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

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 4.4 mg%. This value rises with the duration & the severity of HTN. It is evident by mean values of SUA, in the form of 5.3 mg% & 6.3 mg% respectively in cases of stage-1 & stage-2 HTN and 4.9 mg% & 6.9 mg% in <5 years & >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 worldwide. 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 BP. Hyperuricemia predicts mortality in patients with heart failure or coronary heart disease, cerebrovascular events in individuals with diabetes and cardiac ischemia in hypertension.

Serum uric acid was first noted to be associated with increased BP by Frederick Mohamed in the 1870s. 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 structure.

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 4.4 mg%. This value rises with the duration and the severity of hypertension. It is evident by mean values of SUA, which are 5.37 mg% and 6.39 mg% respectively in stage-1 & stage-2 HTN and 4.94 mg% & 6.93 mg% in <5 years & >5 years of Hypertension. (Table 1).

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 endothelium.

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 factor. 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 hypertensives. Kolbe in his study of 46 hypertensive patients found 26 to be having increased SUA levels (56 %). Kashem et al had hyperuricemia in 24% of cases.

In our study the mean serum uric acid in cases was 5.8 ± 1.3 which was close to the results of Perlstein et al, Strasak et al and Kashem et al. They found mean uric acid level 5.8 ± 0.9 mg/dl, 5.7 ± 1.2 mg/dl and 5.8 ± 1.5 mg/dl respectively. However, a higher mean was observed by Feig et al and Abdalla Jarari et al. They found that the...
mean uric acid was 6.9 mg/dl and 7.48 ± 1.98mg/dl respectively in their study patients.

In male hypertensive cases, mean serum uric acid was 5.99 ± 1.3mg/dl and female hypertensive cases mean uric acid was 5.71 ± 1.4mg/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 sever- ity of hyperuricemia between cases and controls correlat- ed significantly with the severity of hypertension. This was consistent with the Kinsey10 and Breckenridge 16studies. Our study is consistent with the study of Tykarski et al in that there is a positive correlation between SUA and sever- ity 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 e5 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 di- astolic BP was shown in 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 a 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 an biochemi- cal marker to determine the severity and duration of hy- pertension.

DISCUSSION
Elevated SUA levels have been associated with an in- creased risk for cardiovascular disease. The potential mechanisms by which SUA may directly affect cardiovas- cular risk include enhanced platelet aggregation and inflam- matory activation of the endothelium6.

REFERENCE