



CORRELATING URIC ACID LEVELS WITH HYPERTENSION: INSIGHTS FROM A TERTIARY CARE HOSPITAL

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Abstract

Aim/Objective: To determine the frequency of hyperuricemia (high levels of uric acid) among those who have been diagnosed with hypertension.

Materials and Methods: A cross-sectional descriptive study was carried out at Liaquat National Hospital and Medical College Karachi, Pakistan in the duration from September, 2023 to February, 2024, enrolling 100 patients diagnosed with primary hypertension. Serum uric acid levels were analyzed to identify hyperuricemia, defined as levels exceeding >7.0 mg/dL for males and >6.5 mg/dL for females. The results suggested a hyperuricemia occurrence of 62%, with no significant age-related differences observed. Notably, males exhibited a higher incidence of hyperuricemia.

Results: The study included 100 patients, with 53% men and 47% women. The patients' average age was 52.03 ± 08.27 years, with a mean blood uric acid level of 6.85 ± 0.74 mg/dl. A gender-specific investigation indicated an important distinction in hyperuricemia frequencies between both genders, with 40% of male and 22% of females having high uric acid levels. Age-based comparison, however, showed no significant disparity in hyperuricemia prevalence between age groups.

Conclusion: This study elucidates the link between a high level of uric acid(UA) and hypertension, emphasizing the significance of constant uric acid level surveillance in hypertensive patients. These insights facilitate targeted interventions for effective cardiovascular risk management in clinical practice.

Keywords: Hypertension, Hyperuricemia, Uric acid

Introduction

Hypertension, the primary cardiovascular disease among adults, imposes a substantial global health burden, precipitating severe problems such as a cerebrovascular accident, myocardial infarction (MI), kidney disease, and cardiac failure [1]. Its multifactorial origin, predominantly essential or primary hypertension, underscores the complexity of its etiology [2,3]. In the general population, hypertension affects approximately 21.6% of males and 8.6% of females [4]. Notably, hyperuricemia emerges as a

common complication in hypertensive patients, intimately linked to both the onset and progression of hypertension [5,6].

Extensive research underscores the significance of uric-acid(UA) levels as predictive markers for cardio-vascular events, notably myocardial infarction [7]. The staggering toll of hypertension-related mortality, with 3.4 million deaths globally in 2010, underscores its critical importance. In regions like Pakistan and India, where hypertension prevalence is notably high, reaching 16% in rural and 22% in urban populations in Pakistan [8,9], and rising trends observed in India, urgent attention to risk factor identification and intervention strategies is paramount in mitigating its pervasive impact on public health.

Hyperuricemia has emerged as a significant concern in the context of hypertension, with various studies highlighting its association with increased risk and development of hypertension [10]. Hyperuricemia is frequently diagnosed when serum uric acid levels exceed the threshold of 6.8mg/dL under optimal body conditions. Serum uric acid (UA) levels have been identified as independent predictors for hypertension across different ethnicities, including African-Americans, whites, and Asians [11,12]. The precise mechanisms underlying this association entail the increase of renin release and consequent endothelial dysfunction [13,14].

Despite the importance of understanding the prevalence of hyperuricemia, particularly in regions like Pakistan [15], where data is lacking, there is a critical need for epidemiological studies for informing tailored medical care policies and actions to address this public health issue.

Aim/Objective: To determine the frequency of hyperuricemia (high levels of uric acid) among those who have been diagnosed with hypertension.

Study materials and methods

This single center cross-sectional descriptive study was carried-out at Liaquat National Hospital and Medical College Karachi, Pakistan from September, 2023 to February, 2024.

Inclusion Criteria:

The study included patients diagnosed with primary (essential) hypertension and those with a history of ischemic heart disease or acute coronary syndrome, regardless of whether they had undergone stenting procedures. Both male and female patients were eligible for participation, with an age range spanning from 18 to 75 years.

Exclusion Criteria:

The study excluded individuals with secondary hypertension, gout, diabetes mellitus, chronic kidney disease, psoriasis, BMI exceeding 30, pregnant women and those utilizing thiazide or loop diuretics from the data collection process.

Methodology

A sample size of 100 was determined using the WHO sample size calculator. Hypertension was defined according to the 2020 International Society of Hypertension (ISH) Clinical Practice Guidelines, requiring an average office blood pressure(BP) of $\geq 140/90$ mmHg on two separate occasions. Hyperuricemia was identified by serum uric-acid concentration >7.0 mg/dL for males and >6.5 mg/dL for females.

Participants aged 18 to 75 years, presenting with hypertension in both outpatient and inpatient departments were enrolled, following permission from the hospital's Ethical Board/Committee and acquiring informed consent. Predesigned questionnaires facilitated data collection, and SPSS (Version-23) was used for data analysis.

