

Frequency of Hyperuricemia in Hypertensive Patients Presenting at Lady Reading Hospital Peshawar

Sadiq Ullah*, Muhammad Bilal

Department of General Medicine, Lady Reading Hospital, Peshawar, Pakistan

*Corresponding author's email address: drmba@yahoo.com

(Received, 29th January 2025, Accepted 19th May 2025, Published 31st May 2025)

Abstract: Hyperuricemia is increasingly recognized as a metabolic abnormality associated with hypertension and cardiovascular risk. Elevated serum uric acid may contribute to endothelial dysfunction, renal vascular injury, and poor blood pressure control. Identifying its burden among hypertensive patients may help improve risk stratification and clinical management. **Objective:** To determine the frequency of hyperuricemia in hypertensive patients presenting at Lady Reading Hospital, Peshawar. **Methods:** We analyzed 203 patients who were presented with hypertension, which was defined as systolic blood pressure ≥ 140 mmHg and/or diastolic blood pressure ≥ 90 mmHg on two occasions and a known history of antihypertensive drug use for at least three years, from 28-July-2024 to 28-January-2025 in the Department of General Medicine, Lady Reading Hospital, Peshawar. Hyperuricemia was diagnosed based on clinical symptoms and urine test showing serum uric acid level >6.97 mg/dL in men and >6.0 mg/dL in women. SPSS 25 was used for the presentation of hyperuricemia in terms of frequency and percentages. **Results:** Average age was 54.61 ± 10.10 years. Male patients were 16 (57.1%). The frequency of hyperuricemia was 113 (55.7%). The condition was significantly more frequent in male patients ($p=0.001$), patients with diabetes mellitus ($p<0.001$), patients with Body mass index (BMI) greater than 24.9 kg/m² ($p=0.01$) and smokers ($p < 0.001$). **Conclusion:** The frequency of hyperuricemia in hypertensive patients in our study was moderately high at 55.7%. Male gender, smoking, diabetes and elevated BMI were found to be associated with hyperuricemia.

Keywords: Hyperuricemia, Hypertension, Serum Uric Acid, Prevalence, Diabetes

[How to Cite: Ullah S, Bilal M. Frequency Of Hyperuricemia In Hypertensive Patients Presenting At Lady Reading Hospital Peshawar. *Biol. Clin. Sci. Res. J.*, 2025; 6(5): 435-438. doi: <https://doi.org/10.54112/bcsrj.v6i5.2258>

Introduction

Hypertension (HTN) constitutes an enormous worldwide medical concern. Studies indicated that approximately 47% of adult population are impacted by HTN (1). The identification of the root causes of HTN presents a complex challenge, attributed to intricate relationship between genetic factors as well as environmental factors. Multiple factors are involved in development of HTN, rendering it an intricate matter for comprehension (2, 3). The relationship between elevated serum uric acid (SUA) levels and HTN has been a topic of significant debate along with thorough investigation within medical field (4-6). Some studies have found a potential association between HU and HTN; yet, it is essential to consider different confounding variables that could influence this association. It is essential to consider interconnected variables when analyzing relationship HTN and HU (7, 8).

Serum uric acid levels can be influenced by external factors, which include dietary habits along with medication use. Additionally, it has been demonstrated that BMI can be considered a risk factor for elevated serum uric acid concentrations. A separate study showed that the prevalence of HU was 74.45% within patients diagnosed with HTN (9, 10). Establishing an unambiguous link between HU and HTN demands thorough investigation of confounders to prevent oversimplification along with to enhance the accuracy of understanding underlying mechanisms involved. In the developing world, there is a scarcity of data concerning the burden of HU while its potential association with HTN. Another study established a positive relationship between HU and HTN (11-13).

