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Association of Hyperuricemia with Hypertension in Patients Presenting in the Outpatient Department for Regular Follow–Up

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ABSTRACT

Objective: To determine the association of hyperuricemia with hypertension in patients presenting in the Outpatient Department for regular follow-up.

Study Design: Cross-sectional study.

Place and Duration of Study: Department of General Medicine, Pak Emirates Military Hospital, Rawalpindi Pakistan, from Jun 2019 to 2020.

Methodology: Three-hundred patients suffering from hypertension for more than years were recruited in this study. They were evaluated for hyperuricemia during a routine follow-up visit by performing serum uric acid levels.

Results: Out of 300 hypertension patients included in the study, 187(62.3%) had no hyperuricemia, while 113(37.7%) showed the presence of hyperuricemia on routine analysis. The mean age of the study participants was 41.72±6.98 years. The mean duration of hypertension in our patients was 6.61±2.75 years. Polypharmacy and long duration of illness had a significant association with the presence of hyperuricemia among the study participants (p-value<0.001).

Conclusion: Patients with hypertension showed a high frequency of hyperuricemia in our study. The long duration of hypertension and the use of multiple pharmacological agents to achieve adequate control of hypertension predicted raised levels of uric acid among hypertensive attending the routine outpatient clinic in our study.

Keywords: Hypertension, Hyperuricemia, Socio-demographic factors.

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INTRODUCTION

Hypertension is one of those illnesses which affect the whole human body in one way or the other. The incidence and prevalence of this chronic condition have been on the rise across the globe. However, all the preventive measures.[1] Hypertension is a lifelong illness that affects almost all body organ systems via multiple mechanisms.[2] Treatment of this multisystem disorder may also involve various metabolic parameters of the human body.[3,4]

Uric acid is an important chemical compound produced as a result of various reactions in the body. Adequate excretion of this compound from the body is necessary to maintain homeostasis inside the body. Uric acid metabolism and excretion may be affected by multiple factors .[5-7]

A study done in Bangladesh revealed that hyperuricemia was highly prevalent in male and female patients with hypertension. Female patients with hypertension were affected more than male patients but in both genders, being hypertensive raised the chances of developing hyperuricemia compared to the population without hypertension.[8] A large observational survey conducted in the USA concluded that hyperuricemia was common in youth with diabetes.[9] Higher baseline serum uric acid independently increased the risk for the onset of hypertension and elevated urea and electrolytes.[10]

Much work has been published regarding the epidemiology and management aspects of hypertension, but more needs to be available, highlighting the indirect metabolic derangements. Therefore, we planned this study to determine the association of hyperuricemia with hypertension in patients presenting with OPD for regular follow-up at a teaching hospital in Pakistan.

METHODOLOGY

The cross-sectional study was conducted from June 2019 to Jun 2020 at Department of General Medicine, Pak Emirates Military Hospital, Rawalpindi Pakistan. Ethical approval (Letter no: A/28/EC/92 /147) from the Hospital Ethical Review Board Committee and written informed consent form from all the study participants was obtained before starting the study. Sample size was calculated using the WHO

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sample size calculator and population proportion as 30%.[11] Non-probability consecutive sampling technique was applied to recruit the sample for this study.

Inclusion Criteria: Patients of either gender, aged 25 to 60 years who had been suffering from essential hypertension for at least one year were included in the study.

Exclusion Criteria: Patients with secondary hypertension and uric acid problems before the diagnosis of hypertension were not included in the study. Patients with any other physical (uncontrolled DM, IHD, gout, rheumatoid arthritis, osteoarthritis, or any solid or haematological malignancy) were also not included in the study.

UASure Blood Uric Acid Monitoring System was used to measure the uric acid level. A capillary blood sample via fingertip puncture was used for this purpose. This way of assessing uric acid levels has been validated and is comparable to the routine laboratory method.[12] Serum uric acid levels greater than 5.8mg /dl in women and 7mg/dl in men were taken as clinically significant hyperuricemia.[13]

All the study participants' serum uric acid was assessed using the abovementioned method. In addition, the same technician assessed all the participants to reduce the measurement bias. Personal data and correlating factors such as age, gender, smoking, polypharmacy and duration of illness were filled by the patient on a separate Performa filled by each participant before they underwent the serum uric acid analysis. Polypharmacy was defined as patients using more than one medication in routine to control their blood pressure.

Descriptive statistics were used to describe the characteristics of participants and the distribution of hyperuricemia status. Variables in this study included age, gender, smoking, polypharmacy and duration of illness (hypertension). All statistical analysis was performed using Statistics Package for Social Sciences version 24.0. The chi-square test was used, and differences between groups were considered significant if *p*-values were ≤0.05.

