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A study of serum uric acid and atrial fibrillation in hypertensive patients

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Abstract--Background: The aim is to study the correlation of serum uric acid and atrial fibrillation in hypertensive individuals and the effect of duration of hypertension on atrial fibrillation & serum uric acid (SUA). Materials and Methods: Patients (age between 35-65years) were selected from outpatient OPD & IPD. A control group of 100 non hypertensive individuals and another group of 100 hypertensive patients were enrolled. Serum uric acid, Echocardiography: A Trans Thoracic Echocardiography (TTE) measurement of Left atrium diameter (LVST), interventricular septal thickness (LVPWT), posterior wall thickness, left ventricular end diastolic diameter (LV) and LV ejection fraction (LVEF) was recorded. Results: Hyperuricemia incidence in controls was 11% and hyperuricemia incidence in cases was 65 %. The incidence of hyperuricemia in cases with phase 1 of hypertension was 6.27 ± 1.22 mg/dl and those with phase 2 of hypertension was 7.59 ± 1 mg/dl which was significant. Atrial fibrillation incidence was 4% in the hypertensive patients and the atrial fibrillation incidence in normotensive patients was 1%. Conclusion: Hypertension duration had a significant effect on the SUA levels and revealed that there was noteworthy increase in the SUA level in individuals with atrial fibrillation than those without atrial fibrillation.

Keywords---Uric Acid, Atrial Fibrillation, Hypertension.

Introduction

In the era of early nineteenth century, Henri Huchard stated that kidney arteriolosclerosis was perceived in 3 categories: patient suffering with gouty arthritis, other with lead poisoning, and group with supplemented with high fat. As stated these categories are linked with hyperuricemic condition.¹ The relation of blood pressure and hyperuricemia was perceived and described frequently between this phase of era.^{2,3} Twenty to 45% of adult individuals who were not on treatment for hypertension have hyperuricemia levels (>6.6 mg/dl), it figures upsurges intensely when there is high level of uric acid series is involved.^{4,5} In conditions like pre-eclampsia, the link between raised hypertension and rising titre of UA is 75%.⁶

Ciaroni and coworkers observed 95 individuals primarily with no treatment of hypertension cases who has⁷, AF established within a follow-up 24 months of period. Along with age and Left Ventricular mass and with liberated analysts of AF with day and night ambulatory SBP, utmost period and dispersal of the P waves, left atrial aspect, along with peak velocity A wave.

AF is the commonest of all the cardiac arrhythmia, and its frequency surges with time of life. Affected rate is about 1 percent of younger range of individual less than 60 years and nearby 8 percent of individuals above 80 years of age. AF is distinct as a supraventricular tachycardia categorized by noncoordinated atrial stimulation and subsequent worsening of automated atrial functions. 2D echo outcomes include the replacement of the normal steady P waves with oscillatory waves of different sizes, amplitudes, and timing.^{8,9}

Aims and Objective

1. To evaluate correlation of SUA and atrial fibrillation in hypertensive subjects.
2. To evaluate the effect of hypertensive duration on serum uric acid (SUA) and atrial fibrillation.

Materials and Methods

In this study, patients (age between 35-65years) were selected from outpatient department and those admitted in medical wards. Study group included two groups- a control group of 100 non hypertensive individuals and another group of 100 hypertension patients (BP 140/90mm of hg or greater, or those on anti-hypertensive medication). A written informed consent was obtained from every patient. Serum levels of uric acid were measured by using standard colorimetric assay.

1980, Fossati et al. uricase/PAP method to describe UA in blood/urine. In this method reagent contains uricase, peroxidase enzymes and 4-aminoantipyrine and tribromo-3-hydroxy benzoic acid. When the sample was mixed with this reagent, it forms a coloured compound. Intensity of level of uric acid were directly

proportional to intensity of colour. Normal values of serum uric acid for female are 1.5 -6 mg/dl and for male are 2.5-7.0mg/dl.

