

Frequency of Hyperuricemia in Hypertensive Patients: A Descriptive Cross-Sectional Study at Karachi

Ejaz ul Haq¹, Abdul Hameed¹, Gohar Riaz¹, Hira Ahmad², Salman Khan¹ and Rukhsar Bibi²

ABSTRACT

Objective: To find out the frequency of hyperuricemia in patients with hypertension.

Study Design: A Descriptive Cross-Sectional Study

Place and Duration of Study: This study was conducted at the National Institute of Cardiovascular Diseases (NICVD), Karachi from 04-February 2022 to 04-November 2022.

Materials and Methods: Demographic profiles of the patients, like gender and age (years), weight (kg), height (cm), and BMI (kg/m²), were recorded. The total sample size was 191 patients. Patients with a prior history of hypertension and who have been prescribed antihypertensive medication for at least six months were classified as hypertensive. Patients with fasting serum uric acid levels ≥ 7.0 mg/dL were classified as suffering from hyperuricemia.

Results: The mean age was 52.86 ± 11.4 years. Mean BMI was $28.93 (\pm 6.8)$. There were a total of 191 patients. There were 117 (62%) males and 74 (38%) females. Male participants were more than females in this study. In this study 41 (21.47%) were smokers. Most of the participants (in this study had body mass index (BMI) of < 27.5 kg/m² while 19.9% had BMI > 27.5 kg/m². Diabetes was present in 44.7% (71) of the patients. In hypertensive patients, the total prevalence of hyperuricemia was 70(36.5%). Hyperuricemia was more common in diabetic patients (75.7%) compared to non-diabetics (24.3%). Similarly elderly patients (age > 50 years), active smokers and patients with sedentary lifestyle had higher frequency of hyperuricemia compared to younger patients (age < 50 years), non-smokers and patients with active lifestyle and the difference between these groups was statistically significant.

Conclusion: Hyperuricemia is a common metabolic condition and is present frequently in patients with hypertension. In our study its prevalence was 36.5%. Hyperuricemia was more common in smokers, diabetics, and elderly patients (age > 50 years)

Key Words: Hyperuricemia, Hypertension (HTN), coronary heart disease (CHD)

Citation of article: Ejaz ul Haq, Hameed A, Riaz G, Ahmad H, Khan S, Bibi R. Frequency of Hyperuricemia in Hypertensive Patients: A Descriptive Cross-Sectional Study at Karachi. Med Forum 2023;34(7):142-145. doi:10.60110/medforum.340733.

INTRODUCTION

Hypertension is a prevalent chronic condition that impacts over one billion people globally¹. It is a severe disease. In the United States, 65 million adults suffer from hypertension². Hypertension could lead to CHD, CHF, ischemic and hemorrhagic stroke, renal failure, and peripheral arterial disease³.

¹. Department of Interventional Cardiology / Adult Cardiology², National Institute of Cardiovascular Diseases, (NICVD), Karachi.

Correspondence: Hira Ahmad, Consultant Cardiologist, Provincial Headquarter Hospital Gilgit
Contact No: 0332-5200427
Email: hiraahmad1289@gmail.com

Received: February, 2023
Accepted: April, 2023
Printed: July, 2023

Hyperuricemia is a condition that involves metabolic disruption of purine nucleotide and is considered a precursor to gout. In the last ten years, there has been a noticeable growth in incidence rates, although there has been limited investigation into its prevalence within the Chinese population⁴.

Several subsequent cross-sectional and longitudinal studies have indicated that serum uric acid serves as a separate predictor of hypertension⁵. The present study conducted a meta-analysis of 18 prospective studies, comprising a total of 55,607 participants, to investigate the association between hyperuricemia and incident hypertension. The findings indicated that hyperuricemia was a significant predictor of incident hypertension, increased the risk by 13% observed per 1mg/dl increase in serum uric acid levels⁶. The correlation, however, may exhibit variability based on demographic factors such as age and gender, with a greater degree of significance observed among female and younger participants⁷ Liu et al⁸ have reported that the incidence of prehypertension is accurately predicted by

hyperuricemia. It is known that serum uric acid may also be influenced by exogenous factors such as diet and drug usage, which revealed that BMI is an independent risk factor for raised serum uric acid levels⁹.

