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RESEARCH

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Prevalence and Factors Associated with Uncontrolled Hypertension: A Cross-sectional Study

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Abstract

Uncontrolled hypertension remains a major public health concern because it increases the risk of cardiovascular morbidity and mortality, particularly in low- and middle-income settings. This study aimed to estimate the prevalence of uncontrolled hypertension and identify factors associated with poor blood pressure control among adults with diagnosed hypertension receiving follow-up care in Rasau Jaya Village, Kubu Raya Regency, Indonesia. A cross-sectional study was conducted among 252 adult patients with diagnosed hypertension. Data were collected using a structured questionnaire and medical record review, and blood pressure was measured using standardized procedures. Uncontrolled hypertension was defined as systolic blood pressure ≥ 140 mmHg and/or diastolic blood pressure ≥ 90 mmHg. Bivariate analyses and multivariable regression were performed to identify factors associated with uncontrolled hypertension. The prevalence of uncontrolled hypertension was 59.5%. In multivariable analysis, family history of hypertension and hypertension duration of five years or longer remained significantly associated with uncontrolled blood pressure. Participants with a family history of hypertension had a higher likelihood of uncontrolled hypertension (APR = 2.34; 95% CI: 1.36-4.04). Similarly, participants with a hypertension duration of five years or longer were more likely to have uncontrolled blood pressure (APR = 2.18; 95% CI: 1.23-3.86). These findings indicate that uncontrolled hypertension is common among patients receiving follow-up care in this setting. Family history of hypertension and longer disease duration were key determinants of poor blood pressure control. Strengthening routine blood pressure monitoring are essential to improve hypertension control and reduce cardiovascular risk.

Keywords: Associated Factors, Cross-Sectional Study, Prevalence, Uncontrolled Hypertension.

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1. INTRODUCTION

Hypertension is one of the most prevalent non-communicable diseases worldwide and a leading modifiable risk factor for cardiovascular disease, stroke, chronic kidney disease, and premature mortality (Goorani et al., 2025). The World Health Organization estimates that approximately 1.4 billion adults aged 30-79 years are affected by hypertension globally, with a substantial burden concentrated in low- and middle-income countries (WHO, 2025). Despite the availability of effective treatment, global blood pressure control remains inadequate, with only about 23% of cases reported to be controlled (WHO, 2025). In Indonesia, the 2023 Indonesian Health Survey reported a national hypertension prevalence of 30.8% among adults aged ≥ 18 years. Although this represents a decrease from the 34.1% prevalence reported in the 2018 Basic Health Research survey, hypertension remains a major public health burden across several regions, including Kalimantan. Population ageing, urbanization, unhealthy dietary practices, physical inactivity, obesity, and other lifestyle-related factors continue to contribute to this burden (Mills et al., 2020).

Cardiovascular disease (CVD) remains the leading cause of death worldwide and continues to impose a substantial public health burden. According to the World Health Organization, CVD accounted for approximately 19.8 million deaths globally in 2022, representing nearly one-third of all deaths worldwide. Despite advances in prevention and treatment, the global burden of cardiovascular disease has continued to increase over recent years, particularly in low- and middle-income countries. In Indonesia, cardiovascular diseases, especially stroke and ischemic heart disease, remain among the leading causes of mortality and disability. The 2023 Indonesian Health Survey (SKI) reported prevalence rates of 8.3 per 1,000 population for stroke and 8.5 per 1,000 population for heart disease. Given that hypertension is a major modifiable risk factor for cardiovascular disease, improving blood pressure control is essential for reducing cardiovascular morbidity and mortality at both global and national levels.

Effective pharmacological and non-pharmacological interventions for hypertension are widely available, and evidence has consistently demonstrated that adequate blood pressure control substantially reduces the risk of cardiovascular complications and death (Almabruk et al., 2025; Verma et al., 2021). However, despite these advances, rates of blood pressure control remain unacceptably low in many settings. A large proportion of patients receiving antihypertensive treatment fail to achieve recommended blood pressure targets, resulting in a high prevalence of uncontrolled hypertension and ongoing preventable morbidity (Ferreira et al., 2024).

Uncontrolled hypertension is a complex and multifactorial problem influenced by sociodemographic, behavioral, clinical, and health system-related factors (Sharma et al., 2021). Previous studies have identified older age, male sex, low educational status, poor medication adherence, unhealthy lifestyle behaviors, longer duration of hypertension, and comorbidities as important determinants of poor blood pressure control (Abdisa et al., 2022; Chang et al., 2021). In addition, psychosocial factors such as limited knowledge about hypertension and low self-efficacy, may also affect patients' ability to follow long-term treatment and lifestyle recommendations (Bubulac et al., 2025; Kashum & Bahari, 2025).

Family history of hypertension is another important factor because it may reflect genetic susceptibility as well as shared environmental and behavioral exposures (Tozo et al., 2022). Individuals with a positive family history may develop hypertension earlier or experience more severe forms of the disease. Similarly, a longer duration of hypertension may be associated with vascular remodeling, reduced responsiveness to therapy, and treatment fatigue, all of which may contribute to persistent blood pressure elevation.

