



A Study of Serum Uric Acid Level in Patients With Essential Hypertension

KEYWORDS

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ABSTRACT Elevated serum uric acid has been reported to be associated with an increased risk of coronary heart disease and is commonly encountered with essential hypertension, including untreated hypertension and type 2 diabetes mellitus, which are in turn associated with coronary heart disease. A case control study was conducted at Government General Hospital, Department of Biochemistry, Rajiv Gandhi Institute of Medical Sciences, Ongole.

Materials: A total of 400 patients were studied of which 200 patients were cases that were categorized into Stage 1 or Stage 2 hypertension (based on JNC VII classification) and 200 were controls who were patients without hypertension (HTN) or any other condition known to cause raised serum uric acid levels.

Results: It was observed that the value of mean SUA (serum uric acid) was 5.8 mg% significantly more in cases than that was in control group 4.4mg%. This value rises with the duration & the severity of HTN. It is evident by mean values of SUA, in the form of 5.3mg% & 6.3mg% respectively in cases of stage-1 & stage-2 HTN and 4.9mg% & 6.9mg% in <5years & >5 years of HTN.

Conclusion: Serum Uric Acid can be used as a biochemical marker to determine the severity and duration of hypertension.

INTRODUCTION

Hypertension is the third leading killer disease in the world and is responsible for 1 in every 8 deaths. About 1 billion people are affected by hypertension worldwide¹. Hypertension is a major public health problem in India and other countries as well. There is strong positive and continuous correlation between BP and the risk of cardiovascular disease (myocardial infarction, heart failure), renal disease, stroke and mortality. This correlation is more robust with systolic than with diastolic BP². Hyperuricemia predicts mortality in patients with heart failure or coronary heart disease, cerebrovascular events in individuals with diabetes and cardiac ischemia in hypertension³.

Serum uric acid was first noted to be associated with increased BP by Frederick Mohamed in the 1870s⁴. The mechanism(s) by which UA may engender organ damage is still incompletely understood, but there is increasing evidence that endothelial dysfunction is a fundamental mechanism whereby this substance may affect cardiovascular and renal function and structure⁵.

MATERIAL & METHODS

This case control study was conducted in Government General Hospital, Department of Biochemistry, Rajiv Gandhi Institute of Medical Sciences, Ongole. A total of 400 patients were studied of which 200 essential hypertensive patients were cases that were categorized into Stage 1 or Stage 2 hypertension (base on JNC VII classification) and 200 were controls who were patients without hypertension. Patients with secondary hypertension, CCF, renal failure, conditions known to cause raised serum uric acid levels were not included in the study.

RESULTS

It was observed that the value of mean SUA (serum uric acid) was 5.8 mg% significantly more in cases than that was in control group 4.4mg%. This value rises with the duration and the severity of hypertension. It is evident by

mean values of SUA, which are 5.37mg% and 6.39mg% respectively in stage-1 & stage-2 HTN and 4.94mg% & 6.93mg% in <5years & >5 years of Hypertension. (Table 1).

Category	Number	Mean SUA \pm SD
Cases	200	5.888 \pm 1.380
Controls	200	4.476 \pm 1.047
Stage 1	107	5.377 \pm 1.168
Stage 2	93	6.395 \pm 1.385
<5 years	106	4.940 \pm 0.830
>5 years	94	6.936 \pm 1.077

Table 1: Mean serum uric acid in study patients.

Discussion:

Elevated SUA levels have been associated with an increased risk for cardiovascular disease. The potential mechanisms by which SUA may directly affect cardiovascular risk include enhanced platelet aggregation and inflammatory activation of the endothelium⁶.

Because elevated serum uric acid is correlated with several risk factors including renal dysfunction, hypertension, insulin resistance, hyper-homocystenemia and hyperlipidemia, it is debated whether SUA is an independent cardiovascular risk factor⁷⁻⁹. In our study the prevalence of hyperuricemia in controls was 17% and cases was 37%. Various other studies have also shown that increased SUA levels were seen in hypertensive patients. Kinsey in his study with 400 hypertensive patients reported a 46% incidence of hyperuricemia in hypertensives⁶. Kolbe in his study of 46 hypertensive patients found 26 to be having increased SUA levels (56%)¹⁰. Kashem et al had hyperuricemia in 24% of cases¹¹.

In our study the mean serum uric acid in cases was 5.8 \pm 1.3 which was close to the results of Perlstein et al¹², Strassak et al¹³ and Kashem et al¹¹. They found mean uric acid level 5.8 \pm 0.9 mg/dl, 5.7 \pm 1.2 mg/dl and 5.8 \pm 1.5mg/dl respectively. However, a higher mean was observed by Feig et al¹⁴ and Abdalla Jarari et al¹⁵. They found that the

mean uric acid was 6.9 mg/dl and 7.48 ± 1.98 mg/dl respectively in their study patients.

In male hypertensive cases, mean serum uric acid was 5.99 ± 1.3 mg/dl and female hypertensive cases mean uric acid was 5.71 ± 1.4 mg/dl. In male hypertensives there was a non-significant increase in serum uric acid levels when compared with female hypertensives & this finding was consistent with Abdalla Jarari et al¹⁵ study.

The present study revealed that the incidence and severity of hyperuricemia between cases and controls correlated significantly with the severity of hypertension. This was consistent with the Kinsey¹⁰ and Breckenridge¹⁶ studies. Our study is consistent with the study of Tykarski et al in that there is a positive correlation between SUA and severity of hypertension¹⁷.

In our study mean serum uric acid in stage 1 hypertension was 5.37 ± 1.16 mg/dl and those with stage 2 were 6.39 ± 1.3 mg/dl which was statistically significant. The mean SUA level in patients with hypertension < 5 years was 4.94mg/dl with a standard deviation of ± 0.830 . The mean SUA level in patients with hypertension \geq 5 years was 6.93mg/dl with a standard deviation of ± 1.077 .

Regarding the correlation of SUA levels with the severity and duration of hypertension, Breckenridge in his study showed an increasing incidence of hyperuricemia as the diastolic BP was shown increased in his study, but there was no tendency for hyperuricemia to occur, only with patients with more severe hypertension¹⁶.

CONCLUSION

In our study we found that there is definite relation in SUA levels between hypertensive patients and normotensive patients and SUA levels have direct relation to the duration and severity of hypertension. Based on the study carried out it is concluded that SUA can be used as a biochemical marker to determine the severity and duration of hypertension.

DISCUSSION

Elevated SUA levels have been associated with an increased risk for cardiovascular disease. The potential mechanisms by which SUA may directly affect cardiovascular risk include enhanced platelet aggregation and inflammatory activation of the endothelium⁶.

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