



ESSENTIAL HYPERTENSION; “EVALUATION OF SERUM URIC ACID AT TERTIARY CARE HOSPITAL HYDERABAD/JAMSHORO”

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ABSTRACT... Background: Little and sparse information is present in our population on association between serum uric acid and essential hypertension. Increased serum uric acid is related with elevated blood pressure in different research studies. The relationship between serum uric acid level and high blood pressure can be difficult to assess because drugs for high blood pressure usually affect uric acid level. **Objectives:** The objective of our study is to evaluate the association of serum uric acid to severity and duration of essential hypertension at Liaquat University Hospital (tertiary care) Hyderabad / Jamshoro. **Methodology: Study Design:** Case control and prospective study. **Setting:** Medical wards and Out Patient Medicine Department of Liaquat University Hospital Hyderabad / Jamshoro. **Period:** One year i.e. from 20th March 2013 to 19th February 2014. **Methodology:** A total of 75 high blood pressure subjects aged 35 years and above were included as cases with same number (75) of age & sex matched normal blood pressure subjects as controls after excluding, Secondary hypertension, metabolic syndrome, Diabetes Mellitus, age <40 ; >70 years, hypothyroidism, hyperparathyroidism, Ischemic heart disease, congestive cardiac failure, Alcohol abuse, Renal Insufficiency, glomerulonephritis, pyelonephritis, hereditary nephropathy, patients on drugs –, ethambutol, levodopa, pyrazinamide, low dose aspirin, Cytotoxic drugs, nicotinic acid, thiazide diuretics. Qualitative and quantitative data were evaluated in SPSS version 16.0. **Results:** The mean serum uric acid level was 6.3 ± 1.4 mg/dl vs 4.5 ± 1.2 mg/dl in case (n = 75) and control patients (n = 75) respectively. A total of 23 (30.6%, n = 75) patients in cases and 8 (10.6%) subjects in control had high serum uric acid (Odds Ratio 2.13, p <0.05). Therefore, the frequency of increased serum uric acid level subjects & mean serum uric acid level were significantly greater in hypertensive cases, as compared to those of healthy normal blood pressure Controls. Serum uric acid correlated positively with both systolic blood pressure (r=0.132, p<0.01) and diastolic blood pressure (r=0.214; p<0.01). **Conclusion:** High serum uric acid is frequent in our populace with essential hypertension and there is relationship between serum uric acid level and blood pressure. Further large scale research studies on the pathophysiologic significance of high serum uric acid in these high blood pressure patients are in further need.

Key words: High Serum uric acid, essential hypertension, hyperuricaemia, High blood pressure.

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INTRODUCTION

Increased blood pressure is a risk agent for atherosclerotic cardiac disease and major public health issue of adult population across the globe, affecting one in every four persons¹ and elevated serum uric acid level is turning into an expanding matter all over the world with a steady increase in its prevalence.²

The etiological agents related with high blood pressure are hard to predict because sustained

increased blood pressure results from a complex interaction of genetic and environmental factors.¹ Different research studies demonstrates the association between serum uric acid level and high blood pressure. The possible mechanisms for the occurrence of high blood pressure in high serum uric acid includes: (a) uric acid induced activation of rennin angiotensin system and action on glomerular apparatus^{3,4}; (b) increased insulin resistance and increased insulin level, causing decreased excretion of uric acid, sodium,

potassium from kidney tubules^{5,6} and (c) uric acid action in proliferation of vascular smooth muscles⁷, endothelial dysfunction with decrease nitric acid production^{8,9} However, there are different agents including Metabolic syndrome, Diabetes Mellitus, Chronic renal disease, Obesity, Alcohol consumption, Salt ingestion, Fluid volume status etc in the relation of elevated uric acid level and high blood pressure. Thus our main aim was to evaluate the association between high uric acid level and high blood pressure with no cause (Essential hypertension) by controlling above described contributing agents.

Initially uric acid causes constriction of vessels by activation of the rennin-angiotensin system and decreased circulating nitric oxide, which can be reversed by decreasing uric acid. As time passes, uric acid uptake into vascular smooth muscle cells causes cellular proliferation and secondary arteriosclerosis that impairs pressure natriuresis, causing sodium sensitive elevated blood pressure.¹⁰

A more strong relationship between high serum uric acid and the development of high blood pressure has been showed.¹¹ The relationship between the serum uric acid level and the blood pressure in our high blood pressures patients have not been demonstrated previously. Thus main aim of our study is to evaluate the association between serum uric acid levels and Essential hypertension and association of serum uric acid level and severity and duration of primary hypertension.