HTN is a major public health concern worldwide and emerging evidence suggests a significant association between HU and development or worsening of hypertension. Hyperuricemia has been proposed to contribute to vascular dysfunction and inflammation, all of which play roles in blood pressure regulation. Most existing studies have been conducted in Western or high-income countries that leaving a knowledge gap regarding its prevalence and clinical relevance in other demographic

settings. This study aims to determine the frequency of HU in HTN cases to fill this gap and provide population specific data that could guide screening strategies and inform comprehensive hypertension management.

Methodology

This cross-sectional study was carried out from 28-July-2024 to 28-January-2025 in the Department of General Medicine, Lady Reading Hospital, Peshawar. Ethical approval was taken from the hospital before commencing the study. We determined a sample of 203 patients using the World Health Organization's sample size calculator. This calculation was based on the frequency of hyperuricemia 74.45% among hypertensive patients from a previous study (10) with 95 percent confidence level and margin of error set at six percent. The recruitment of participants followed a non-probability consecutive sampling technique.

We included adult patients having gender aged between 30 and 70 years who were confirmed with hypertension. The diagnosis of hypertension was made on the basis of the presence of clinical symptoms such as headaches, blurred vision and arrhythmia. Further diagnosis was made if the systolic blood pressure reading was 140 mm Hg or higher and/or diastolic blood pressure was 90 mm Hg or higher on two separate occasions. Patients who were already on antihypertensive medication for a period of at least three years were also included. Patients presenting with chronic kidney disease, those diagnosed with psoriasis, patients with active malignancies and pregnant women were excluded.

The data collection procedure was initiated after securing consent from all patients. A proforma was utilized to record detailed demographics including patient's age, gender, profession, educational status, area of residence and financial background along with smoking and diabetes. All the patients were evaluated for the presence of hyperuricemia. The confirmation of hyperuricemia was based on the presence of symptoms such as joint pain (VAS >3) and the formation of tophi or joint stiffness.



Diagnosis was affirmed through a urine test with hyperuricemia being labelled positive for serum uric acid levels exceeding 6.97 mg/dl in males and 6.0 mg/dl in females. The entire patient assessment was done under the supervision of an experienced consultant.

All the gathered data was analyzed with SPSS 25. Age, height, weight, body mass index and serum uric acid levels were presented using mean and standard deviation. Categorical demographics, smoking, diabetes and hyperuricemia were presented using frequency and percentages. The associations between the demographics and hyperuricemia were then analyzed using the Chi-square test with a predetermined level of significance set at 5%.

Results

Two hundred three hypertensive patients were included in this study. Their average age was 54.61 ± 10.10 years. Our cohort had 116 (57.1%)

males and 87 (42.9%) females. There were 57 (33%) smoker and diabetes was present in 49 patients (24.1%) patients (Table 1). Hyperuricemia was identified in 113 patients (55.7%). The remaining 90 patients (44.3%) did not have hyperuricemia (Table 2). A strong association was observed with gender, we observed that 76 (67.3%) of the hyperuricemic patients were male (P = 0.001). The presence of diabetes was also linked to hyperuricemia. Among those with hyperuricemia 42 (37.2%) were diabetic (P < 0.001). In patients with hyperuricemia there were 57 (50.%) smokers (P = < 0.001). BMI was another major factor. A higher BMI exceeding 24.9 kg/m² was found in 75 (66.4%) of the hyperuricemic patients (P = 0.01). No association was found between hyperuricemia and age groups (p=0.47) (Table 3).

Table 1: Demographics Characteristics of study population

Demographics		Mean	SD
Age (Years)		54.61	10.102
Serum uric acid level (ng/dl)		6.9762	1.16519
BMI (Kg/m ²)		26.4486	2.70522
		n	%
Gender	Male	116	57.1%
	Female	87	42.9%
Area of living	Urban	119	58.6%
	Rural	84	41.4%
Financial background	Upper class	64	31.5%
	Middle class	95	46.8%
	Lower class	44	21.7%
Profession	Labor	38	18.7%
	Office work	56	27.6%
	Retired	65	32.0%
	Other	44	21.7%
Education status	Educated	115	56.7%
	Uneducated	88	43.3%
Smoking	Yes	67	33.0%
	No	136	67.0%
Diabetes	Yes	49	24.1%
	No	154	75.9%