RESULTS

Three hundred ten patients with hypertension were approached to participate in this study. Two were not interested and did not give consent. Eight either have uric acid level disturbances before the onset of hypertension or have malignancy. Thus, 300 patients with HTN were finally included in the study analysis. Out of 300 patients with hypertension, 187(62.3%) had no hyperuricemia, while 113(37.7%) showed the presence of hyperuricemia on routine analysis. The mean age of the study participants was 41.72±6.98 years. 168(56%) were males, while 132(44%) were females. The mean duration of hypertension among the patients in this study was 6.61±2.75 years. Table showed that polypharmacy and long duration of illness had a significant association with the presence of hyperuricemia among the study participants (*p*-value<0.001 for both variables). At the same time, gender, increasing age and tobacco smoking were not significantly associated in our study when binary logistic regression was applied.

Table: Characteristics of the Hypertension Patients and Presence of Hyperuricemia (n=300)

Characteristics	No Hyperuricemia (n=187)	Hyperuricemia (n=113)	*p*-value
Age			
25-40 years	75(40.1%)	47(41.6%)	0.800
>40 years	112(59.9%)	66(58.4%)	
Gender			
Male	89(47.6%)	43(38.1%)	0.106
Female	98(52.4%)	70(61.9%)	
Duration of Illness			
<5 years	167(89.3%)	82(72.6%)	<0.001
>5 years	20(10.7%)	31(27.4%)	
Smoking			
Non Smoker	143(76.5%)	79(69.9%)	0.212
Smoker	44(23.5%)	34(30.1%)	
Poly-Pharmacy			
No	96(51.3%)	31(27.4%)	<0.001
Yes	91(48.7%)	82(72.6%)	

DISCUSSION

More than 37% of patients with HTN showed the presence of hyperuricemia in our analysis. Limited data has been available in Pakistan regarding the relationship between HN and hyperuricemia.[13,14] Our results have been in accordance with the studies done on a similar subject in other parts of the world by Kuwabara *et al.* in 2019 and Lin *et al.*[10,11]

Ouppatham *et al.* in the Thai population, showed similar results and concluded that uric acid levels are affected by several variables other than renal profile. Age, body mass index, gender and serum cholesterol levels were all extra-renal factors directly related to raised uric acid levels in their patients. In addition, both systolic and diastolic blood pressure were significant predictors of hyperuricemia in their patients.[15] Our results strengthen their results. This study has been similar to ours in terms of the study population.

Raja *et al.* revealed that hypertension and the treatment of hypertension might also be related to hyperuricemia. They found that thiazide diuretics were strongly related to the presence of hyperuricemia in their patients. The more years patients were on these medications to control blood pressure, the more chances they had of developing hyperuricemia.[16] This study is very important as it is done on the patients of our own country. Salem *et al.* published interesting results in this regard as well. They incorporated a lot of common clinical conditions and patients taking various pharmacological agents. Anti-hypertensive drugs had a significant relationship with the presence of hyperuricemia or gout in their study.[17] Results of our study were not different in this regard, and the use of more than one pharmacological agent to control hypertension merged as a significant risk factor for developing hyperuricemia. Another local study done by Khan *et al.* postulated that losartan might help lower the uric acid levels raised by thiazide diuretics confirming that all hypertensive drugs interfere with the metabolism or excretion of uric acid in one way or other.[18] Lin *et al.* from China also reported similar findings highlighting the fact that hyperuricemia hypertensive subjects demonstrated a corresponding elevation of serum uric acid and serum creatinine irrespective of diuretic use. Elevation of serum uric acid and serum creatinine may represent a progression of renal function impairment.[19] This throws light on the direct and indirect effects of hypertension or medications used for hypertension on uric acid levels.

Long duration of hypertension, may it be well managed and controlled, emerged as a risk factor for the presence of raised uric acid levels among the study participants. Feig *et al.* in 2012 stated similar findings and came up with the idea that both sodium and uric acid levels affect blood pressure and in the acute phase, it is more uric acid which regulates blood pressure, while in chronic hypertension, sodium is mainly responsible.[20] Therefore patients with long term hypertension may they be following lifestyle modifications and adherent with the medications; still level of suspicion for raised uric acid levels should be kept high, and it should be assessed as per clinicians suspicion.

LIMITATIONS OF STUDY

This study was cross-sectional in design, so the results could not be generalized. A cohort study following up on hypertension patients from the start with a group of normotensive people for comparison may give an accurate insight into this phenomenon.

CONCLUSION

Patients with hypertension showed a high frequency of hyperuricemia in our study. In addition, the long duration of hypertension and the use of multiple pharmacological agents to achieve adequate control of hypertension predicted the presence of raised levels of uric acid among hypertensive attending the routine outpatient clinic in our study.

Conflict of Interest: None.

Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

AA & MNAK: Data acquisition, data analysis, data interpretation, critical review, approval of the final version to be published.

IA & MZH: Study design, drafting the manuscript, data interpretation, critical review, approval of the final version to be published.

MSK & YS: Concept, critical review, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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