Results:

The study included 100 patients, with 53% men and 47% women. The average-age of the participants was 52.03 ± 08.27 years. Amongst them, 59 individuals aged over 50 years, while 41 were 50 or

younger. The highest recorded systolic blood pressure was 188 mmHg, while the lowest was 144 mmHg, with an average of 158.66 ± 12.34 mmHg. Similarly, the highest diastolic blood pressure was 120 mmHg, the lowest was 92 mmHg, and the average was 100.27 ± 9.72 mmHg. The mean serum uric-acid(UA) concentration was 6.85 ± 0.74 mg/dl. Hyperuricemia was observed in 62% of patients, while 38% had normal uric acid levels (Table 1).

Table 1: Demographic variables at the baseline

Variables	Value
Gender	Percentage (%)
- Male	53%
- Female	47%
Age	Years
- Mean	52.03 ± 08.27
- Range	32 to 71
Age Distribution	n
- >50 years	59 patients
- ≤50 years	41 patients
Systolic BP	mmHg
- High	188 mmHg
- Low	144 mmHg
- Mean/Average	158.66 ± 12.34 mmHg
Diastolic BP	mmHg
- High	120 mmHg
- Low	92 mmHg
- Mean/Average	100.27 ± 9.72 mmHg
Serum Uric Acid Level	mg/dL
- Mean	6.85 ± 0.74 mg/dL
Hyperuricemia Frequency	62%
Normal Uric Acid Frequency	38%

Table 2 presents a gender-specific comparison of hyperuricemia prevalence. Among males, 40 exhibited elevated uric acid levels, while 13 had normal levels. In contrast, among females, 22 had elevated uric acid levels, with 25 having normal levels. The p-value of 0.042 signifies a statistically significant difference in hyperuricemia prevalence between genders.

Table 2: Gender based prevalence of hyperuricemia

Gender	High Uric-acid conc.	Normal Uric-acid conc.	p-value
Male	40	13	0.042
Female	22	25	

Table 3 presents an age-related comparison of hyperuricemia prevalence. Among individuals aged above 50 years, 39 exhibited elevated uric acid levels, while 20 had normal levels. In contrast, among those aged below 50 years, 23 had elevated uric acid levels, with 18 having normal levels. The p-value of 0.571 indicates that the frequency of hyperuricemia is similar in both age groups.

Table 3: Age-related prevalence of hyperuricemia

Age (years)	High Uric-acid conc.	Normal Uric-acid conc.	p-value
Above 50	39	20	0.571
Below 50	23	18	

Discussion

Recent study has focused on the link between high levels of serum uric acid and hypertension. Our study underscores an increased incidence of hyperuricemia among hypertensive patients, highlighting its potential compounding effects on health outcomes. Interestingly, age did not significantly influence uric acid levels in our hypertensive cohort; however, male population was found to be predominantly affected.

Numerous studies consistently demonstrate a strong correlation between hyperuricemia and hypertension, although the precise mechanisms remain elusive. Our study sought to investigate the prevalence of an elevated uric-acid concentration in hypertensive people, and the results revealed a significant 62% prevalence. These findings highlight the significance of conducting additional study to understand the complexities of this association and develop focused therapies for better handling of both conditions.

Our study's findings align with various existing research efforts examining the correlation between hyperuricemia and hypertension. Studies by Afifi et al. and Rahman et al. reported hyperuricemia frequencies of 55.4% and 40.3% among hypertensive patients, respectively, bolstering our observations [16,17]. Similarly, Muhammad Haroon Bilal et al. reported a hyperuricemia prevalence of 41.78% among patients, in line with our findings of increased hyperuricemia incidence in hypertensive individuals [8].

Additionally, research conducted by Dasti et al. within Pakistan emphasized a hyperuricemia prevalence of 65% among hypertensive patients, with significant associations noted between hyperuricemia and age and gender, contrasting with our observations regarding age associations [18]. Conversely, Tanaguchi et al.'s study in Osaka, Japan, highlighted a higher likelihood of hypertension development in individuals with hyperuricemia, consistent with our study's conclusions [19].

Overall, these investigations highlight the importance of hyperuricemia as an indicator of risk in hypertensive individuals. Monitoring uric-acid concentrations, especially in adults or those with specific risks, could aid in early identification and management to mitigate associated complications, including cardiovascular disease and resistant hypertension.

Conclusion

Our investigation elucidates a strong correlation between hyperuricemia and hypertension, indicating an increased prevalence of hyperuricemia among individuals with hypertension. Notably, age did not exert a discernible impact on this relationship. These results highlight the importance of diligent monitoring of uric-acid concentrations in hypertensive patients, as part of comprehensive cardiovascular risk management protocols.

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