Table 2: Frequency of hyperuricemia

Hyperuricemia	n	%
Yes	113	55.7%
No	90	44.3%

Table 3: Stratification of hyperuricemia with demographics

Demographics		Hyperuricemia				P value
		Yes		No		
		n	%	n	%	
Age groups (Years)	30 to 45	19	16.8%	18	20.0%	0.47
	46 to 60	55	48.7%	48	53.3%	
	> 60	39	34.5%	24	26.7%	
Gender	Male	76	67.3%	40	44.4%	0.001
	Female	37	32.7%	50	55.6%	
Smoking	Yes	57	50.4%	10	11.1%	< 0.001
	No	56	49.6%	80	88.9%	
Diabetes	Yes	42	37.2%	7	7.8%	< 0.001
	No	71	62.8%	83	92.2%	
BMI (Kg/m ²)	18.5 to 24.9	38	33.6%	46	51.1%	0.01
	> 24.9	75	66.4%	44	48.9%	

Chi square applied

Discussion

The demographic and clinical profile of our participants with a mean age of 54.61 years and male patients being in majority 57.1% is fairly consistent with other Pakistani studies. Shahid et al. and Ejaz et al. reported similar mean ages of 52.93 and 52.86 years respectively indicating that hypertension and its comorbidities are most frequently encountered in the fifth and sixth decades of life in our population.(14,15) The male preponderance in our study is echoed in the work of Ejaz ul Haq et al. with 62% males and Haroon et al. who reported 67.7% males, suggesting a consistent epidemiological pattern across different urban centers in Pakistan.(15,16) However it is noteworthy that Shahid et al. reported a female majority of 59.0% highlighting potential geographic or selection-based variations in patient demographics that warrant further exploration.(14)

The main finding of this study is a hyperuricemia frequency of 55.7% among hypertensive patients. This figure occupies a critical midpoint within the wide spectrum of prevalence rates reported in the literature from Pakistan. Ahad et.al reported 22.9% frequency of hyperuricemia in Swat and Philmon et al. reported 42.3% prevalence.(17,18). Our finding is substantially higher than the 40.3% by Shahid et al. and 36.5% reported by Ejaz ul Haq et al.(14,15) Our findings is closely aligned with the 60.9% reported by Haroon et al.(16) Another study by Khaliq et al. documented that among their cohort of patients with hyperuricemia, hypertension was present in more than 80% of the patients.(19)

This elevated prevalence of hyperuricemia in similar settings reinforce the concept of a strong pathophysiological link between elevated serum uric acid and hypertension, a connection well-established in international literature, it has been reported that an increase in blood pressure causes a raise in uric acid levels. (20) The mean serum uric acid level of 6.98 mg/dl in our cohort further validates the high burden of this metabolic disturbance in our hypertensive population.

We observed an association between hyperuricemia and male gender in our study with 67.3% of hyperuricemic patients being male. This finding is supported by Bocha et al. they documented a notable association between hyperuricemia and male gender. (21) The pathophysiological reason for this gender disparity often points towards the uricosuric effects of estrogen in pre-menopausal women offering a protective effect that diminishes after menopause.(22) Our data confirm this trend. Another association was observed with diabetes mellitus where 37.2% of hyperuricemic patients were diabetic compared to only 7.8% in the non-hyperuricemic group. This relationship was also identified as significant by Ejaz ul Haq et al. who reported that 75.7% of their hyperuricemic patients were diabetic.(15)

Furthermore our study identified a potential relationship between Body Mass Index (BMI) and hyperuricemia with 66.4% of hyperuricemic patients having a BMI greater than 24.9 kg/m². This aligns perfectly with the conclusions of Ahad et al. who found obesity to be a major factor which correlated with hyperuricemia and its mechanism is well-explained by increased uric acid production from heightened purine turnover and decreased renal excretion linked to hyperinsulinemia.(17)

