



A STUDY OF SERUM URIC ACID LEVELS IN NEWLY DIAGNOSED CASES OF ESSENTIAL HYPERTENSION

Medicine

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ABSTRACT

Background: The association of raised serum uric acid levels with various cardiovascular risk factors has often led to the debate of whether raised serum uric acid levels could be an independent risk factor in essential hypertension. Hence, the present study was conducted for assessing the serum uric acid levels in cases of essential hypertension and comparing them with normal healthy, non-hypertensive controls. **Materials & Methods:** Sixty patients visiting in the department of general medicine, MMIMSR with newly diagnosed cases of essential hypertension [according to the Indian guidelines on Hypertension (IGH) III-2013], fulfilling the inclusion criteria and after verifying the exclusion criteria were finally taken up for the study. Sixty controls of age and sex matched were taken from the same catchment area. **Results:** The mean age of the subjects of the essential hypertension group and control group was found to be 45.75 years and 47.8 years respectively. Mean systolic blood pressure and diastolic blood pressure among the subjects of the essential hypertension group was 161.3 and 102.3 mm of Hg. Mean systolic blood pressure and diastolic blood pressure among the subjects of the control group was 116.8 and 77.4 mm of Hg. Mean serum uric acid levels among the subjects of the essential hypertension group and control group was found to be 6.45 mg/dL and 5.57 mg/dL respectively. Significant results were obtained while comparing the mean serum uric acid levels among the subjects of the essential hypertension group and the control group. Hyperuricemia was present in 38.33 percent of the patients (23 patients) of the essential hypertension group and 13.33 percent of the patients (8 patients) of the control group. Significant results were obtained while comparing the prevalence of hyperuricemia in between the two study groups. **Conclusion:** An independent relationship of elevated serum uric acid levels with hypertension and indicates the significance of maintaining normal serum uric acid concentration to prevent hypertension.

KEYWORDS

Blood pressure, Hypertension, Uric acid

INTRODUCTION

High blood pressure (BP) is ranked as the third most important risk factor for attributable burden of disease in south Asia. Hypertension (HTN) exerts a substantial public health burden on cardiovascular health status and healthcare systems in India. 57% of all stroke deaths are accredited to HTN while HTN is also directly responsible for 24% of all coronary heart disease (CHD) deaths in India.¹ The WHO rates HTN as one of the most important causes of premature death worldwide. The Global and Regional Burden of Disease and Risk Factors study, in a systematic analysis of population health data for attributable deaths and attributable disease burden, has ranked HTN in south Asia as second only to child underweight for age.²

Uric acid (UA) represents the final product of purine metabolism, in humans mainly regulated by the xanthine-oxidoreductase enzyme, which converts hypoxanthine to xanthine and xanthine to UA. Dietary factors may influence serum UA (SUA), increasing its levels (meat, seafood, fructose, alcohol and sodium) or decreasing them (coffee and ascorbic acid). In addition, high cellular turnover conditions, i.e. in neoplastic diseases, may increase UA concentration.³

UA may have an opposite role to oxidative stress, according to its intracellular (anti-oxidant) and extracellular (pro-oxidant) localization. The xanthine-oxidoreductase enzyme isoform xanthine-oxidase (XO) generates reactive oxygen species (ROS) as byproducts and may have a detrimental effect on vascular endothelium. The production of ROS induced by UA seems paradoxical since UA is known as a suspected anti-oxidant which prevent the stress to affect the cardiac and vascular system.⁴ Hence; the present study was conducted for assessing the serum uric acid levels in newly diagnosed cases of essential hypertension and comparing them with normal healthy, non-hypertensive controls.

Materials & Methods

This study was conducted in the department of General medicine, MMIMSR, Mullana, Ambala. Sixty patients visiting in the department of general medicine, MMIMSR with newly diagnosed cases of

essential hypertension according to the Indian guidelines on Hypertension (IGH) III-2013] were considered for the study. The patients fulfilling the inclusion criteria and after verifying the exclusion criteria were finally taken up for the study. Sixty controls of age and sex matched were taken from the same catchment area. All study members including cases and controls were chosen according to compliance with inclusion and exclusion criteria. All study members were given detailed explanation of the study in their understandable language before obtaining their informed consent for involvement in study and for venipuncture.