Echocardiography: A Trans Thoracic Echocardiography (TTE) analysis was executed in all the patients via portable Doppler Echocardiography device. Parasternal long as well as short-axis view was obtained. Left atrial diameter (LAD) along with thickness posterior wall of LV and LV end diastolic diameter (LVEDd) were evaluated. LV ejection fraction (LVEF) was resolved IVTH chamber view and IIND chambers view via usage of Simpson's Biplane formulation. Altogether echocardiographic statistics was analysed. Study was conducted after the permission from the ethical committee. During the study the subjects of atrial fibrillation were treated according to the standard protocol.

Results

During this study an aggregate of 200 patients were considered out of which 100 patients were classified into stage 1, 2 hypertensions (based according to JNC VIII classification) and 100 were taken as controls as with no hypertension without any other ailment be the origin of increased uric acid level and patients without valvular cardiac disease.

In the study the cases were distributed into 50 males and 50 female individuals and controls were distributed into 50 in each of male and female group. Atrial fibrillation and risk among cases and controls group. The overall cases number was 100, figures analysed showed that there were 4 patients of atrial fibrillation. The controls number were 100 (males and females both) and the analysis of data reveals that there was 1 patient of atrial fibrillation.

AF and period of hypertension

The hypertension period classified into 2 groups – patient who has hypertension of < 5 years and who has hypertension of > 5 years.

The patients who have hypertension for <5 years was 50 and patients with hypertension of period >5 years was 50. Along with hypertension >5 years they had AF in 3 patients and in 1 patient with hypertension <5 years of duration.

Atrial fibrillation and Serum uric acid level in cases

Cases were divided into individuals with AF and other group without atrial fibrillation (both for males and females' group).

The total number of individuals with AF were 4 and those without AF were 96. The mean uric acid level in individuals with atrial fibrillation was 8.62 with a SD of ± 0.55 .

The mean SUA level without atrial fibrillation was 6.8 with a standard deviation of ± 1.44 .

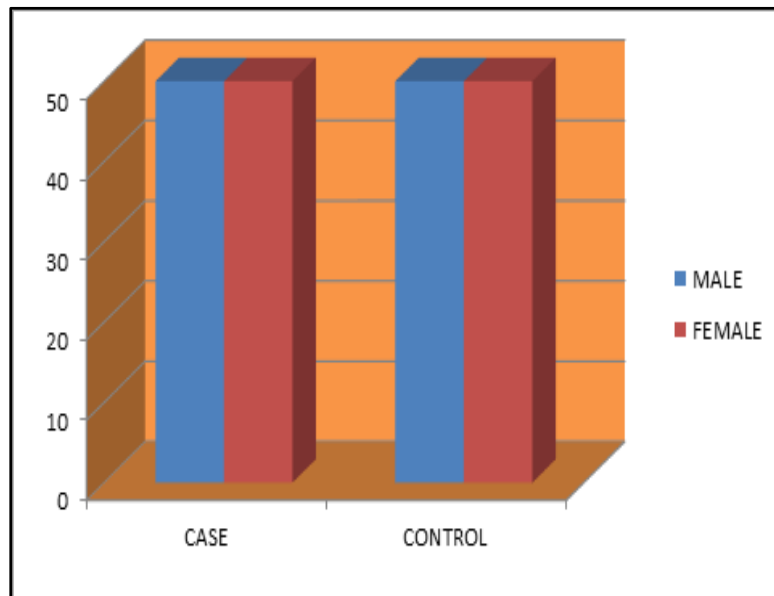


Figure 1: Sex distribution of cases and controls

Table 1: Atrial fibrillation and risk between cases and controls

	AF	Non AF
Case	4	96
Control	1	99

The p value being >0.01 showed no significant dissimilarity between hypertensive and normotensive group.