Smoking is an independent cardiovascular risk factor which has direct contribution to uric acid elevation, as evident from our findings, we found that among the patients of hyperuricemia, majority were smokers (50.4%). This findings is affirmed by Ejaz et al. and Nguedia et al. who found that smoking was associated with hyperuricemia.(15,20)

The findings from this study strongly suggests that serum uric acid measurement should be integrated as a routine in the management of all hypertensive patients particularly males and those with co-existing diabetes or obesity. The early identification of hyperuricemia provides an opportunity for favorable interventions. We recommend that patients with hypertension should consider serious lifestyle modification along with cessation of smoking. Further studies should explore in depth the relation of hypertension and elevated uric acid levels by integrating a control arm.

Conclusion

In conclusion, the frequency of hyperuricemia in hypertensive patients in our study was moderately high at 55.7%. Risk factors identified in our study were male gender, smoking, diabetes and elevated BMI, they were found to be associated with hyperuricemia.

Declarations**Data Availability statement**

All data generated or analysed during the study are included in the manuscript.

Ethics approval and consent to participate

Approved by the department concerned. (Ref#191/LRH/MTI)

Consent for publication

Approved

Funding

Not applicable

Conflict of interest

The authors declared the absence of a conflict of interest.

Author Contribution**SU (Postgraduate Resident)**

Data Collection, Manuscript drafting, Study Design,

MB (Associate Professor)

Critical guidance and final approval of manuscript

All authors reviewed the results and approved the final version of the manuscript. They are also accountable for the integrity of the study.

References

1. Awan MU, Akram Z, Mushtaq HH, Niazi HS, Irshad L, Imtiaz R, et al. Prevalence of hypertension in people aged 40 years and above. *J Health Rehabil Res.* 2024;4(2):1524-1529. <https://doi.org/10.61919/jhrr.v4i2.1167>
2. Manosroi W, Williams GH. Genetics of human primary hypertension: focus on hormonal mechanisms. *Endocr Rev.* 2019;40(3):825-856. <https://doi.org/10.1210/er.2018-00071>
3. Ayogu RNB, Ezeh MG, Okafor AM. Prevalence and predictors of different patterns of hypertension among adults aged 20–60 years in rural communities of Southeast Nigeria: a cross-sectional study. *Arch Public Health.* 2021;79(1):210. <https://doi.org/10.1186/s13690-021-00724-y>
4. Amiya E. Link between hyperuricemia, renal dysfunction, and hypertension. *J Clin Hypertens (Greenwich).* 2021;23(12):2078-2079. <https://doi.org/10.1111/jch.14389>
5. Bezerra TTD, Bezerra LS, Santos-Veloso MAO, Lordsleem ABMDS, Lima SG. Association between hyperuricemia and hypertension: a case-control study. *Rev Assoc Med Bras (1992).* 2021;67(6):828-832. <https://doi.org/10.1590/1806-9282.20210021>
6. Lanaspá MA, Andres-Hernando A, Kuwabara M. Uric acid and hypertension. *Hypertens Res.* 2020;43(8):832-834. <https://doi.org/10.1038/s41440-020-0481-6>
7. Piani F, Cicero AFG, Borghi C. Uric acid and hypertension: prognostic role and guide for treatment. *J Clin Med.* 2021;10(3):448. <https://doi.org/10.3390/jcm10030448>
8. Alqahtani SAM, Awan ZA, Alasmay MY, Al Amoudi SM. Association between serum uric acid with diabetes and other biochemical markers. *J Family Med Prim Care.* 2022;11(4):1401-1409. <https://doi.org/10.4103/jfmpe.jfmpe.1833.21>