According to a 2015 systematic review, population-based evidence has been published regarding the prevalence of HU in 24 countries. Previous studies have reported a greater incidence of hyperuricemia (HU) in the Asian population, particularly in East Asia. However, there currently needs to be more data pertaining to the prevalence of HU in South Asia¹⁰. 9.3% of the population, according to Bangladeshi research published in 2018, has hyperuricemia¹¹. 25.8% of Indians were predicted to have hyperuricemia in 2018, with diabetics, hypertensives, and diabetic hypertensives accounting for most cases¹².

MATERIALS AND METHODS

This cross-sectional study was conducted at National Institute of Cardiovascular Diseases (NICVD), Karachi from 04-February 2022 to 04-November 2022 after approval from the hospital ethical committee. Informed consent was obtained from all participants. The patient's gender, age, weight, height, and BMI will be recorded. Operational definitions require patients' diabetes, smoking, obesity, and sedentary lifestyle backgrounds. The working definition will be used to evaluate and record hyperuricemia. Inclusion and exclusion criteria and stratification will limit bias and confounding. Patient data will be secured. The total sample size was 191 patients who were consecutively enrolled. Patients with past history of HTN and are on anti-hypertensive treatment for at least six months were reported hypertensive. Patients with fasting plasma uric acid ≥ 7.0 mg/dl were labelled hyperuricemia.

Data will be analyzed by using SPSS version-21. Shapiro-Wilk test will be applied to check the hypothesis of normality for age (years), weight (kg), height (cm), and BMI (kg/m²) and descriptive statistics such as mean \pm SD, median (IQR), maximum and minimum will be calculated appropriately. Frequency and percentages will be calculated for categorical variables such as gender, age group, diabetes mellitus, smoking, obesity, sedentary lifestyle, and hyperuricemia. Effect modifiers like age groups, gender, diabetes mellitus, smoking, obesity, and a sedentary lifestyle will be controlled through stratification. Post-stratification chi-square test or Fisher exact test will be applied. P-value of ≤ 0.05 will be taken as a criterion of statistical significance. For the graphical presentation of data, bar graphs and pi-charts will be used.

RESULTS

The total sample size was 191 patients consecutively enrolled to analyses the frequency of hyperuricemia in hypertensive patients. Mean age was 52.86 (± 11.4)

(SD) years, ranging from (85 -35) years; average height and weight were found to be 164.95 (± 9.3) & 82.58 (± 17.1), BMI was 28.93 (± 6.8) as presented in (Table 1). Out of 191 patients 117(62%) were male and 74(38%) were female. Males were more predominant as compared to females. (Chart-1) Smoking status was as follows, 41(21.47%) of the patients were smokers, and the rest were non-smokers. The frequency distribution of diabetes is presented in (Chart 2). body mass index (BMI) of <27.5 kg/m² was observed in 80.1% (153) , and the remaining 19.9% (38) had a BMI of ≥ 27.5 kg/m² and were obese. Diabetes was present in 44.7% (71) of the patients, and 55.3% (88) were nondiabetic. Only a few hypertensive patients, 17.8%, had a sedentary lifestyle, accounting for 34. The overall frequency of hyperuricemia was 70(36.5%) in Hypertensive patients.

