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Frequency of Hyperuricemia in Hypertensive Patients Presenting to Ayub Teaching Hospital

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ABSTRACT

Background: Hyperuricemia is increasingly recognized as a common comorbidity in patients with hypertension and a potential contributor to cardiovascular risk. This study aimed to determine the prevalence of hyperuricemia among hypertensive patients presenting to a tertiary care hospital and to identify associated demographic and clinical factors. **Methods:** A cross-sectional study was conducted on 176 hypertensive patients attending Ayub Teaching Hospital, Abbottabad from September 2024 to February 2025. Hyperuricemia was defined as serum uric acid >7 mg/dL in males or >6 mg/dL in females. Data on demographics, clinical characteristics, and relevant factors (including gender, age, obesity, diabetes, dyslipidemia, alcohol consumption, diuretic use, chronic kidney disease, smoking, hypertriglyceridemia, and central obesity) were collected. Associations were analyzed using Chi-square tests of independence. **Results:** The prevalence of hyperuricemia in hypertensive patients was 61.4% (108/176 patients) in our study. Hyperuricemia showed significant associations with male gender, older age (≥60 years, obesity (BMI ≥30 kg/m^2; diuretic use, chronic kidney disease, smoking, hypertriglyceridemia, and central obesity. No significant associations were found with diabetes, overall dyslipidemia, beta-blocker use, or ACE inhibitor/ARB use. **Conclusion:** Hyperuricemia is highly prevalent in hypertensive patients in tertiary care settings, with strong links to male gender, advanced age, obesity-related factors, renal impairment, smoking, and diuretic therapy. These findings highlight the need for routine uric acid screening in high-risk hypertensive subgroups to facilitate early intervention and mitigate associated cardiovascular complications.

INTRODUCTION

Hypertension affects an estimated 1.13 billion people worldwide and the World Health Organization reports that it is implicated in 13% of deaths globally.[1] The etiology of essential hypertension is multifactorial and complex, with an increasing number of contributory factors being appreciated in recent decades. There is a strong relationship between uric acid (UA) and blood pressure (BP) that is studied many times before.[2] Epidemiology of Hyperuricemia United States epidemiological data from 2007 to 2008 suggest that the prevalence of hyperuricemia in the adult population is as high as 21.4% and this continues to increase over time.[3] Over the past three decades, there has been an increasing appreciation that hyperuricemia is a strong independent predictor of hypertension and may indeed be causative. In 1994, Jossa and colleagues reported an independent association between Serum uric acid levels and the development of hypertension in 619 Italian males over 12 years of follow up; where age, BMI, serum cholesterol and serum triglyceride levels were controlled.[4,5] In more recent years, a host of clinical trials have demonstrated comparable findings.[6,7]

Cicero and colleagues selected 619 individuals from the Brisighella Heart Study and found a significant incremental increase in risk of hypertension and metabolic syndrome, along with an increase of carotid intima media thickness (CIMT), in those progressing from the second to fourth quartile of SUA measurement (from 23% to 56.3% for hypertension prevalence).[8] Essential hypertension has been reported in 89% of children and adolescents with UA levels > 5.5 mg/dL (> 330 µmol/L), compared with 30% in those with secondary hypertension and 0% in healthy controls or those diagnosed with white-coat hypertension.[9]

In research done by Poudel et al, the mean serum uric acid levels and number of patients with hyperuricemia was, significantly higher in hypertensive group, than those without hypertension (28.8% vs 13.7%) with Odds ratio of 2.55.[10] Shrivastav et al showed that the mean serum uric acid levels and hyperuricemic patients were significantly higher in newly diagnosed cases of essential hypertension

as compared to prehypertensive or normotensive controls (37.33% vs 14%). In another study by Bâ Hamidou Oumar et al, the prevalence of hyperuricemia was found to about 66% in hypertensive patients.[11]

The proposed research study aims to determine the frequency of hyperuricemia among a population of hypertensive patients as there is paucity of literature at the local level. The findings from this study will provide valuable insights into the burden of hyperuricemia in the hypertensive population, which can assist healthcare providers in making informed decisions regarding the routine screening and management of hyperuricemia in these patients. Additionally, the results may contribute to the development of clinical guidelines and protocols for the comprehensive care of hypertensive individuals.

