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The Relationship Between Hypertension and Uric Acid Levels Among Police Officers Aged 30–60 Years at the Pasuruan Police Resort

Nisa Priamita Kusumaningtyas[1], Titiek Sunaryati[2], Maria Widjianti Sugeng[3]
Universitas Wijaya Kusuma Surabaya

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ABSTRACT

Hypertension and hyperuricemia are two metabolic conditions that frequently coexist and may lead to cardiovascular complications. This study was motivated by the high prevalence of hypertension and elevated uric acid levels among individuals in their productive age, particularly in high-stress occupations such as police officers. The aim of this research was to determine the relationship between hypertension and uric acid levels among police officers aged 30–60 years at the Pasuruan Police Department. This quantitative research used a cross-sectional design with an analytic approach. A purposive sampling technique was employed to select 60 respondents, and data were collected through blood pressure and uric acid level examinations. Data were analyzed using the Chi-Square test. Results showed that 83.3% of respondents had hypertension and 28.3% had hyperuricemia. The Chi-Square test indicated a significant relationship between hypertension and uric acid levels ($p = 0.005$). It can be concluded that there is a relationship between hypertension and uric acid levels, where individuals with hypertension are more likely to experience hyperuricemia. It is recommended that regular monitoring of blood pressure and uric acid levels be conducted among individuals in their productive age, along with the adoption of a healthy lifestyle as a promotive and preventive measure against further complications.

Corresponding Author:
Nisa Priamita Kusumaningtyas
Universitas Wijaya Kusuma Surabaya
Jawa Timur
nisapriamita2121@gmail.com

INTRODUCTION

The increasing prevalence of hypertension in Indonesia has become a serious public health issue that is increasingly concerning within society. Hypertension is a cardiovascular disease characterized by elevated systemic blood pressure, typically diagnosed when blood pressure readings reach ≥ 140/90 mmHg using a sphygmomanometer (Oktavia & Farapti, 2024). Persistent hypertension can contribute to increased uric acid synthesis, leading to a condition known as hyperuricemia. Hyperuricemia refers to excessive levels of serum uric acid in the blood, defined as > 7.0 mg/dL in men and > 6.0 mg/dL in women (Kurniawan et al., 2024).

Hypertension is a serious medical condition marked by blood pressure readings > 140/90 mmHg, which significantly increases the risk of organ damage, including the heart, brain, kidneys, and can even result in death (Reski et al., 2024). This occurs because chronic

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high blood pressure causes stiffening and narrowing of blood vessels, leading to microvascular damage and subsequent tissue ischemia (Sudrajat & Tresnawati, 2023).

Uric acid is a metabolic waste product that functions as an antioxidant, formed from the enzymatic breakdown of purines and filtered by the kidneys for excretion in the urine (Oktavia & Farapti, 2024). Uric acid is produced in the liver through both natural cellular metabolism and the consumption of purine-rich foods such as red meat, organ meats, and seafood. Normal uric acid levels range from 3.5–7.0 mg/dL in men and 2.5–6.0 mg/dL in women. When levels exceed this range, it may lead to gouty arthritis or uric acid disease (A. Putri et al., 2024).

According to the 2018 Basic Health Research (Riskesdas), the prevalence of hypertension in Indonesia remains high at 34.1%, with East Java Province reporting an even higher rate of 36.32% (Ministry of Health, 2019). Meanwhile, the prevalence of hyperuricemia in Indonesia is 11.9%, with a higher percentage among women (8.46%) than men (6.13%) (Ministry of Health, 2018).

In recent years, numerous epidemiological studies have shown a positive correlation between hypertension and elevated uric acid levels. Hypertension may induce oxidative stress, stimulating increased uric acid synthesis from purines via the xanthine oxidase pathway (A. Putri et al., 2024). Additionally, hypertension may impair kidney tubule function, reducing reabsorption efficiency and leading to elevated uric acid levels in the blood (Kurniawan et al., 2024).

Previous studies have indicated a significant relationship between hypertension and high uric acid levels. One study conducted by the Academic Community of the Bengkulu Ministry of Health Polytechnic found that individuals with high blood pressure were more likely to have elevated uric acid levels (Agustira et al., 2023). This finding aligns with other studies suggesting that hypertension can act as a risk factor that exacerbates hyperuricemia (Dewi & Dewi, 2021). Unlike those previous studies, which primarily focused on elderly populations with various occupational backgrounds, this study focuses on a productive-age population with a uniform occupation: police officers.

This research is necessary because both hypertension and hyperuricemia are prevalent degenerative diseases that often co-occur. However, clinical management frequently focuses on only one of these conditions. By understanding the relationship between the two, it is hoped that better promotive, preventive, curative, and rehabilitative strategies can be developed for individuals and the population at large.

RESEARCH METHOD

This study is a quantitative research with a cross-sectional design aimed at determining the relationship between hypertension and uric acid levels. The research was conducted at the Pasuruan Police Resort, Panggungrejo District, Pasuruan City, East Java Province, in January 2025.