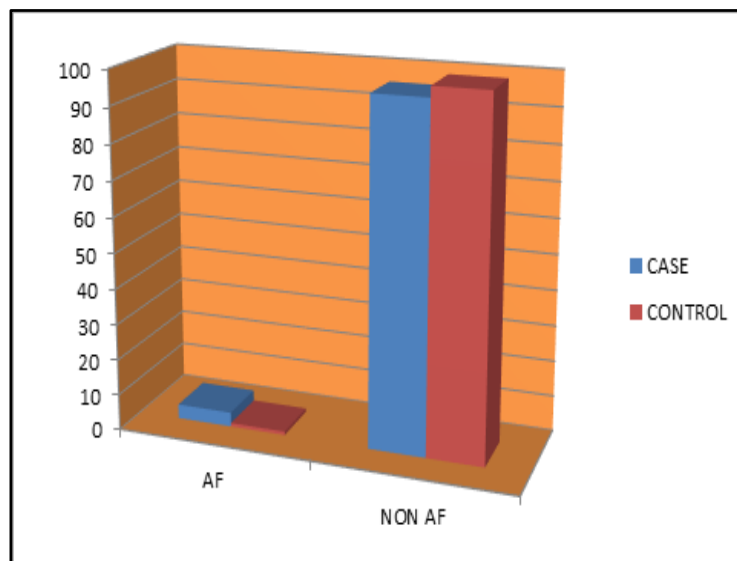


Figure 2: Atrial fibrillation and risk between cases and controls

Table 2: AF and hypertension duration

Hypertension duration	<5 years	>5 years
AF	1	4
Non AF	49	46

The p value is >0.01 which revealed that there is insignificant difference between hypertensive patients < 5 years period than those with hypertensive patient > 5 years.

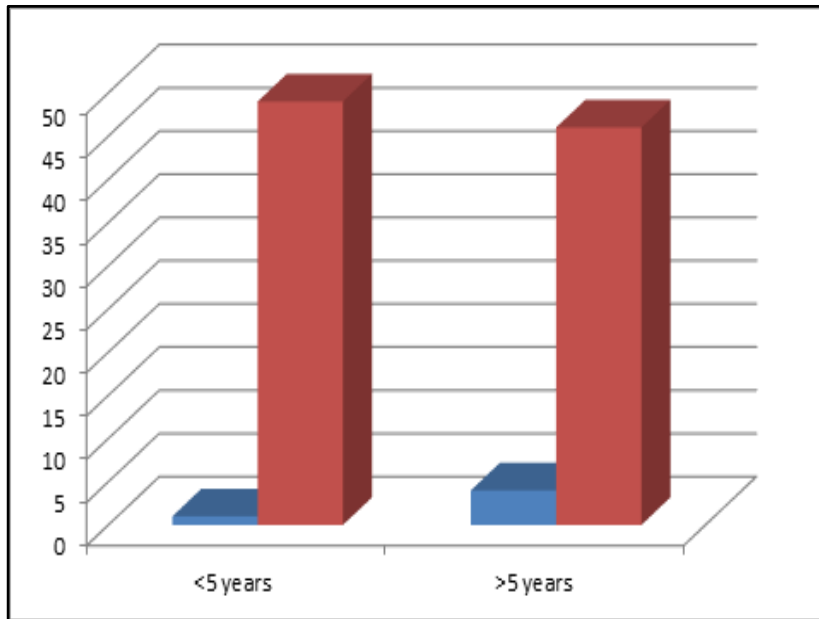


Figure 3: AF and duration of hypertension

Table 3: Atrial fibrillation and Serum uric acid level in cases

	Mean SUA \pm SD
AF	8.62 \pm 0.55
Non AF	6.8 \pm 1.44

The p value was <0.001 which revealed a noteworthy upsurge in SUA level in individual with AF than those without atrial fibrillation.