MATERIALS AND METHODS

A cross-sectional study was conducted at Ayub Teaching Hospital, Abbottabad on 176 adult patients diagnosed with hypertension who presented to the medical outpatient department and wards during the study period from September 2024 to February 2025. Patients of both genders were included using a non-probability consecutive sampling technique, while those with acute illness, known gout, malignancy, or on urate-lowering therapy were excluded. After obtaining informed consent, demographic data and clinical characteristics including age, gender, duration of hypertension, smoking status, alcohol intake, medication history (diuretics, beta-blockers, ACE inhibitors/ARBs), and comorbid conditions such as diabetes mellitus, chronic kidney disease, dyslipidemia, obesity, hypertriglyceridemia, and central obesity were recorded using a structured proforma. Body mass index was calculated using standard methods, and central obesity was assessed by waist circumference. Blood samples were collected under aseptic conditions to measure serum uric acid and lipid profile using standard laboratory techniques. Hyperuricemia was defined as a serum uric acid level >7 mg/dL in males and >6 mg/dL in females. Data were analyzed using statistical software, with categorical variables expressed as frequencies and percentages. Associations between hyperuricemia and clinical variables were assessed using the Chi-square test, and a p-value ≤0.05 was considered statistically significant.

RESULTS

This cross-sectional study included 176 hypertensive patients presenting to a tertiary care hospital. Out of 176 patients, 108 had hyperuricemia (serum uric acid >7 mg/dL in males or >6 mg/dL in females), corresponding to a prevalence of 61.4%. The remaining 68 patients (38.6%) had normal uric acid levels. This observed prevalence was not significantly different from other studies reported frequency of 65% in similar populations from which sample size is calculated.

The study population consisted of 100 males (56.8%) and 76 females (43.2%), with patients stratified into <60 years (45.5%) and ≥60 years (54.5%). Obesity (BMI ≥30 kg/m^2) was present in 39.8% of patients, diabetes in 28.4%, and dyslipidemia in 45.5% and diuretic use in 34.1% as shown in details in table 1. Additional metabolic factors included chronic kidney disease (eGFR <60 mL/min/1.73m^2) in 28.4%, smoking in 33.0%, hypertriglyceridemia in 38.6%, and central obesity in 50.0% as shown in table 2.

Hyperuricemia showed statistically significant associations with several variables. It was more prevalent in males. It was also more common in patients ≥60 years. Obesity was present in 50/108 (46.3%) of hyperuricemic patients. Diuretic use was reported in 45/108 (41.7%) of hyperuricemic cases. Chronic kidney disease was observed in 38/108 (35.2%) hyperuricemic patients. Smoking was higher (42/108 or 38.9%. Hypertriglyceridemia was present in 48/108 (44.4%; and central obesity was found in 62/108 (57.4%).

Table 1

Demographic and Clinical Characteristics of Hypertensive Patients by Hyperuricemia Status (n = 176)

Variable	Category	Hyperuricemia Present(n=108)	Hyperuricemia Absent (n=68)	Total (n=176)	p-value (Chi-square)
Gender	Male	70 (64.8%)	30 (44.1%)	100 (56.8%)	0.011
	Female	38 (35.2%)	38 (55.9%)	76 (43.2%)	
Age Group	<60 years	40 (37.0%)	40 (58.8%)	80 (45.5%)	0.008
	≥60 years	68 (63.0%)	28 (41.2%)	96 (54.5%)	
Obesity (BMI ≥30 kg/m^2)	Yes	50 (46.3%)	20 (29.4%)	70 (39.8%)	0.038
	No	58 (53.7%)	48 (70.6%)	106 (60.2%)	
Diabetes Mellitus	Yes	35 (32.4%)	15 (22.1%)	50 (28.4%)	0.190
	No	73 (67.6%)	53 (77.9%)	126 (71.6%)	
Dyslipidemia	Yes	55 (50.9%)	25 (36.8%)	80 (45.5%)	0.093
	No	53 (49.1%)	43 (63.2%)	96 (54.5%)	
Diuretic Use	Yes	45 (41.7%)	15 (22.1%)	60 (34.1%)	0.012
	No	63 (58.3%)	53 (77.9%)	116 (65.9%)	
Smoking status	Yes	42 (38.9%)	16 (23.5%)	58 (33%)	0.032
	No	66 (61.1%)	52 (76.5%)	118 (67%)	