Table No. 1: Descriptive Statistics of the study characteristics in Hypertensive Patients (n=191)

Descriptive Statistics	Mean \pm SD	Range (Max-Min)
Age (Years)	52.86 (± 11.4)	(85 -35)
Weight (Kg)	82.58 (± 17.1)	(110 -36)
Height (Cm)	164.95 (± 9.3)	(180 -150)
Weighty in (Kg)	1.65 (± 0.1)	(1.8 -1.5)
BMI (kg/m ²)	28.93 (± 6.8)	(47.8 -18.17)

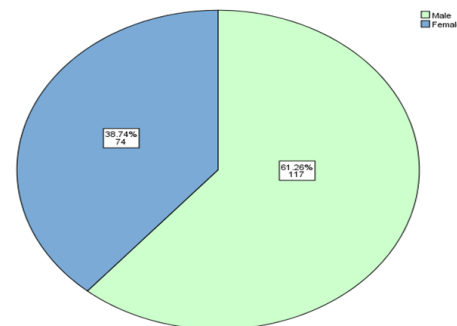


Chart No. 1: Classification of gender distribution in Hypertensive Patients

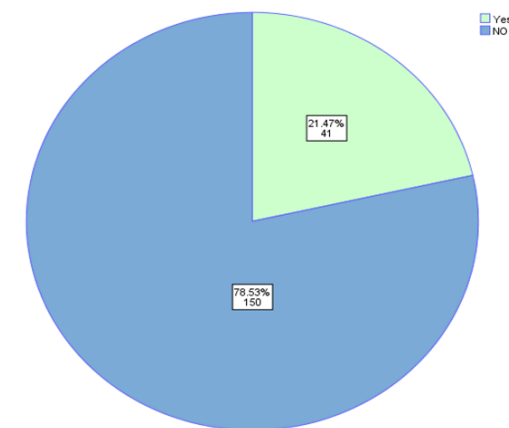


Chart No. 2: Classification of Smoking Status in Hypertensive Patients

Classification of age groups was divided into two categories, with 45.5% (87) adults (≤ 50 years) and 54.5% (104) more than (>50 years) of age. Comparison of hyperuricemia among baseline and confounding factors, Age groups, diabetes mellitus, smoking status and sedentary lifestyle were significantly associated. 52 (74.29%) out of 70 presented hyperuricemia patients who belong to age >50 years of age (P-value $<0.001^*$), 53(75.71%)/72 diabetic patients significantly contributed with hyperuricemia groups,(P-value $<0.001^*$), Similarly, Patients who do not smoke associated considerably with hyperuricemia, (P-value $<0.001^*$). Furthermore, patients who were not active and of a sedentary lifestyle are significantly associated with hyperuricemia (P-value $<0.001^*$), as shown on (Table-2-6).

Table No. 2: Comparison of Age groups with hyperuricemia in hypertensive patients (n=191)

Age Groups	Hyperuricemia			P-value
	Yes	NO	Total	
<50 Years	18 (25.71%)	69 (57.02%)	87 (45.55%)	$<0.001^*$
>50 Years	52 (74.29%)	52 (42.98%)	104 (54.45%)	
Total	70 (100%)	121 (100%)	191 (100%)	

Table No. 3: Comparison of gender distribution with hyperuricemia in hypertensive patients (n=191)

Gender	Hyperuricemia			P-value
	Yes	NO	Total	
Male	46 (65.71%)	71 (58.68%)	117 (61.26%)	0.336
Female	24 (34.29%)	50 (41.32%)	74 (38.74%)	
Total	70 (100%)	121 (100%)	191 (100%)	

Table No. 4: Comparison of diabetes mellitus (T2DM) distribution with hyperuricemia in hypertensive patients (n=191)

DM	Hyperuricemia			P-value
	Yes	NO	Total	
Yes	53 (75.71%)	19 (15.7%)	72 (37.7%)	$<0.001^*$
NO	17 (24.29%)	102 (84.3%)	119 (62.3%)	
Total	70 (100%)	121 (100%)	191 (100%)	

Table No. 5: Comparison of smoking status with hyperuricemia in hypertensive patients (n=191)

