

Assessment of serum uric acid levels in essential hypertension

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Abstract

Background: To assess serum uric acid levels in essential hypertension. **Methodology:** One hundred twenty patients diagnosed with essential hypertension of both genders was included. All patients were kept in group I and healthy subjects in group II. Parameter such as body weight, height, body mass index, waist circumference, pulse rate, systolic and diastolic blood pressure etc. was recorded. Serum uric acid was assessed. **Results:** Age group <40 years had 30 in group I and 25 in group II, 41-60 years had 45 in group I and 40 in group II and >60 years had 35 in group I and 45 in group II. The mean serum uric acid in group I was 6.23 mg/dl and in group II was 5.12 mg/dl. The difference was significant ($P < 0.05$). The mean serum uric acid in patients with < 5 years of hypertension was 5.02 and >5 years was 6.52. The mean serum uric acid in patients with stage I was 5.62 and in stage II was 6.84. The difference was significant ($P < 0.05$). **Conclusion:** There was high serum uric acid level in essential hypertension patients. Higher values was present based on duration of and stage of hypertension.

Keywords: essential hypertension, blood pressure, uric acid.

INTRODUCTION

Hypertension is an important, increasing medical and public health problem. Worldwide prevalence estimates for hypertension may be as much as 1 billion individuals and approximately 7.1 million deaths per year may be attributable to hypertension.¹ The WHO reports that suboptimal blood pressure (>115 mm of Hg systolic BP) is responsible for 62% of cerebrovascular disease and 49% of ischemic heart disease.² In addition, suboptimal blood pressure is the number one attributable risk for death due to myocardial infarction, stroke, congestive heart failure, peripheral vascular disease and end stage renal disease throughout the world.³

The reasonable mechanism for the development of hypertension in hyperuricemia includes uric acid induced activation of renin-angiotensin system and action on glomerular apparatus, increased insulin resistance and hyperinsulinaemia, causing decreases excretion of uric acid, sodium, potassium from renal tubules and uric acid action in proliferation of vascular smooth muscle endothelial dysfunction with decrease nitric acid production.^{4,5} However, there are numerous factors including metabolic syndrome, diabetes mellitus, chronic kidney disease, obesity, alcohol consumption, salt intake, fluid volume status etc. in the association of hyperuricemia and hypertension.

Hyperuricemia is also common among adults with prehypertension, especially when microalbuminuria is present.⁶ The observation that hyperuricemia precedes the development of hypertension indicates that it is not simply a result of hypertension per se.⁷ We performed this study to assess serum uric acid levels in essential hypertension.

METHODS

After considering the utility of the study and obtaining approval from ethical review committee, we selected one hundred twenty patients diagnosed with essential hypertension of both genders. Inclusion criteria was stage 1 and stage 2 hypertension according to JNC-VII without any target end organ damage. Patients consent was obtained before starting the study.

Data such as name, age, gender etc. was recorded. All patients were kept in group I and healthy subjects in group II. Parameter such as body weight, height, body mass index, waist circumference, pulse rate, systolic and diastolic blood pressure etc. was recorded. Serum uric acid was assessed. The results were compiled and subjected for statistical analysis using Mann Whitney U test. P value less than 0.05 was set significant.

RESULTS

Table 1: Age wise patient distribution.

Age group (years)	Group I	Group II
<40	30	25
41-60	45	40
>60	35	45

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Age group <40 years had 30 in group I and 25 in group II, 41-60 years had 45 in group I and 40 in group II and >60 years had 35 in group I and 45 in group II (Table 1).

Table 2: Serum uric acid in both groups

Groups	Serum uric acid	P value
Group I	6.23	0.02
Group II	5.12	

Table 3: Serum uric acid based on duration and stage of hypertension

Parameters	Mean	P value
Duration		
<5 years	5.02	0.05
>5 years	6.52	
Stage		
Stage I	5.62	0.04
Stage II	6.84	

The mean serum uric acid in group I was 6.23 mg/dl and in group II was 5.12 mg/dl. The difference was significant ($P < 0.05$) (Table 2).

The mean serum uric acid in patients with < 5 years of hypertension was 5.02 and >5 years was 6.52. The mean serum uric acid in patients with stage I was 5.62 and in stage II was 6.84. The difference was significant ($P < 0.05$) (Table 3).

DISCUSSION

Hypertension is the emerging public health problem of adult population across the globe, affecting one in every four individuals. The etiological factors associated with hypertension is difficult to predict because hypertension results from a complex interaction of genes and environmental factors.⁸

The mechanisms underlying the increase in SUA and its potential prognostic implications in patients with essential hypertension are still not completely known.⁹ Uric acid, a final product of purine metabolism, is bound 5% to plasma proteins is freely filtered at the glomerulus as a function of renal blood flow is 99% reabsorbed in the proximal tubule, secreted by the distal tubule, and subjected to considerable post-secretory reabsorption.¹⁰ Fractional secretion of uric acid is about 7% to 10%. A direct association exists between SUA and renal vascular resistance in subjects with essential hypertension.¹¹ Uric acid is also commonly associated with hypertension. It is present in 25% of untreated hypertensive subjects, in 50% of subjects taking diuretics, and in >75% of subjects with malignant hypertension.¹² We performed this study to assess serum uric acid levels in essential hypertension.