Table 2

Metabolic and Renal Factors

Variable	Category	Hyperuricemia Present (n=108)	Hyperuricemia Absent (n=68)	Total (n=176)	p-value (Chi-square)
eGFR Category	<60 mL/min/1.73m^2	38 (35.2%)	12 (17.6%)	50 (28.4%)	0.009
	≥60 mL/min/1.73m^2	70 (64.8%)	56 (82.4%)	126 (71.6%)	
Hypertriglyceridemia	Yes	48 (44.4%)	20 (29.4%)	68 (38.6%)	0.041
	No	60 (55.6%)	48 (70.6%)	108 (61.4%)	
Central Obesity	Yes	62 (57.4%)	26 (38.2%)	88 (50.0%)	0.011
	No	46 (42.6%)	42 (61.8%)	88 (50.0%)	

No significant associations were found with diabetes mellitus, overall dyslipidemia, beta-blocker use or ACE inhibitor/ARB use.

These results highlight that hyperuricemia is highly prevalent in this tertiary care hypertensive cohort and is strongly linked to male gender, advanced age, obesity-

related factors, renal impairment, smoking, and diuretic therapy. The findings suggest hyperuricemia as a common comorbidity in hypertensive patients with metabolic and renal burden, warranting routine screening in high-risk subgroups.

DISCUSSION

The present study demonstrated a high frequency of hyperuricemia among hypertensive patients, reinforcing findings from other tertiary care settings in Pakistan where significant proportions of hypertensive subjects exhibit elevated serum uric acid levels.[12, 13.] Relative to community studies that report lower prevalence estimates, hospital-based cohorts such as ours often reflect more advanced disease and multiple comorbidities, consistent with broader evidence linking hyperuricemia and hypertension.[14,15] Internationally, various epidemiological analyses suggest a significant association between elevated uric acid levels and increased risk of hypertension and cardiovascular mortality, emphasizing the global relevance of this comorbidity.[16]

Our findings of significant relationships between hyperuricemia and male gender, older age, obesity, central obesity, and dyslipidemia traits mirror patterns observed in regional research indicating that demographic and metabolic factors may amplify the interplay between serum urate and blood pressure regulation.[12,17] The pathophysiological basis for such associations likely involves endothelial dysfunction, oxidative stress, and impaired renal handling of urate, mechanisms supported by recent reviews of uric acid research and its links to vascular disease.[18,19]

The observed association with chronic kidney disease and diuretic use is also in line with research showing that reduced renal excretion and certain antihypertensive therapies commonly contribute to elevated uric acid levels, potentially complicating hypertension management.[16] Smoking as a risk correlate further underscores the influence of lifestyle factors on cardiometabolic health in hypertensive populations.[17]

Although our study did not find statistically significant associations with diabetes and overall dyslipidemia, other Pakistani and international studies have reported variable results, suggesting that the interplay between hyperuricemia and these comorbidities may depend on population characteristics and study design.[12,20] Taken together, our results and the current literature support routine assessment of serum uric acid as part of comprehensive cardiovascular risk evaluation in hypertensive patients, especially in high-risk subgroups.

CONCLUSION

Hyperuricemia is highly prevalent among hypertensive patients presenting to a tertiary care hospital, affecting more than half of the study population. It shows significant associations with male gender, advancing age, obesity, central adiposity, smoking, diuretic use, hypertriglyceridemia, and chronic kidney disease, highlighting its close link with cardiometabolic and renal risk factors. These findings underscore the importance of routine screening for serum uric acid in hypertensive patients, particularly in high-risk subgroups, to enable early identification and comprehensive management. Incorporating uric acid assessment into standard hypertension care may help reduce future cardiovascular and renal complications and improve overall patient outcomes.

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