Hypertension and Hyperuricemia: A Compelling Correlation

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Introduction

Hypertension is a public health issue worldwide. A recent analysis of data from 154 countries involving ~87 lakh individuals by Forouzanfar et al estimated that in 2015, 87.4 crore adults had a systolic blood pressure (SBP) of ≥140mmHg. In India, current reports estimate that nearly 3 out of every 10 adults suffer from hypertension with an estimated prevalence of 22.9% in men and 23.6% women by 2025. Reports state that every 20 mmHg and 10 mmHg increase in SBP and diastolic blood pressure (DBP), respectively, results in twice the risk of death from heart disease, stroke or other vascular disease.

According to the 2017 India: Health of the Nation’s States report jointly prepared by the Indian Council of Medical Research (ICMR), Public Health Foundation of India (PHFI) and Institute for Health Metrics and Evaluation (IHME), hypertension was the risk factor that caused 8.5% of all disability-adjusted life years (DALYs) with ischaemic heart disease and stroke causing 8.7% and 3.5% of all DALYs in 2016. The long-term disease burden of hypertension makes it imperative to assess the risk factors which contribute to its increased prevalence.

Hypertension and Uric Acid

Though several modifiable risk factors for hypertension are well-known, novel risk factors such as hyperuricemia, which is often accompanied by hypertension and other metabolic disorders, are also being evaluated to optimise treatment. Hyperuricemia is defined as serum uric acid (SUA) levels >6.8mg/dl. It is commonly caused by a detrimental lifestyle including a diet with excessive protein, purine nucleotides, carbohydrates and alcohol intake. Moreover, certain drugs such as thiazides and other diuretics also reduce uric acid excretion leading to enhanced SUA levels. The association between hypertension and hyperuricemia was noticed in late 1800s and the theory that uric acid may be a vital component in the development of hypertension was given credence by several large epidemiological studies which showed that hyperuricemia increased the risk of hypertension by 1.2 to 3-fold, even after adjustment for several common risk factors. Moreover, hyperuricemia was associated with incident hypertension in both men and women.

Hypertension and Hyperuricemia

The association between hyperuricemia and hypertension has been evaluated in several studies. An analysis of the prevalence of hyperuricemia in newly-diagnosed hypertensives could help in enhanced understanding of the disease and its progression. In this issue, Agarwal et al have explored this relationship and have conducted an observational case control study in the Department of Medicine, Dr. Rajendra Prasad Government Medical College, Kangra in the sub-Himalayan region of North India on newly-diagnosed adult hypertensive patients along with age and sex-matched normotensive controls. Overall, 40 males and 60 females were included in the study. Patients with conditions or medications which could increase SUA levels such as secondary hypertension, diabetes, gout, alcohol abuse, hypothyroidism, hyperparathyroidism, ischemic heart disease, congestive cardiac failure, chronic kidney disease, any acute illness, pregnancy and steroidal medications were excluded. The normotensive controls were not on any medication. Blood pressure was measured and classified as per the Joint National Committee (JNC) guidelines and SUA was measured by the Uricase method. Fasting blood glucose and lipid levels were also measured. Both the cases and the controls were similar with respect to their family history of hypertension, body mass index (BMI), waist-hip ratio (WHR), fasting blood glucose (FBG) and lipid variables. In the female cases vs controls, there were more smokers and there was a greater prevalence of family history of hypertension.

The overall prevalence of hyperuricemia was significantly higher among the cases (24%) than the controls (6%). Mean SUA levels
were also significantly higher in cases than in controls. Moreover, the odds ratio for the hyperuricemic hypertensives versus hyperuricemic normotensives was 4.9 indicating a robust positive association between hypertension and hyperuricemia.

Significantly higher hyperuricemia prevalence for newly-diagnosed cases vs controls was also observed by Poudel et al (28.8% vs 13.7%).

Shrivastav et al (37.33% vs 14%) and Mishra et al (26% vs 6%).

Mean SUA levels (mg/dl) were also significantly higher in newly-diagnosed hypertensive cases vs controls but varied across the studies.10-12

Gender-based differences in hyperuricemia prevalence was also evaluated by Agarwal et al Overall, the mean SUA level was significantly higher in the male vs female cases. Also, amongst the cases, significantly higher number of males (40%) vs females (13.3%) were hyperuricemic. The prevalence of hyperuricemia in male cases was 4 times that in male controls. Also, mean SUA levels were significantly higher in the male cases vs male controls. On the other hand, mean SUA in female cases was not significantly different from the female controls. However, the authors suggest that this could partly be due to the uricosuric action of oestrogen.

Therapeutic Implications

Though the increase in SUA has been correlated with increased risk for metabolic syndrome in several studies, but in the study done by Agarwal et al there was no significant difference between the cases and control groups with respect to body mass index and fasting lipid profile. Thus hyperuricemia-hypertension risk correlation in this study were irrespective of the presence of metabolic syndrome. Xanthine oxidase inhibitors, which help in reducing uric acid levels, have also been found to reduce blood pressure and may help in the treatment of hyperuricemic hypertensives.

The key points brought to light by this study are:

1. There is a strong correlation between hyperuricemia and hypertension in even newly-diagnosed hypertensive patients – Monitor BP in all patients with Hyperurecaemia/ Gout, similarly monitor SUA levels in all patients with Hypertension

2. A greater prevalence of hyperuricemia is observed in both male and female hypertensives compared to normotensive individuals and

3. The relationship between hyperuricemia and hypertension exists irrespective of the presence of the metabolic syndrome.

Summary

The long-term effects of hypertension are well-known and India is especially vulnerable to its impact. Since SUA levels are strongly correlated with hypertension, evaluation of SUA levels in patients at risk for hypertension and in those suffering from hypertension should be done as early as possible in the course of the disease. Treatment of hyperuricemia in hypertension with appropriate therapy may thus be a valuable addition to its management.

References


5. Indian Council of Medical Research, Public Health Foundation of India and Institute for Health Metrics and Evaluation. India: Health of the Nation's States - The India State-Level Disease Burden Initiative. New Delhi, India; ICMR, PHFI and IHME; 2017.


