ORIGINAL RESEARCH

Correlation study between serum uric acid and lipid profile in patients with essential hypertension

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ABSTRACT

Background: Hypertension ranks among the most common chronic medical condition characterized by a persistent elevation in arterial pressure. Despite many theories of serum uric acid elevation, no solely reliable cause has been established, but it could be assumed that serum uric acid elevation is due to renal uric acid transport impairment. Hence; the present study was conducted for assessing the Correlation between serum uric acid and lipid profile in patients with essential hypertension. **Materials & methods:** A total of 100 patients with confirmed diagnosis of essential hypertension were enrolled. Complete demographic and clinical details of all the patients was obtained. All the patients were kept on overnight fasting and were recalled in the morning. Blood samples were taken and were sent to lab. Serum uric acid and lipid profile was evaluated using an auto-analyzer. All the results were recorded in Microsoft excel sheet and were subjected to statistical analysis using SPSS software. **Results:** Mean total cholesterol levels, mean HDL, mean LDL, mean triglycerides and mean uric acid levels were found to be 183.3 mg/dL, 43.9 mg/dL, 98.1 mg/dL, 161.7 mg/dL and 6.2 mg/dL respectively. Significant results were obtained while correlating serum uric acid levels with lipid profile among essential hypertension patients. **Conclusion:** It was shown that there is a strong correlation between uric acid and hypertension. Reducing the occurrence of hypertension may be possible by controlling hyper- and dyslipidemia with dietary modifications and medicines.

Key words: Lipid, Uric Acid, Hypertension

INTRODUCTION

The current definition of hypertension (HTN) is systolic blood pressure (SBP) values of 130 mm Hg or more and/or diastolic blood pressure (DBP) of more than 80 mm Hg. Hypertension ranks among the most common chronic medical condition characterized by a persistent elevation in arterial pressure.Hypertension has been among the most studied topics of the previous century and has been one of the most significant comorbidities contributing to the development of stroke, myocardial infarction, heart failure, and renal failure. The definition and categories of hypertension have been evolving over the years, but there is a consensus that persistent BP readings of 140/90 mm Hg or more should undergo treatment with the usual therapeutic target of 130/80 mm Hg or less.[1, 2]

A century of epidemiological, clinical, and physiological research in humans and animals has provided remarkable insights on the relationships existing between dietary salt (sodium chloride), renal sodium handling, and blood pressure. The evidence points to a causal link between a chronically high salt intake and the development of hypertension, when the kidneys are unable to excrete the ingested amount of sodium unless blood pressure is increased. In conjunction with this primary causal factor, a number of adjunctive factors, such as obesity, diabetes, aging, emotional stress, sedentary life style, and low potassium intake, may increase the probability of developing hypertension.[3, 4]

Despite many theories of serum uric acid elevation, no solely reliable cause has been established, but it could be assumed that serum uric acid elevation is due to renal uric acid transport impairment and so, hyperuricemia is suggested as an indicator of renal damage in hypertension.[5, 6] Hence; the present study was conducted for assessing the Correlation between

serum uric acid and lipid profile in patients with essential hypertension.

MATERIALS & METHODS

The present study was conducted for assessing the Correlation between serum uric acid and lipid profile in patients with essential hypertension. A total of 100 patients with confirmed diagnosis of essential hypertension were enrolled. Complete demographic and clinical details of all the patients was obtained. All the patients were kept on overnight fasting and were recalled in the morning. Blood samples were taken and were sent to lab. Serum uric acid and lipid profile was evaluated using an auto-analyzer. All the results were recorded in Microsoft excel sheet and were subjected to statistical analysis using SPSS software. Chi-square test and univariate analysis was done for evaluation of level of significance.

RESULTS

Mean age of the patients was 43.9 years. 59 percent of the patients were males while the remaining were females. Majority proportion of patients were of rural residence. Mean total cholesterol levels, mean HDL, mean LDL, mean triglycerides and mean uric acid levels were found to be 183.3 mg/dL, 43.9 mg/dL, 98.1 mg/dL, 161.7 mg/dL and 6.2 mg/dL respectively. Significant results were obtained while correlating serum uric acid levels with lipid profile among essential hypertension patients.