Smoking Status	Hyperuricemia			P-value
	Yes	NO	Total	
Yes	34 (48.57%)	7 (5.79%)	41 (21.47%)	$<0.001^*$
NO	36 (51.43%)	114 (94.21%)	150 (78.53%)	
Total	70 (100%)	121 (100%)	191 (100%)	

Table No. 6: Comparison of sedentary lifestyle with hyperuricemia in hypertensive patients (n=191)

Sedentary Life Style	Hyperuricemia			P-value
	Yes	NO	Total	
Yes	25 (35.71%)	9 (7.44%)	34 (17.8%)	$<0.001^*$
NO	45 (64.29%)	112 (92.56%)	157 (82.2%)	
Total	70 (100%)	121 (100%)	191 (100%)	

DISCUSSION

It has been estimated that hypertension has a global prevalence of 1.4 billion people, and according to the World Health Organization, it is associated with 13% of global mortality¹²⁻¹³. Hypertension is one of the main causes of mortality and disability globally, accounting for 3.4 million deaths in 2010 alone¹⁴. In Pakistan, hypertension was 21.6% in urban areas and 16.2% in rural areas¹⁵. According to Tanaguchi et al.¹⁶ Male patients with hyperuricemia in Osaka, Japan, were shown to be more likely to develop hypertension than patients with normal uric acid levels. This is consistent with the study's results. The prevalence of hyperuricemia was 65% in hypertensive patients in one of the investigations conducted by Dasti et al.¹⁷ in 2015 in a rural area of Pakistan, with a mean value for the plasma uric acid level 13.74. Age (p <0.01) and gender (p <0.05)-related statistical significance was also discovered for this. This differs from our results in that, whereas we found a positive correlation between hyperuricemia and hypertension, no such connection was identified in age. Bilal et al.¹⁸ found hyperuricemia in around 42% of hypertension patients in another study in Pakistan. According to a survey by Raina et al. in Sub-Himalayan India, hyperuricemia was more common in hypertension patients than normotensive patients (p <0.05). Around one billion people all over the world have been diagnosed with hypertension¹. Hypertension is a main public health problem in Pakistan and other countries. The results of the current study indicate that hyperuricemic patients with hypertension might have uncontrolled blood pressure despite effective antihypertensive therapy, which is clinically significant; Ramsay et al.¹⁹, in his analysis of 73 men with untreated hypertension, had 18 patients with raised serum uric acid levels (25%).

CONCLUSION

Hyperuricemia is a common metabolic condition and is present frequently in patients with hypertension. In our study its prevalence was 36.5%.Hyperuricemia was more common in smokers, diabetics, and elderly patients (age >50 years) and those with sedentary lifestyle. All hypertensive patients should therefore be screened for hyperuricemia and managed promptly if

they have hyperuricemia to decrease the risk of cardiovascular diseases.

Author's Contribution:

Concept & Design of Study: Ejaz ul Haq
 Drafting: Abdul Hameed,
 Gohar Riaz
 Data Analysis: Hira Ahmad, Salman
 Khan, Rukhsar Bibi
 Revisiting Critically: Ejaz ul Haq, Abdul
 Hameed
 Final Approval of version: Ejaz ul Haq

Conflict of Interest: The study has no conflict of interest to declare by any author.

