DOI: https://doi.org/10.53350/pjmhs02024181233

ORIGINAL ARTICLE

Association of Hyperuricemia with Hypertension in a Tertiary Hospital of Karachi

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ABSTRACT

Objective: To determine the frequency of hyperuricemia in hypertensive patients admitted to a tertiary healthcare hospital of Karachi.

Methodology: This study was conducted in Sohail Trust Hospital in Department of Medicine. It was a cross sectional study. Duration was 6 months from 13th March, 2023 to 13th September, 2023. All patients who fulfilled the inclusion criteria in the department of General Medicine, Sohail Trust Hospital, Karachi, were included in the study. After taking informed written consent, history was taken, clinical examination was done and serum uric acid level was checked to reach the outcome i.e. hyperuricemia.

Result: A total of 235 patients with hypertension were included. 159 patients (67.7%) were males & 76 patients (32.3%) were females with the mean age of 57.540+8.459 years**.** Hyperuricemia was seen in 143(60.9%) patients**.**

Conclusion: In conclusion the frequency of hyperuricemia was high in hypertensive patients. It increases with the increase in age, duration of hypertension and predominant in male gender. The trend in low socio-economic class was hence found to be similar.

Keywords: Hyperuricemia, risk factor, hypertension

INTRODUCTION

Hypertension, especially when uncontrolled, pose serious risks for various organs in our body, including eye, kidney and brain to name a few. There is an ever-increasing population of hypertensive adults in the suburbs of Pakistan. The study of risk factors associated with it, particularly in the Asian population, needs to be undertaken at an equal pace. As of now, the known risk factors of hypertension are increasing age, obesity, a positive family history, salt intake, smoking, alcohol, stress, and African origin. According to a study conducted in Karachi, Pakistan, around 26% of population have raised blood pressure. The incidence was higher in male and people residing in urban areas.[1]

Uric acid is an end-product of purine metabolism. Food with moderate to high number of purines include organ meats like liver, some fish, meat such as beef, veal, chicken, alcoholic beverages and shellfish. Hyperuricemia can be caused by either increased intake, increased production or turnover, and decreased excretion. Purine metabolism occurs in the liver but the end products are excreted by the kidney. Hyperuricemia has not only been identified as causing gout, but it is also an independent risk factor for cardiovascular, and renal side effects. A study highlighted the rising burden of hyperuricemia, estimated to be 40% in men and 20% in women of Karachi.[2]

According to recommendation from some studies, asymptomatic hyperuricemia is not treated with pharmacological therapy, especially in CKD patients.[3] However, other studies now support even treating asymptomatic individuals.

According to international data, 67.3% of the patients with hyperuricemia had hypertension. However, this association and its risk factors has not been extensively studied in Karachi. A study was conducted in Rawalpindi, Pakistan which showed that 84% of patients with hyperuricemia were hypertensive while only 41% without hyperuricemia had increased blood pressure[4]. Another research conducted in DG Khan, Pakistan, catered a total of 359 patients with HTN, and hyperuricemia was seen in 150(41.78%) patients.[5]

Different mechanisms have been proposed in previous studies. According to one study, Hypertension is a consequence of acute vasoconstriction by the renin-angiotensin system, decreased nitric oxide as well as uptake of uric acid into vascular smooth muscle, leading to arteriosclerosis[6]. Whereas another source suggests that monosodium urate crystals have effect on vascular endothelium. The oxidative stress required for the production of uric acid is a contributory factor as evidenced by the calcification of arteries.[7]

A study highlighted the association of raised LDL with SUA 1eve1s [8]which itself is an independent risk factor for atherosclerosis and hypertension. According to available data hyperuricemia and Gout is more frequent in developed countries as compared to developing nations.[9] It is more common in males as compared to females, although after menopause the incidence rises.[10-11] Diet has its own role but more studies are needed to prove the perfect diet for its prevention.[12] Raised BMI is another risk factor associated with it.[13]

This study is designed to see the frequency of raised uric acid levels in hypertensive patients in Pakistan and various risk factors, particularly in low socio-economic area of Karachi. Very few studies are available in this regard. Routine lab investigations for hypertensive patients usually does not include uric acid levels. Hence, if it is a prevalent phenomenon, we will lower our threshold of treating and recommending it. Also, various factors like diet could be modified to prevent this altogether.

METHODOLOGY

It was a cross sectional study. This study was conducted in Sohail Trust Hospital, Karachi, in the Department of General Medicine. Duration of study was 6 months from 13th March, 2023 to 13th September, 2023. Sample size was calculated on the basis of population size 235, response distribution of hyperuricemia in hypertensive patients 67.3%[2] , confidence level 95% and margin of error 6%. Sampling technique was non probability consecutive sampling. In inclusion criteria both men and women, between 40 to 80 years of age, who were known hypertensive and on treatment for more than a week were included and those with signed informed consent. In exclusion criteria those on diuretics, chronic kidney disease, hemolytic, myeloproliferative disorders, and patients with psoriasis were excluded.

Patients who were admitted in department of General medicine, Sohail Trust Hospital with known hypertension were enrolled in the study. In all these patients we recorded the biodata, comorbidities like DM, dyslipidemia, IHD (as defined in operational definition), weight, BP and uric acid levels after a written informed consent, on the Proforma. Strict adherence to the inclusion and

Received on 15-10-2023
Accepted on 27-12-2023

exclusion criteria was ensured to avoid errors. Privacy of the patient was ensured.