Table 1: Demographic data

Variable	Number	Percentage
Mean age	43.9 years	
Gender: Male	59	59
Gender: Female	41	41
Residence: Rural	62	62
Residence: Urban	38	38

Table 2: Biochemical profile

Variable	Mean	SD
Total cholesterol (mg/dL)	183.3	31.7
HDL (mg/dL)	43.9	6.8
LDL (mg/dL)	98.1	13.5
Triglycerides (mg/dL)	161.7	43.2
Uric acid (mg/dL)	6.2	0.94

Table 3: Correlation of uric acid and lipid profile (Pearson's correlation)

Serum uric acid levels Vs	r-value	p-value
Total cholesterol (mg/dL)	-1.221	0.001 (Significant)
HDL (mg/dL)	-0.398	0.001 (Significant)
LDL (mg/dL)	-2.113	0.001 (Significant)
Triglycerides (mg/dL)	-0.846	0.001 (Significant)

DISCUSSION

Essential hypertension accounts for more than 90% of all hypertensive patients, but the exact underlying mechanisms remain ambiguous. The present treatment of essential hypertension mainly based on long-term BP control but not curing the disease, which relies a lot on the patient's financial status and adherence to treatment. Therefore, the investigation of the causative mechanism has been the key research direction of essential hypertension.A variety of environmental factors, such as smoking, socioeconomic status, stress, high salt diets, obesity and vitamin D deficiency, have been shown to play roles in the pathogenesis of EH. These factors cause EH through epigenetic and genetic interaction, or by the induction of specific gene expression. While the exact mechanisms by which environmental factors cause EH are not clear, recent research has provided exciting clues shedding light on the mechanisms of salt and vitamin D deficiency-induced hypertension.[7-9]

In humans, serum uric acid (SUA) is the final oxidation product of purine catabolism. Excessive uric acid production and its decreased excretion by the kidneys are one of the major causes of hyperuricemia. The prevalence of hyperuricemia is rapidly increasing in the international communities; emerging evidence shows that hyperuicemia is now more frequent in the developing nations. The variability in SUA levels is multi-factorial and influenced by both genetic and environmental factors.[10-12]

Mean age of the patients was 43.9 years. 59 percent of the patients were males while the remaining were females. Majority proportion of patients were of rural residence. Mean total cholesterol levels, mean HDL, mean LDL, mean triglycerides and mean uric acid levels were found to be 183.3 mg/dL, 43.9 mg/dL, 98.1 mg/dL, 161.7 mg/dL and 6.2 mg/dL respectively. Significant results were obtained while correlating

serum uric acid levels with lipid profile among essential hypertension patients. The link of between hyperuricemia and CVD has been established in several studies. Hyperuricemia predisposes to the development of hypertension and may increase the oxidative stress and generate of free radicals, which eventually can be the source of future cardiovascular disease. Although it still needs to be investigated whether the observed relationship between increased SUA and CVD is a causative or simply epidemiological; several lines of evidence report that determination of uric acid in serum or plasma might be helpful in early predict the risk of CVD.[13, 14] Kim YH et al evaluated the relationship of hyperuricemia and essential hypertension. They studied serum uric acid in 139 patients with essential hypertension and analyzed its values in terms of various clinical and laboratory parameters.The mean concentration of serum uric acid and incidence of hyperuricemia in essential hypertension were 6.60 ± 1.96 mg%, 57.9% and those of the normal control group were 3.87 ± 1.30 mg%, 17.8%, respectively with significantly higher values in the hypertension group. The mean concentration of serum uric acid and the incidence of hyperuricemia were significantly correlated with the levels of diastolic blood pressure, mean arterial pressure, BUN, and serum creatinine. Significant correlation between the mean concentration of serum uric acid and the extent of target organ damage and abnormal urine findings were observed.[15]Ali N et al evaluated the association of SUA with hypertension among Bangladeshi adults. Blood samples were obtained from 140 males and 115 females and analyzed for SUA and lipid levels. The prevalence of hypertension and prehypertension was significantly higher in male (15.4 and 47.6%, respectively) than in the female (5.6 and 33.4%, respectively) subjects ($p < 0.01$). Males had a higher mean level of SUA (310.7 ± 67.9 μmol/L) than in the females (255.3 ± 69.3 μmol/L) ($p < 0.001$). Hyperuricemia was prevalent 9.1% in males and 10.3% in females. An increasing trend for hypertension and prehypertension was found in both genders with increasing SUA levels in the quartiles ($p < 0.01$). SUA levels in the quartiles were positively correlated with blood pressure ($p < 0.01$). After adjusting for baseline covariates, SUA levels were significantly associated with hypertension ($p < 0.01$).[16]

CONCLUSION

It was shown that there is a strong correlation between uric acid and hypertension. Reducing the occurrence of hypertension may be possible by controlling hyper- and dyslipidemia with dietary modifications and medicines.

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