Our results showed that age group <40 years had 30 in group I and 25 in group II, 41-60 years had 45 in group I and 40 in group II and >60 years had 35 in group I and 45 in group II. Our results showed that the mean serum uric acid in group I was 6.23 mg/dl and in group II was 5.12 mg/dl. Neki NS et al¹³ reported value rises with the duration and the severity of

hypertension. It is evident by mean values of SUA, which are 5.37 mg% and 6.39mg% respectively in stage-1 and stage-2 HTN and 4.94 mg% and 6.93 mg% in 5 years of Hypertension.

Our results showed that the mean serum uric acid in patients with < 5 years of hypertension was 5.02 and >5 years was 6.52. The mean serum uric acid in patients with stage I was 5.62 and in stage II was 6.84. Shrivastav C et al¹⁴ investigated the existence of an association between serum uric acid and essential hypertension reported. Among Control, Pre-hypertensive and hypertensive groups, mean serum uric acid levels were 4.91 ± 0.88 mg/dl, 5.89 ± 0.97 and 6.56 ± 0.64 mg/dl.

Feig and Johnson¹⁵ observed that the mean serum uric acid level (\pm SD) in control subjects and children with white coat hypertension were nearly identical but slightly higher in secondary hypertension (4.3 ± 1.4 mg/dl, respectively; $P = 0.80$) but very high in children with primary hypertension (6.7 ± 1.3 mg/dl; $P = 0.004$). There was a tight, linear correlation between the serum uric acid levels and the systolic and diastolic BP in patients who were referred for evaluation of hypertension ($r = 0.8$ for systolic BP and $r = 0.6$ for diastolic BP). Among patients who were referred for evaluation of hypertension, a serum uric acid > 5.5 mg/dl had an 89% positive predictive value for essential hypertension, whereas a serum uric acid level.

CONCLUSION

There was high serum uric acid level in essential hypertension patients. Higher values was present based on duration of and stage of hypertension.

REFERENCES

- Zhou X, Matavelli L, Frohlich ED. Uric acid: its relationship to renal hemodynamics and the renal reninangiotensin system. *CurrHypertens Rep.* 2006;8:120–124.
- BabinskaK, Kovacs L, Janko V, Dallos T, Feber J. Association between obesity and the severity of ambulatory hypertension in children and adolescents. *J Am SocHypertens.* 2012;6:356–363.
- Yoo TW, Sung KC, Shin HS, Kim BJ, Kim BS, Kang JH, et al. et al. Relationship between serum uric acid concentration and insulin resistance and metabolic syndrome. *Circ J.* 2005;69:928–933.
- Corry DB, Eslami P, Yamamoto K, Nyby MD, Makino H, Tuck ML. Uric acid stimulates vascular smooth muscle cell proliferation and oxidative stress via the vascular renin-angiotensin system. *J Hypertens.* 2008;26:269–275.
- Higashi Y, Kihara Y, Noma K. Endothelial dysfunction and hypertension in aging. *Hypertens Res.* 2012;35:1039–1047.
- Jossa F, Farinaro E, Panico S, Krogh V, Celentano E, Galasso R, et al. Serum uric acid and hypertension: the Olivetti heart study. *J Hum Hypertens.* 1994;8:677–81.
- Brand FN, McGee DL, Kannel WB, Stokes 3rd J, Castelli WP. Hyperuricemia as a risk factor of coronary heart disease: the Framingham study. *Am J Epidemiol.* 1985;121:11–8.
- Kansui Y, Ohtsubo T, Goto K, Sakata S, Ichishima K, Fukuhara M, et al. Association of serum uric acid with blood pressure in Japanese men. Cross-sectional study in work-site group. *Circ J.* 2011;75:2827–32.
- Zhang W, Sun K, Yang Y, Zhang H, Hu FB, et al. Plasma uric acid and hypertension in a Chinese community: prospective study and meta-analysis. *Clin Chem* 2009;55: 2026-2034.
- Kaplan NM “Anxiety induced hyperventilation: A common cause of symptoms in patients with hypertension” *Archives of Internal Medicine* 1997: 157; 945.

11. Naomi DL Fischer, Gordon H. Williams “Hypertensive Vascular Diseases”, Harrison’s Textbook of Internal Medicine 16th edition, Vol.2; Mc-Graw Hill 1468- 1469.
12. Wilson PWF, Sullivan L, et al “Overweight and obesity as determinants of cardiovascular risk, The Framingham experience” Archives of Internal Medicine 2002; 162: 1867.
13. Neki NS, Tamilmani NS. A Study of Serum Uric Acid level in Essential Hypertension. JIMSA. 2015;28 No. 1.
14. Shrivastav C, Sharma S, Suhalka ML, Kaur M. Hyperuricaemia and essential hypertension: A case control study in Southern Rajasthan. Int J Res Med Sci 2016;4:78-83.
15. Feig DI, Johnson RJ: Hyperuricemia in childhood primary hypertension, Hypertension 2003;42: 247-252.