9. Yao J, Zhang Y, Zhao J, Lin YP, Lu QY, Fan GJ. Correlation of obesity, dietary patterns, and blood pressure with uric acid: data from the NHANES 2017–2018. *BMC Endocr Disord.* 2022;22(1):196. <https://doi.org/10.1186/s12902-022-01112-5>
10. 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):304-308. <https://doi.org/10.51253/pafmj.v71i1.2808>
11. Poudel B, Yadav BK, Kumar A, Jha B, Raut KB. Serum uric acid level in newly diagnosed essential hypertension in a Nepalese population: a hospital-based cross-sectional study. *Asian Pac J Trop Biomed.* 2014;4(1):59-64. [https://doi.org/10.1016/S2221-1691\(14\)60209-4](https://doi.org/10.1016/S2221-1691(14)60209-4)
12. Liu C, Qiu D, Zhang M, Hou J, Lin J, Liao H. Association of hyperuricemia and hypertension phenotypes in hypertensive patients without uric acid lowering treatment. *Clin Exp Hypertens.* 2021;43(6):516-521. <https://doi.org/10.1080/10641963.2021.1907397>
13. Muszyński P, Dąbrowski EJ, Paślawska M, Niwińska M, Kurasz A, Świączkowski M, et al. Hyperuricemia as a risk factor in hypertension among patients with very high cardiovascular risk. *Healthcare (Basel).* 2023;11(17):2460. <https://doi.org/10.3390/healthcare11172460>
14. Devanand, Shahid M, Mansoor S, Ishaq W, Hussain SF, Asim F. Frequency of hyperuricemia in hypertensive patients: a descriptive cross-sectional study. *J Popul Ther Clin Pharmacol.* 2024;31(3):783-788. <https://doi.org/10.53555/jptcp.v31i3.5027>
15. Haq EU, Hameed A, Riaz G, Ahmad H, Khan S, Bibi R. Frequency of hyperuricemia in hypertensive patients: a descriptive cross-sectional study at Karachi. *Medical Forum Monthly.* 2023;34(7):142-145.
16. 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. <https://doi.org/10.53350/pjmhs02024181233>
17. Ahad A, Qadir S, Khan S, Khan T, Khan S, Khalid F. Prevalence and correlates of hyperuricemia in patients with hypertension: a cross-sectional study from a tertiary care hospital in Pakistan. *Pak J Health Sci.* 2025;6(2):15-19. <https://doi.org/10.54393/pjhs.v6i2.2116>
18. Daka OP, Jember TB, Tesfa KH. Hyperuricemia and associated factors among hypertensive patients attending an academic hospital of Ethiopia: a cross-sectional study. *Metabol Open.* 2024;23:100312. <https://doi.org/10.1016/j.metop.2024.100312>
19. Khaliq A, Tariq AM, Khattak AL, Ali K, Satti SA, Rehman HY. Association of hyperuricemia with hypertension in Pakistani population. *J Bahria Univ Med Dent Coll.* 2020;10(2):98-101. <https://doi.org/10.51985/JBUMDC2019042>
20. Nguedia Assob JC, Ngowe MN, Nsagha DS, Njunda AL, Waidim Y, Lemuh DN, et al. The relationship between uric acid and hypertension in adults in Fako Division, SW Region Cameroon. *J Nutr Food Sci.* 2014;4(1):257. <https://doi.org/10.4172/2155-9600.1000257>
21. Bocha Y, Jafri A, Agha F, Najam U, Ahmed SZ, Mohyuddin S, et al. Age and gender specific associations between hyperuricemia and hypertension: a cross-sectional study in Karachi. *Pak J Health Sci.* 2025;6(6):165-170. <https://doi.org/10.54393/pjhs.v6i6.3086>
22. Naseem R, Zafar SMAF, Jawed S, Mukhtar S, Ijaz F, Aftab RK. Influence of serum estradiol on serum uric acid level in pre and postmenopausal women. *Professional Med J.* 2019;26(9):1587-1591. <https://doi.org/10.29309/TPMJ/2019.26.09.3720>



Open Access This article is licensed under a Creative Commons Attribution 4.0 International License, <http://creativecommons.org/licenses/by-nc/4.0/>. © The Author(s) 2025