In low-resource settings, barriers related to healthcare access, medication availability, continuity of care, and patient education may further worsen hypertension control (Religioni et al., 2025). Although blood pressure control has been studied in many populations, the prevalence and determinants of uncontrolled hypertension vary across geographic areas and

healthcare settings. Local evidence is therefore needed to guide context-specific interventions and policies.

This study was conducted in all hamlets in Rasau Jaya Village, Kubu Raya Regency, West Kalimantan, Indonesia. The setting was selected because of the local hypertension burden, limited evidence on blood pressure control in the area, and the diversity of sociodemographic characteristics in the population. In addition, no recent study has comprehensively examined the prevalence and determinants of uncontrolled hypertension in this setting. Understanding the local magnitude of uncontrolled hypertension and the factors associated with poor blood pressure control is important for developing targeted strategies to improve hypertension management and reduce the risk of cardiovascular complications among patients in the area.

Therefore, this study aimed to assess the prevalence of uncontrolled hypertension and identify factors associated with poor blood pressure control among adult hypertensive patients receiving follow-up care in Rasau Jaya Village. The findings are expected to inform local hypertension-management strategies and contribute to efforts to reduce cardiovascular risk.

2. RESEARCH METHOD

This cross-sectional study was conducted from October to November 2025 in the service area of Rasau Jaya Public Health Center, Kubu Raya Regency, West Kalimantan, Indonesia. The health center provides outpatient follow-up services for patients with hypertension. The study population consisted of adult patients (≥ 18 years) with a confirmed diagnosis of hypertension who were receiving antihypertensive treatment or follow-up care through the public health center.

Participants were eligible if they attended follow-up during the data collection period and provided informed consent. Pregnant patients, critically ill patients, and those unable to communicate were excluded. A total of 252 participants completed the study. Participants were selected using a systematic sampling technique.

Data were collected using a pretested structured questionnaire covering sociodemographic characteristics, lifestyle factors, medication adherence, and clinical history. Blood pressure was measured using a calibrated tensiometer in accordance with standard guidelines. Blood pressure was measured by trained enumerators using a calibrated tensiometer in accordance with standardized procedures. Each participant's blood pressure was measured twice, and the measurement results were used to determine blood pressure control status. Uncontrolled hypertension was defined as systolic blood pressure ≥ 140 mmHg and/or diastolic blood pressure ≥ 90 mmHg at the time of measurement.

Data were entered and analyzed using SPSS. Descriptive statistics were used to summarize the data. Variables with $p < 0.25$ in binary logistic regression were entered into multivariable logistic regression. Statistical significance was set at $p < 0.05$. This study was approved by the Health Research Ethics Committee of the Faculty of Health and Psychology at Universitas Muhammadiyah Pontianak with Approval Letter No. 040/KEPK-FikPsi/UM PONTIANAK/ 2025.

3. RESULTS AND DISCUSSION

A total of 252 adult patients with hypertension were included in the analysis. Overall, 150 participants (59.5%) had uncontrolled hypertension, while 102 participants (40.5%) had controlled blood pressure. The distribution of study variables and their bivariate associations with uncontrolled hypertension are shown in Table 1.

Table 1. Univariate and bivariate analysis of factors associated with uncontrolled hypertension.

Characteristics	Blood Pressure Control		Bivariate	
	Uncontrolled Freq. (%)	Controlled Freq. (%)	p-value	cPR (95% CI)
Age				
≥50	123 (62.4)	74 (37.6)	0.10	1.72 (0.94 – 3.15)
<50	27 (49.1)	28 (50.9)		
Sex				
Female	122 (58.9)	85 (41.1)	0.81	0.87 (0.45 – 1.69)
Male	28 (62.2)	17 (37.8)		
Education				
Low	145 (61.4)	91 (38.6)	0.03	3.51 (1.18 – 10.42)
High	5 (31.3)	11 (6.5)		
Family history*				
Yes	99 (70.7)	41 (29.3)	<0.001	2.89 (1.72 – 4.86)
No	51 (45.5)	61 (54.5)		
Hypertension duration*				
≥5 years	75 (73.5)	27 (26.5)	<0.001	2.78 (1.61 – 4.79)
<5 years	75 (50.0)	75 (50.0)		
Treatment adherence				
Non adhered	118 (55.9)	93 (44.1)	0.01	0.36 (0.16 – 0.79)
Adhered	32 (78.0)	9 (22.0)		
Knowledge				
Low	72 (65.5)	38 (34.5)	0.12	1.56 (0.93 – 2.59)
High	78 (54.9)	64 (45.1)		
Self-efficacy				
Low	31 (60.8)	20 (39.2)	0.96	1.07 (0.57 – 2.00)
High	119 (59.2)	82 (40.8)		

cPR: Crude Prevalence Ratio

Table 1 shows that most participants were aged ≥50 years (197; 78.2%), female (207; 82.1%), and had a low educational level (236; 93.7%). More than half of participants reported a family history of hypertension (140; 55.6%). In the bivariate analysis, education level, family history of hypertension, hypertension duration, and treatment adherence were significantly associated with uncontrolled hypertension ($p < 0.05$).