REFERENCES

- Mills KT, Stefanescu A, He J. The global epidemiology of hypertension. *Nat Rev Nephrol* 2020;16(4):223-37.
- Muntner P, Carey RM, Gidding S, Jones DW, Taler SJ, Wright JT, et al. Potential US Population Impact of the 2017 ACC/AHA High Blood Pressure Guideline. *Circulation* 2018;137(2):109-18.
- Benjamin EJ, Muntner P, Alonso A, Bittencourt MS, Callaway CW, Carson AP, et al. Heart Disease and Stroke Statistics-2019 Update: A Report From the American Heart Association. *Circulation* 2019;139(10):e56-e528.
- Song J, Jin C, Shan Z, Teng W, Li J. Prevalence and Risk Factors of Hyperuricemia and Gout: A Cross-sectional Survey from 31 Provinces in Mainland China. *J Transl Int Med* 2022;10(2):134-45.
- Mazzali M, Hughes J, Kim YG, Jefferson JA, Kang DH, Gordon KL, et al. Elevated uric acid increases blood pressure in the rat by a novel crystal-independent mechanism. *Hypertension* 2001;38(5):1101-6.
- Grayson PC, Kim SY, LaValley M, Choi HK. Hyperuricemia and incident hypertension: a systematic review and meta-analysis. *Arthritis Care Res (Hoboken)* 2011;63(1):102-10.
- Li C, Hsieh MC, Chang SJ. Metabolic syndrome, diabetes, and hyperuricemia. *Curr Opin Rheumatol* 2013;25(2):210-6.
- Huang J, Sun Y, Niu K, Wan Z, Yao W, Gao Y, et al. Does elevated serum uric acid level predict the hypertension incidence? A Chinese prospective cohort study. *Clin Exp Hypertens* 2015;37(6):498-504.
- Villegas R, Xiang YB, Cai H, Elasy T, Cai Q, Zhang X, et al. Lifestyle determinants of C-reactive protein in middle-aged, urban Chinese men. *Nutr Metab Cardiovasc Dis* 2012;22(3):223-30.
- Chen-Xu M, Yokose C, Rai SK, Pillinger MH, Choi HK. Contemporary prevalence of gout and hyperuricemia in the United States and decadal trends: the National Health and Nutrition Examination Survey, 2007–2016. *Arthritis Rheumatol* 2019;71(6):991-9.
- Ali N, Perveen R, Rahman S, Mahmood S, Rahman S, Islam S, et al. Prevalence of hyperuricemia and the relationship between serum uric acid and obesity: A study on Bangladeshi adults. *PLoS One* 2018;13(11):e0206850.
- Billa G, Dargad R, Mehta A. Prevalence of Hyperuricemia in Indian Subjects attending Hyperuricemia Screening Programs-A Retrospective Study. *J Assoc Physicians Ind* 2018; 66(4):43-6.
- Al-Makki A, DiPette D, Whelton PK, Murad MH, Mustafa RA, Acharya S, et al. Hypertension Pharmacological Treatment in Adults: A World Health Organization Guideline Executive Summary. *Hypertension* 2022;79(1):293-301.
- Lim SS, Vos T, Flaxman AD, Danaei G, Shibuya K, Adair-Rohani H, et al. A comparative risk assessment of burden of disease and injury attributable to 67 risk factors and risk factor clusters in 21 regions, 1990-2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet* 2012;380(9859):2224-60.
- Basit A, Tanveer S, Fawwad A, Naeem N, Members N. Prevalence and contributing risk factors for hypertension in urban and rural areas of Pakistan; a study from second National Diabetes Survey of Pakistan (NDSP) 2016–2017. *Clin Experimental Hypertension* 2020;42(3):218-24.
- Taniguchi Y, Hayashi T, Tsumura K, Endo G, Fujii S, Okada K. Serum uric acid and the risk for hypertension and Type 2 diabetes in Japanese men: The Osaka Health Survey. *J Hypertens* 2001;19(7):1209-15.
- Dasti MA, Hashmi SFA, Shah NA, Hussain SS, Gohar M, Farah Z, et al. Essential Hypertension: Hyperuricemia in Patients. *The Professional Med J* 2015;22(12):1555-9.
- Shah SSUH, Iqbal U, Ahmad E. Frequency of Hyperuricemia in Hypertensive Patients and its Association with Age of Patient. *Pak Armed Forces Med J* 2021;71(1):304-08.
- Yokokawa H, Fukuda H, Suzuki A, Fujibayashi K, Naito T, Uehara Y, et al. Association Between Serum Uric Acid Levels/Hyperuricemia and Hypertension Among 85,286 Japanese Workers. *J Clin Hypertens (Greenwich)* 2016;18(1):53-9.