MATERIAL & METHODS

This case control and prospective study was carried out in the Medical wards and Out Patient Medicine Department of Liaquat University Hospital Hyderabad / Jamshoro for the period of one year i.e. from 20th March 2013 to 19th February 2014. All male and female patients between 40-70 years old with essential hypertension were involved in this study as cases. The diagnosis of essential hypertension were done according to J-N-C Seven Criteria.

- Systolic blood pressure equal to or more than 140 mm Hg

- Diastolic blood pressure equal to or more than 90 mm Hg

Same number (75) of age and sex matched having normal blood pressure as controls were taken. Patients with

- Age <40 and >70 years
- Hypertension with obvious cause
- Diabetes, hypothyroidism, hyperparathyroidism.
- Ischemic cardiac disease, congestive heart failure.
- Gout.
- Obesity (body weight more than 25% of ideal weight).
- Alcohol using persons.
- Renal insufficiency, Glomerulonephritis, Pyelonephritis, Hereditary renal problems.
- Patients on drugs – levodopa, ethambutol, pyrazinamide, nicotinic acid.
- Cytotoxic drugs, low dose aspirin, thiazide diuretics were not included in this study.

Data collection procedure

Detailed information is gained by history with special importance to duration and treatment of elevated blood pressure, vital signs, complete general physical examination including weight, height and systemic examination including fundoscopic examination of eye is also done. All the patients were advised to proceed on overnight fast of 12 hours.

The grading of hypertensive retinopathy is done according to Keith Wagener Barker classification.

Grade 1: Narrowing of Arteriovenous ratio (normal Arteri:Venous=3:4). The arteriolar light reflex is seen a broadened yellow line with red blood column.

Grade 2: There is Arteriovenous crossing defect (Arterio-Venous nipping). The arterioles are seen like broad yellow line (Copper Wire) without blood column.

Grade 3: Exudates and hemorrhages are seen with broad white line (Silver Wiring) appearance of arteriole.

Grade 4: Presence of papilloedema in a case of hypertensive encephalopathy.

The blood pressure is recorded with the every person comfortably sitting on a chair with feet on the floor for 5 min in a quiet, private setting with a comfortable room temperature. No tea or caffeine in any form before , no smoking before 30min, no external adrenergic stimulants and tight clothing on arm affecting the blood pressure were removed from the arm .At least two blood pressure readings are taken. The center of the cuff was at cardiac level, and the width of the bladder cuff equal at least 40% of the arm circumference; the length of the cuff bladder was enough to encircle at least 80% of the arm circumference. It is important to pay attention to cuff placement, stethoscope placement, and the rate of deflation of the cuff (2mmHg/s). Systolic blood pressure is the first of at least two regular “tapping” korotkoff sounds, and diastolic blood pressure is the point at which the last regular korotkoff sound is heard.

Hypertension is classified according to J-N-C Seven criteria.

Classification	Systolic, mmHg	Diastolic, mmHg
Normal	<120	<80
Prehypertension	120–139	80–89
Stage 1 hypertension	140–159	90–99
Stage 2 hypertension	160	100
Isolated systolic hypertension	140	<90

When systolic and diastolic blood pressures fall under different categories, the higher category is selected.

Hyperuricemia is defined as serum uric acid level greater than 7 mg/dl in men and above 6 mg/dl in ladies.¹⁴

DATA ANALYSIS

The data were entered and analyzed in Statistical Program SPSS version 16.0. Qualitative data (frequencies and percentage) were presented as n (%). Numerical variables like age (in years), serum uric acid, hypertension (systolic and diastolic blood pressure) etc. were presented as Mean

± Standard deviation. All data were calculated on 95% confidence interval. P value ≤ 0.05 was considered as statistically significant level.

RESULTS

This prospective and case control study was conducted in Medical wards and Out Patient Medicine Department of Liaquat University Hospital / Jamshoro on 150 subjects for the assessment of association between serum uric acid levels and essential hypertension and relation of serum uric acid level to severity and duration of essential hypertension.

The mean age of group I was 51.2 ± 9.1 years and 49.5 ± 7.5 years of that of group II. Most of the patients belonged to 50–60 years in both groups. Male, female ratio was 1.5:1.