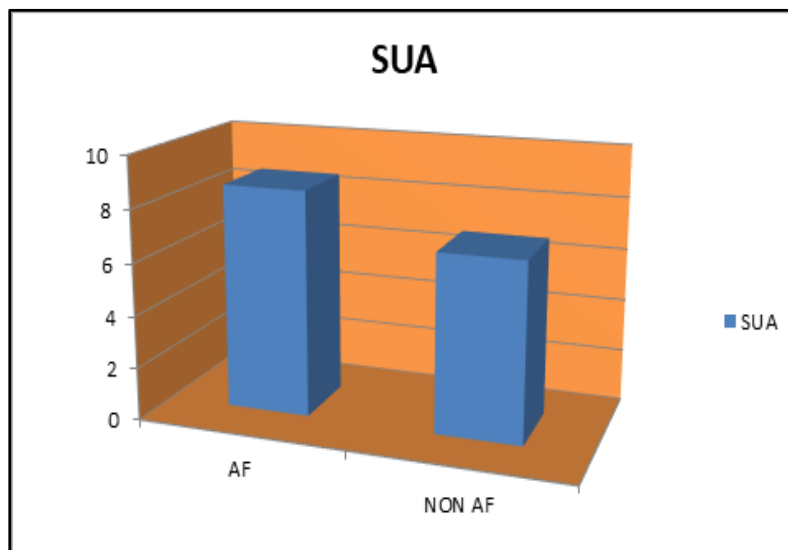


Figure 4: Atrial fibrillation and SUA level in cases

Discussion

Prominent correlation of SUA levels with amplified danger of CVD. The probable contrivances by which SUA level might directly affect risk of CV diseases comprise improved aggregation of platelet and inflammatory activity of the vessel wall. This study reveals incidence of hyperuricemic state in control group was 11% and it is 65% in group of cases. Study done by C. J. Bulpitt evaluates 48% hypertensive males and 40 % of hypertensives females when their SUA level in the hyperuricemic variety.¹⁰

Three likely assumptions be evaluated by relationship of hypertension with hyperuricemia -. Blood pressure might uprise as an outcome of hyperuricemic state, hypertension can cause rise in SUA along with period and hypertension severity which is linked in association to hyperuricemia. Hypertension might uprises as in direct association with raised SUA levels, although the probability of uric acid which played to be the important factor in risk of creating oxidative stress rise in hypertension in individuals with elevated SUA levels may be linked with rise production of free radicals.

Messerli et al revealed that hyperuricemic state in hypertension is due to premature involvement of kidney vasculature, specifically, renal sclerosis. SUA levels rise due to impairment of renal tubule leads to hyperuricemic state.¹¹ Tykarski in his exclusive evaluation presented that hyperuricemia in hypertensive individual involves because of compromised tubular secretion of urate.¹² In our study the incidence of hyperuricemia incidence of hypertension stage 1 was 6.27 ± 1.22 mg/dl and in hypertension stage 2 was 7.59 ± 1 mg/dl which was significant.

In our review, we discovered a clear relationship among levels of uric acid in normotensive and hypertensive, as well as directly proportional relationship among SUA levels and the severity and hypertensive duration. As a result, the

possibility of serum uric acid possibly causes oxidative and free radicles, which leads to hypertension, as well as severity and duration of rising blood pressure leading to nephrosclerosis and renal dysfunction leading to increased urate level must be studied, since other studies have given a positive association among hypertensive state and hyperuricemia.

Hypertension came out to be casual factor for AF in general population studies. Framingham Heart Study and the Manitoba Follow-up, showed risk of AF was raised by 1.9 times in hypertension participants compared to normotensive subjects.^{13,14} Atrial fibrillation was shown to be 4 percent common in hypertension individuals and 1 percent common in normotensive patients in this study. Because our study group included patients aged 35 to 65, the incidence of atrial fibrillation increases with age >75 years, and there is also a link between atrial fibrillation and LV mass, lack of significant difference in atrial fibrillation in hypertensive v/s normotensive patients.

Uric acid is a cardiovascular risk factor related oxidative and inflamed stress. Atrial fibrillation (AF) too has been linked to inflammation and oxidative stress in recent years. In present study, the mean SUA level in patients with atrial fibrillation found to 8.620.55, while SUA mean level in non-atrial fibrillation patient found to be 6.81.44, indicating that patients with atrial fibrillation have high titer of uric acid level significantly than without atrial fibrillation.

Conclusion

According to the findings of the aforementioned study, there is a direct link between hyperuricemia and atrial fibrillation, as well as hyperuricemia and hypertension. Furthermore, stage 2 hypertensive a patient had higher rise in uric acid levels than those with stage 1 hypertension, according to the study. The higher hyperuricemia level showed significant association with longer duration of hypertension than those with a shorter duration. The hyperuricemic state also showed significant association with AF patient than patient who had no episodes of AF.

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