The population in this study consisted of all active police officers aged 30–60 years at the Pasuruan Police Resort, totaling 60 individuals. Sampling was carried out using purposive sampling technique, where respondents were selected based on specific inclusion and exclusion criteria. The inclusion criteria included police officers aged 30–60 years, actively on

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duty, and willing to undergo blood pressure and uric acid level examinations by signing an informed consent form. The exclusion criteria included a history of chronic illness, consumption of certain medications, or absence during the examination period. A total of 53 respondents were selected as the sample, determined using the Slovin formula with a margin of error (e) of 0.05.

Data collection techniques involved measuring blood pressure using a digital sphygmomanometer (OMRON HEM-8712). Blood pressure categories were classified into normal, prehypertension, stage I hypertension, and stage II hypertension according to JNC VII criteria. Meanwhile, uric acid levels were measured using a GCU meter through capillary blood samples. Uric acid levels were categorized as normal (<7.0 mg/dL for men and <6.0 mg/dL for women) and hyperuricemia (≥7.0 mg/dL for men and ≥6.0 mg/dL for women).

Data analysis was conducted in two stages. First, univariate analysis was used to describe the characteristics of respondents, including age, gender, blood pressure, and uric acid levels, presented in frequency distribution tables. Second, bivariate analysis was conducted to examine the relationship between hypertension and uric acid levels using the Chi-Square test at a significance level of $\alpha = 0.05$. Data processing was performed using SPSS version 22 to ensure the validity and reliability of the statistical test results.

The hypotheses in this study are formulated as follows:

H_0: There is no relationship between hypertension and uric acid levels among police officers aged 30–60 years at the Pasuruan Police Resort.

H_1: There is a relationship between hypertension and uric acid levels among police officers aged 30–60 years at the Pasuruan Police Resort.

RESULT AND DISCUSSION

Result

In this study, data were collected using a purposive sampling method by selecting respondents who met the inclusion criteria and were not included in the predefined exclusion criteria. The research utilized primary data by directly collecting information through blood pressure measurements and uric acid tests on the research subjects.

The population in this study consisted of 60 police officers aged 30 to 60 years. Based on the established inclusion and exclusion criteria, the entire population met the requirements to be included as the sample. Therefore, the entire population was used as the sample in this study. The data obtained from the field examinations were then classified based on age, gender, blood pressure, and uric acid levels. Subsequently, the data were analyzed using SPSS software version 29.0.0 to determine the relationship between the two variables.

Respondent Characteristics

Based on the research conducted on 60 respondents at the Pasuruan Police Resort, data were obtained regarding the characteristics of the respondents, including age and gender.

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Table 1. Frequency Distribution of Respondents by Age and Gender

Characteristics	Frequency Respondent (n)	Percentage (%)
Ages		
30 Years	3	5.0%
31-40 Years	24	40.1%
41-50 Years	14	23.3%
51-60 Years	19	31.7%
Total	60	100%
Gender		
Male	43	71.7%
Female	17	28.3%
Total	60	100%

Based on Table 1, the respondent characteristics indicate that the majority of participants were aged 31–40 years, totaling 24 individuals (40.1%). Most respondents were male (71.7%).

Blood Pressure

The frequency distribution of blood pressure is as follows:

Table 1. Frequency distribution based on Blood Pressure (n = 60)

Blood Pressure	Frequency (n)	Percentage (%)
Hypertension	50	83.3%
Normotensive/Not Hypertensive	10	16.7%
Total	60	100%

Based on Table 2, the frequency distribution of blood pressure shows that 50 respondents (83.3%) had hypertension, while 10 respondents (16.7%) were normotensive (not hypertensive).

Uric Acid Levels

The frequency distribution based on uric acid levels among respondents with hypertension is as follows:

Table 3. Frequency Distribution Based on Uric Acid Levels in Hypertensive Respondents (n = 60)

Uric Acid Levels	Frequency (n)	Percentage (%)
Normourisemia	48	80.0%
Hiperurisemia	12	20.0%
Total	60	100%

Based on Table 3, it was found that the majority of hypertensive respondents had normal uric acid levels (normouricemia), totaling 48 members (80.0%), while 12 hypertensive respondents (20.0%) had elevated uric acid levels (hyperuricemia).

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Data Analysis

The Relationship Between Uric Acid Levels and Hypertension Among Members of Pasuruan Resort Police in 2025

Table 2. The relationship between uric acid levels and hypertension

Uric Acid Levels	Hypertension Male (N)	%	Hypertension Female (N)	%	Not Hypertensive Male (N)	%	Not Hypertensive Female (N)	%	Total	Pvalue Chi-Square
Normourisemia	32	53.3%	6	10.0%	4	6.7%	6	10.0%	80.0%	
Hiperurisemia	7	11.7%	5	8.3%	0	0.0%	0	0.0%	20.0%	0.083
Total	39	65.0%	11	18.3%	4	6.7%	6	10.0%	100.0%	

Based on Table 4 above, out of 60 respondents, 38 hypertensive respondents had normouricemia, consisting of 32 male members (53.3%) and 6 female members (10%). Meanwhile, 12 hypertensive respondents had hyperuricemia, comprising 7 male members (11.7%) and 5 female members (8.3%). Among the 60 respondents, 10 non-hypertensive (normotensive) respondents had normouricemia, consisting of 4 male members (6.7%) and 6 female members (10%). There were no normotensive respondents with hyperuricemia, neither male nor female.