S. Uric acid was detected by URCA method which is a modification of Uricase method. Apart from serum uric acid assessment, all patients and controls underwent following laboratory investigations such as complete haemogram, fasting blood sugar, liver function test, blood urea, creatinine, routine and microscopic examination of urine, chest x ray, Ultrasonography of abdomen, electrocardiography, serum electrolytes, total cholesterol, HDL-Cholesterol, LDL-Cholesterol, Triglyceride. The data was entered in MS EXCEL spreadsheet and analysis was done using Statistical Package for Social Sciences (SPSS) version 21.0.

RESULTS

Table I shows that mean age of the subjects of the essential hypertension group and control group was found to be 45.75 years and 47.8 years respectively. In the essential hypertension group, 31.67 percent of the patients (19 patients) and 26.67 percent of the patients (16 patients) belonged to the age group of 51 to 60 years and 41 to 50 years respectively. In the control group, 31.67 percent of the patients (17 patients) and 28.33 percent of the patients (17 patients) belonged to the age group of 51 to 60 years and 41 to 50 years respectively. Non-significant results were obtained while comparing the age-wise distribution of patients between the two study groups.

Table II shows that in the essential hypertension group, 61.67 percent of the patients (37 patients) had stage II hypertension while the remaining 38.33 percent of the patients (23 patients) had stage I

hypertension.

Table III shows mean serum uric acid levels among the subjects of the essential hypertension group and control group was found to be 6.45 mg/dL and 5.57 mg/dL respectively. Significant results were obtained while comparing the mean serum uric acid levels among the subjects of the essential hypertension group and the control group.

Table IV shows that mean serum uric acid levels among the subjects of essential hypertension group with stage I and stage II hypertension was found to be 6 mg/dL and 6.94c respectively. While comparing statistically, significant results were obtained.

Graph I shows that hyperuricemia was present in 38.33 percent of the patients (23 patients) of the essential hypertension group and 13.33 percent of the patients (8 patients) of the control group. Significant results were obtained while comparing the prevalence of hyperuricemia in between the two study groups.

DISCUSSION

Uric acid was first discovered in 1776 by a Swedish chemist Scheele. Scheele isolated it from a urinary tract stone. It serves no biochemical function other than being an end product of purine metabolism. In 1797, uric acid was detected in a tophus by a British chemist Wallaston, which was removed from his own ear.³ Hypertension is the third leading cause of mortality worldwide and approximately 12.5% of all deaths are attributed to it worldwide. It affects about 1 billion people worldwide. With advancing age, risk of developing hypertension also increases. More than half of individuals in their seventh decade of life (60-69 years) and more than three fourth of those aged 70 years and older are affected. The present study was undertaken for assessing the serum uric acid levels in newly diagnosed cases of essential hypertension and to compare them with normal healthy, non-hypertensive controls.

We found that the mean age of the subjects of the essential hypertension group and control group was found to be 45.75 years and 47.8 years respectively. In the essential hypertension group, 31.67 percent of the patients (19 patients) and 26.67 percent of the patients (16 patients) belonged to the age group of 51 to 60 years and 41 to 50 years respectively. In the control group, 31.67 percent of the patients (17 patients) and 28.33 percent of the patients (17 patients) belonged to the age group of 51 to 60 years and 41 to 50 years respectively. Ahammed SKK et al⁶, mean age of the subjects of the essential hypertension group and control group was 50.63 years and 48.96 years respectively.

We found that in the essential hypertension group, 63.33 percent of the subjects (38 subjects) were males while the remaining 36.67 percent of the subjects (22 subjects) were females. In the control group, 66.67 percent of the subjects (40 subjects) were males while the remaining 33.33 percent of the subjects (20 subjects) were females. Parveen M et al⁷, 62.5 percent of the subjects of the essential hypertension group and 72.5 percent of the subjects of the control group were males.

We found that mean systolic blood pressure and diastolic blood pressure among the subjects of the essential hypertension group was 161.3 and 102.3 mm of Hg. Mean systolic blood pressure and diastolic blood pressure among the subjects of the control group was 116.8 and 77.4 mm of Hg. Mean systolic and diastolic blood pressure among the subjects of the essential hypertension group was significantly higher in comparison to the subjects of the control group. Mean systolic and diastolic blood pressure among the subjects of the essential hypertension group and the control group in the study conducted by Shrivastav C et al⁸ was 160.04, 92, 114.06 and 74.66 mm of Hg respectively. We found that mean serum uric acid levels among the subjects of the essential hypertension group and control group was found to be 6.45 mg/dL and 5.57 mg/dL respectively. Mean serum uric acid levels among the patients of the essential hypertension group and the control group in the study conducted by Sundaram PRM et al⁹ were found to be 6.4 mg/dL and 5.2 mg/dL respectively.

