26%)	4(%)

We performed the Pearson's correlation analysis between SBP, DABP, duration of hypertension with serum uric acid. The observations are described below. The scatter plot represented below demonstrates correlation trend between systolic Blood Pressure and Serum uric acid. The serum uric acid can be seen to be following a linear up curve in relation to systolic blood pressure. The Pearson's correlation coefficient was 0.712, 0.477 and 0.735 for correlation of serum uric acid with SBP, DBP and duration of hypertension respectively. As shown in the figure below, this correlation was of moderate strength for systolic blood pressure and duration of hypertension while the correlation was mild with diastolic blood pressure. Figure2.

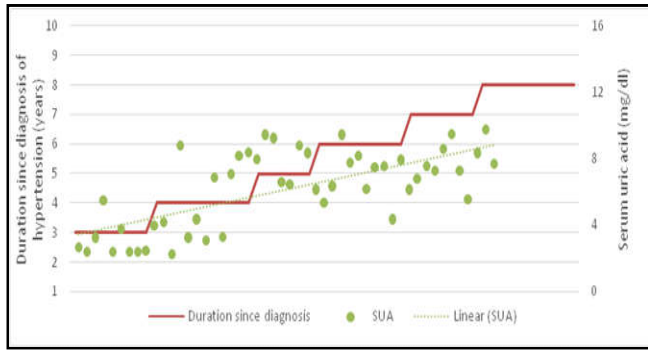


Figure 2. Correlation trend between duration since diagnosis and Serum uric acid (Scatter plot, represented in ascending order of Duration since diagnosis of hypertension)

The Pearson's correlation coefficient was 0.712, 0.477 and 0.735 for correlation of serum uric acid with SBP, DBP and duration of hypertension respectively.

Conclusion

The serum uric levels increase with the duration of hypertension and also with systolic as well as diastolic blood pressure. This correlation is of moderate strength. The raised serum uric acid may increase the vascular events in the patients with hypertension. Screening of patients of hypertension for serum uric acid may help in indicating the control of hypertension and severity. Based on the study carried out it is concluded that SUA can be used as an biochemical marker to determine the severity and duration of hypertension.

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