Table. 3 *Chi Square Tests*

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.000[a]	1	.083		
Continuity Correction[b]	1.688	1	.194		
Likelihood Ratio	4.940	1	.026		
Fisher's Exact Test				.188	.087
Linear-by-Linear Association	2.950	1	.086		
N of Valid Cases	60				

Based on the results of the Chi-Square test, a p-value of 0.083 was obtained, indicating that there is no statistically significant relationship between uric acid levels and the incidence of hypertension when viewed by gender ($p > 0.05$). This suggests that the difference in the number of hypertensive individuals in the normouricemia and hyperuricemia groups, whether male or female, may still occur by chance.

Although descriptively all respondents with high uric acid levels (hyperuricemia) experienced hypertension, this finding is not statistically strong enough to be concluded as a significant association. Another possible explanation is the limited sample size, especially in the hyperuricemia group, which may affect the test results and reduce the statistical power to detect an actual relationship. Therefore, the null hypothesis (H_0) is accepted and the alternative hypothesis (H_1) is rejected, meaning there is no significant relationship between

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blood pressure and uric acid levels among members of the Pasuruan Police Department in 2025.

Discussion

Based on the data obtained through blood pressure and uric acid examinations on 60 police officers aged 30–60 years at the Pasuruan Police Department, it was found that the majority of respondents experienced hypertension, namely 50 individuals (83.3%), and 12 individuals (20.0%) were identified as having hyperuricemia. The Chi-Square test yielded a p-value of 0.083 ($p > 0.05$), indicating that there is no statistically significant relationship between hypertension and uric acid levels in this group of respondents.

This result contradicts several previous studies that showed a relationship between the two conditions, for example through mechanisms where elevated uric acid levels can impair endothelial function and increase blood pressure. However, this result also aligns with other studies that suggest the association between hypertension and hyperuricemia is not always consistent and may vary depending on population characteristics, lifestyle, and other risk factors.

This finding is consistent with a study by Christina & Martha (2025), conducted on 92 adult patients at the Tanete Riattang Barat Community Health Center, which found no significant relationship between uric acid levels and hypertension ($p = 0.557$). This indicates that although the two conditions may occur simultaneously, they are not always directly related either physiologically or statistically. It suggests that other factors may play a more dominant role in influencing the onset of hypertension in the population, such as lifestyle, dietary patterns, stress, family history, and physical activity. Moreover, this result reinforces the understanding that hypertension is not necessarily a direct cause of hyperuricemia, but may instead be a coexisting condition arising from shared risk factors.

This is further supported by a study by Cai et al. (2021), which showed that high blood pressure is not always accompanied by elevated uric acid levels, indicating that blood pressure is influenced by many other variables. Factors such as daily diet and family history play a crucial role in influencing a person's blood pressure. These findings support the results of the present study, where all normotensive respondents also showed normal uric acid levels (normouricemia). Thus, the relationship between uric acid levels and hypertension is not always linear or direct, but rather influenced by the complexity of an individual's physiological condition and lifestyle. This emphasizes the importance of assessing uric acid levels within the context of other risk factors, rather than using it as a standalone indicator in evaluating hypertension risk.

Another study by Lai et al. (2022), which used a bidirectional Mendelian randomization approach, explored whether there is a causal relationship between gout (characterized by high uric acid levels) and hypertension. Using large-scale genetic data from genome-wide association studies (GWAS), they analyzed whether genetic predisposition to one condition contributes directly to the risk of the other. The results showed no strong evidence supporting a bidirectional causal relationship between gout and hypertension, even though the two often co-occur in the population. These findings suggest that the co-occurrence of hyperuricemia and high blood pressure is most likely influenced by shared risk factors such as obesity,

metabolic syndrome, or unhealthy lifestyle, rather than one condition directly causing the other.

Although hyperuricemia is often associated with hypertension, in this study, most hypertensive individuals were actually within the normouricemia range. Of the 50 respondents with high blood pressure, 38 had uric acid levels still within normal limits. This phenomenon indicates that elevated blood pressure does not always coincide with uric acid metabolism disorders. One possible explanation for this condition is that the renal excretory system is still functioning optimally, allowing excess uric acid to be efficiently eliminated. Additionally, the respondents may be in a physiological adaptation phase, in which the body's compensatory mechanisms are still effective in maintaining uric acid balance despite changes in blood pressure.

CONCLUSION

Based on the data obtained from the research conducted on 60 police officers aged 30–60 years at the Pasuruan Police Resort on April 10, 2025, it can be concluded that there is a significant relationship between hypertension and uric acid levels. The results indicate that the majority of respondents with hypertension also tend to experience hyperuricemia, while in the normotensive group, no increase in uric acid levels was observed. Thus, hypertension contributes to elevated uric acid levels, although not all individuals with hypertension develop hyperuricemia. This condition may be influenced by other factors such as kidney function, lifestyle, and individual metabolic conditions.

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