We found that mean serum uric acid levels among the subjects of essential hypertension group with stage I and stage II hypertension was found to be 6 mg/dL and 6.94c respectively. While comparing statistically, significant results were obtained. Our results were in concordance with the results obtained by Sundaram PRM et al.⁹

We observed that hyperuricemia was present in 38.33 percent of the patients (23 patients) of the essential hypertension group and 13.33 percent of the patients (8 patients) of the control group. Significant results were obtained while comparing the prevalence of hyperuricemia in between the two study groups. Our results were in concordance with the results obtained by Sundaram PRM et al.⁹

This infers that dyslipidemia is related to rise of serum uric acid levels in hypertensive group, where as in control group no such relation between dyslipidemia and uric acid levels were observed. This clearly denotes the correlation of serum uric acid and dyslipidemia in essential hypertension is due to lipid deposition in lumen of arterial wall, causing atherosclerosis.¹⁰ This increases the resistance to flow of blood in blood vessel, causing hypertension. HDL-Cholesterol also diminishes the endothelium dependent dilation. HDL-cholesterol, which plays a protective role against atherosclerosis, is also decreased in hypertensive, suggesting more risk of developing complication of hypercholesterolemia.¹¹ Elevated cholesterol levels influence adrenergic stimulation and outcome of target organ damage is more in hypertensive. LDL-cholesterol is vasoconstrictor, mitogenic, proinflammatory and thrombogenic. So, its elevated levels are also considered to be responsible for increased risk of developing complication in cases of hypertension.¹²

Uric acid is an independent risk factor for atherosclerosis. Decreased renal perfusion due to hypertension can affect uric acid secretion by kidney. Association of endothelial dysfunction has also been observed in hypertensive complications like CCF, heart failure usually due to dyslipidemia and raised uric acid.^{13,14}

CONCLUSION

Authors suggest an independent relationship of elevated serum uric acid levels with hypertension and indicate the significance of maintaining normal serum uric acid concentration to prevent hypertension. Early and proper management of serum uric acid levels, as well as blood pressure, may be useful in preventing the development of future CVDs.

Table I Age-wise distribution of patients

Age group (years)	Essential hypertension patients		Controls		P value
	Number	Percentage	Number	Percentage	
Less than 20	1	1.67	1	1.67	0.77
20 to 30	8	13.33	7	11.67	
31 to 40	9	15	7	11.67	
41 to 50	16	26.67	17	28.33	
51 to 60	19	31.67	19	31.67	
More than 60	7	11.67	9	15.00	
Total	60	100	60	1.67	
Mean ±SD	45.75±12.55		47.8±12.21		

Table II Distribution of patients of hypertension group according to the stages of hypertension

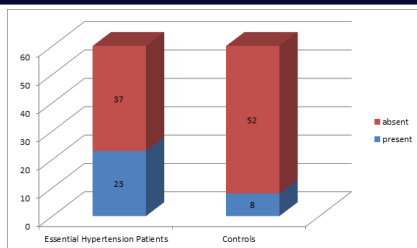
Stage of hypertension	Essential hypertension group	
	Number	Percentage
STAGE I	23	38.33
STAGE II	37	61.67
TOTAL	60	100

Table III Comparison of mean serum uric acid levels

PARAMETER	ESSENTIAL HYPERTENSION		CONTROLS		P-VALUE
	MEAN	SD	MEAN	SD	
Uric Acid(mg/dL)	6.45	1.54	5.57	1.21	0.010

Table IV Comparison of mean serum uric acid levels among essential hypertension group divided on the basis of stages of hypertension

PARAMETER	ESSENTIAL HYPERTENSION PATIENTS		P-VALUE
	MEAN	SD	
STAGE I	6.00	1.59	0.019
STAGE II	6.94	1.44	



GRAPH 1 Prevalence of Hyperuricemia

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