In this study, the mean systolic blood pressure was 160.2 ± 11.9 mmHg and 105.5 ± 10.1 mmHg in group I and group II and the mean diastolic blood pressure was 90.5 ± 5.6 mmHg and 80.2 ± 6.0 mmHg in group I and group II respectively and the mean systolic and diastolic blood pressure difference were statistically significant (p<0.05) between two groups (cases and controls).

We found that increased uric acid level subjects’ number was significantly greater in case group as compared to controls (30.6% vs 10.6%) (p < 0.05). However, the mean serum uric acid level was also increased i.e. 6.3 ± 1.4 mg/dl vs 4.5 ± 1.2 mg/dl in case and control patients respectively, which was significantly elevated in case group (p<0.05).

Characteristics	Group I (Case, n = 75)	Group II (Control, n = 75)	P value
Mean age ± SD (Range)	51.2 ± 9.1 (40 to 70 years)	49.5 ± 7.5 (40 to 70 years)	> 0.05*
40 to 50 years	23(30.6%)	24(32.0%)	> 0.05*
51 to 60 years	29(38.6%)	30(40.0%)	
61 to 70 years	16(21.3%)	18(24.0%)	
> 70 years	07(9.3%)	03(4.0%)	

Table-I. Baseline characteristics of the study cases and controls(n=150)
* P value is statistically not significant

DISCUSSION

High blood pressure is a mounting major cardiovascular risk agent, affecting approximately one billion.¹² It is one of the most essential source to global disease burden, with its actual prevalence in several developing nations.¹³

Our observed variation of high serum uric acid between cases and controls well compared with study of Garrick et al.¹⁴ where they noted that 31% of their patients had elevated uric acid level with hypertension. The mean uric acid in cases were near to that of study by Perlstein et al¹⁵ and Strasak et al¹⁶, they demonstrated mean uric acid level 5.8 ± 0.9 mg/dl and 5.7 ± 1.2 mg/dl respectively, however, increased mean were observed in the study of Feig et al¹⁷, where they reported mean uric acid was 6.9 mg/dl in their study patients. Mean age of the patients was similar to those of Mellen et al¹⁸, where the investigators calculated the mean age was 53.3 years. Forman et al¹⁹ described age range of the patients was 53 to 68 years. These results are like wise to our study.

Forman, et al¹⁹ found in his study that median age was 43.2 years. Strasak et al¹⁶, Perlstein et al¹⁵ and Krishnan et al²⁰ observed mean age of their study patients were 41.6 ± 14.7 years, 41.7 ± 9.2 years and 44.7 ± 5.8 years respectively. Male, female ratio of this study patients was same than that of Feig et al¹⁷, where they showed male female ratio was 1.5:1, which shows that male was dominant in their study and he also observed the mean systolic and diastolic blood pressure were 139 mmHg and 83 mmHg respectively in their study patients. Krishnan, et al²⁰ showed in his study, the mean systolic and diastolic blood pressure were 123.1 ± 8.6 mmHg and 82.3 ± 5.4 mmHg respectively in their patients. Strasak et al¹⁶ observed in their study that mean systolic blood pressure was 132.0 ± 18.8 mmHg and diastolic blood pressure was 81.6 ± 10.8 mmHg. Mellen et al¹⁸ showed mean systolic blood pressure was 113.8 mmHg and diastolic blood pressure 70.2 mmHg. Similar mean blood pressure obtained by Perlstein et al¹⁵; most of the study observations are dependable with the present study regarding the mean blood pressure. The limitations of our

study was one visit blood pressure recordings (may be white coat hypertension) and small sample size.

CONCLUSION

Elevated serum uric acid level is significantly linked with Essential hypertension in patients irrespective of metabolic syndrome. Our study also show that number of high uric acid persons & mean serum uric acid level were significantly greater in high blood pressure cases, as compared to those of healthy with normal blood pressure (controls). Further research studies on large scale with large sample size and multiple visits blood pressure recordings with several days apart are required for the assessment of association and risk linkage between elevated serum uric acid and hypertension.

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AUTHORSHIP AND CONTRIBUTION DECLARATION

Sr. #	Author-s Full Name	Contribution to the paper	Author=s Signature
1	Dr. Muhammad Iqbal Shah	Contribution to conception and designing, collection of data, shares of expert research opinion, in help analysing data.	
2	Dr. Ramesh Kumar Suthar	Contributed in drafting, sharing expert research opinion, data collection, analysis and finalizing the manuscript.	
3	Dr. Mukhtiar Ahmed Soomro	Contributed in data collection, data analysis, expert view for manuscript designing.	