This study was followed after the approval of ethical review committee. For Data analysis SPSS v.23 was used for data analysis. For qualitative variables like gender, co-morbidities (DM, dyslipidemia IHD) and hyperuricemia frequency and percentages was computed. For quantitative variables like age, height, weight, BMI, blood pressure, uric acid level and duration of hypertension, mean +standard deviation was presented. Chi square test was used for association between outcome and effect modifier (age, gender, BMI, co-morbid and duration of hypertension). P <0.05 was considered as level of significance.

RESULT

A total of 235 patients with hypertension were selected to conduct this study. In our study 159 patients (67.7%) were males & 76 patients (32.3%) were females. The mean age was 57.540+8.459 years, the mean height was 73.121+12.392 cm, the mean weight was 164.280+11.402 kg & the mean BMI was 26.203+2.381 kg/m^2. The distribution. The descriptive statistics of age, height, weight & BMI is presented in Table-1.

The mean duration of hypertension was 10.451+5.081 years, the mean blood pressure (systolic) was 150.510+5.590 mmHg, the mean blood pressure (diastolic) was 96.170+4.101 mmHg & the mean uric acid was 7.875+3.207. The distribution of duration of hypertension groups is presented in Graph-II. Diabetes mellitus was noted in 81(34.5%) patients. IHD was seen in 33(14%) patients. Dyslipidemia was seen in 52(22.1%) patients. In our study hyperuricemia was seen in 143(60.9%) patients.

The frequencies of age groups (years), gender, BMI, duration of hypertension, diabetes mellitus, IHD & dyslipidemia were calculated according to hyperuricemia**.** In our study hyperuricemia was not significantly associated with age (p=0.558), gender (p=0.354), BMI (p=0.679), duration of hypertension (p=0.987), diabetes mellitus (p=0.935), IHD (p=0.975) & dyslipidemia (p=0.836).

Table-1: (Descriptive statistics of age (years), height (m), weight (kg) & BMI (kg/m^2)

Statistics	Age (years)	Height (cm)	Weight (kg)	BMI (kg/m^2)
Minimum	40	49	97	18.30
Maximum	75	115	188	34
Mean	57.540	73.121	164.280	26.203
Std. Deviation	8.459	12.392	11.402	2.381

Table-2: Hyperuricemia according to duration of hypertension (years). (n=235)

Hyperuricemia	Duration of hypertension (years)		Total	P-value
	2-13	14-24		
Yes	39(16.6%)	104(44.3%)	143(60.9%)	.0987
No	25(10.6%)	67(28.5%)	92(39.1%)	
Total	64(27.2%)	171(72.8%)	235(100%)	

Chi-square-test was applied
P-value ≤ 0.05 considered as significant.
Not Significant at 0.05 level

DISCUSSION

Uric acid lowering therapies have shown to have impact on the lowering of BP. According to a study done on Allopurinol there was slight decrease in blood pressure associated with its use. [14] . Other therapies commonly used for decreasing SUA levels are febuxostat and uricosuric agents. A similar result was found with febuxostat on BP. [15] The recommended first line agent is Allopurinol, followed by febuxostat. [16]

A study demonstrated how uric acid is responsible for arterial stiffness. Two main pathways are demonstrated. One is mainly through oxidative stress and the other through formation of crystals. [17] . First it is important to understand how uric acid is involved in the causation of hypertension. Some involved mechanisms are the increase in RAAS pathway, arteriolopathy in the afferent tubule of kidney, dysfunction of endothelium and upregulation of inflammatory pathway. [18]

According to a study, it is suggestive that patients with higher uric acid levels tend to have higher BP but he role of uric acid lowering drugs on hypertension is not still clear. [19] The main mechanism of action of injury is oxidative stress and endothelial injury in non-communicable diseases like CKD and CHD. Allopurinol has antioxidant potential. But its role in patient with DM is still vague. [20]

Prior studies demonstrated male predominance with hyperuricemia. [21] Age is also directly proportional to SUA levels. [22] BMI also correlates positively with raised SUA levels. [23] A meta-analysis studied 738 individuals, most of whom were adults, found that allopurinol was responsible for a small decrement in both SBP (3.3 mmHg) and DBP (1.3 mmHg) compared with controls. [24] Evidence suggests that older hypertensive adults (> 65 years) require higher doses of allopurinol to achieve a greater reduction in BP,[25] and those treated with higher doses also have significantly lower risk of cardiac and cerebrovascular events.[14]

In our study frequency of hyperuricemia was 60.9% in hypertensive patients. This can be attributable to the epidemiological differences, changes in diet and lifestyle of people in Karachi. Also, consumption of meat intake has exponentially increased in the recent times with the fast food culture. According to a study, approximately 25% to 40% of untreated hypertensive patients have concurring hyperuricemia.[26]

The limitation of our study was single center study and smaller sample size, so further studies with larger sample sizes are required.

CONCLUSION

In conclusion the frequency of hyperuricemia was higher in hypertensive patients. It increases with the increase in age, duration of hypertension and predominant in male gender.

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This article may be cited as: Haroon M, Malik R, Riaz U, Kumar A, Kumari M, Zameer F: Association of Hyperuricemia with Hypertension in a Tertiary Hospital of Karachi. Pak J Med Health Sci, 2024;18(1):233-235.