Respondents with low education were more likely to have uncontrolled hypertension than those with high education (cPR = 3.51; 95% CI: 1.18–10.42). Similarly, participants with a family history of hypertension (cPR = 2.89; 95% CI: 1.72–4.86) and those with hypertension duration ≥5 years (cPR = 2.78; 95% CI: 1.61–4.79) also had a higher prevalence of uncontrolled hypertension. Age, knowledge, sex, and self-efficacy were not significantly associated with uncontrolled hypertension ($p > 0.05$). However, variables with p-values <0.25 (age, education, family history, hypertension duration, treatment adherence, and knowledge) were included in the multivariable analysis.

Table 2. Logistic regression analysis of factors associated with uncontrolled hypertension

Characteristics	Model I		Model II		Model III	
	p-value	APR (95% CI)	p-value	APR (95% CI)	p-value	APR (95% CI)
Age						
≥50	0.14	1.79 (0.83 – 3.87)		-	-	-
<50						
Education						
Low	0.19	2.34 (0.66 – 8.36)		-	-	-
High						
Family history*						
Yes	0.001	2.74 (1.50 – 5.00)	0.003	2.29 (1.32 – 3.96)	0.002	2.34 (1.36 – 4.04)
No						
Hypertension duration*						
≥5 years	0.04	1.88 (1.04 – 3.43)	0.02	2.01 (1.12 – 3.58)	0.007	2.18 (1.23 – 3.86)
<5 years						
Treatment adherence						
Non adhered	0.05	0.43 (0.19 – 0.98)	0.06	0.46 (0.20 – 1.03)	-	-
Adhered						
Knowledge						
Low	0.25	1.41 (0.79 – 2.49)		-	-	-
High						

Model fit statistics: Nagelkerke $R^2 = 0.181$; overall classification accuracy = 66.3%.

*Significance at p-value ≤ 0.05 ; CPR: Crude Prevalence Ratio; APR: Adjusted Prevalence Ratio

The final logistic regression model demonstrated modest explanatory power, accounting for 18.1% of the variation in uncontrolled hypertension (Nagelkerke $R^2 = 0.181$). The model achieved an overall classification accuracy of 66.3%, indicating that it correctly classified approximately two-thirds of study participants according to their hypertension control status. Family history of hypertension and longer hypertension duration remained independently associated with uncontrolled hypertension across adjusted models. In Model III, participants with a family history of hypertension had a higher likelihood of uncontrolled blood pressure than those without a family history (APR = 2.34; 95% CI: 1.36-4.04). Participants with hypertension duration ≥ 5 years were also more likely to have uncontrolled blood pressure than those with a shorter disease duration (APR = 2.18; 95% CI: 1.23-3.86).

This study assessed the prevalence of uncontrolled hypertension and its associated factors among adult patients with diagnosed hypertension. The findings revealed that nearly three-fifths of participants had uncontrolled blood pressure, indicating a substantial gap in effective hypertension management in this setting. This prevalence is comparable with reports from several low- and middle-income countries, where uncontrolled hypertension remains common among patients receiving treatment, but it appears higher than rates reported in some high-income settings with more structured follow-up systems and better access to continuous care (Farhadi et al., 2023; Makukule et al., 2023; Schutte et al., 2021).

The high prevalence of uncontrolled hypertension observed in this study is consistent with findings from studies conducted in sub-Saharan Africa and parts of Asia, which have reported similarly poor blood pressure control among patients on treatment (Ferdinand, 2020; Ralapanawa & Udaya, 2023). Possible explanations include delayed diagnosis, limited patient education, suboptimal adherence to lifestyle recommendations, and health system–related challenges such as medication availability and inadequate follow-up.

Family history of hypertension was found to be a significant independent predictor of uncontrolled hypertension. Participants with a positive family history had a higher likelihood of uncontrolled hypertension than those without such a history (Kunnas & Nikkari, 2023; Suprpto et al., 2025). This finding aligns with previous studies that have demonstrated the role of genetic predisposition and shared environmental and behavioral factors in hypertension control (Takase et al., 2025; Zappa et al., 2024). Individuals with a family history of hypertension may develop the condition earlier and exhibit more severe or resistant forms, making blood pressure control more challenging (Elendu et al., 2024; Ukpeh et al., 2025).

The association between family history of hypertension and uncontrolled blood pressure may be explained by a combination of genetic, behavioral, and environmental mechanisms. Individuals with a positive family history often inherit genetic traits related to salt sensitivity, vascular stiffness, sympathetic nervous system activity, and renal sodium handling, all of which may contribute to persistent blood pressure elevation despite treatment. In addition, family members frequently share dietary habits, physical activity patterns, and other lifestyle behaviors that influence blood pressure control. Similar findings have been reported in recent studies conducted in China, Nigeria, and Brazil, which identified family history as an important predictor of poor blood pressure control among treated hypertensive patients (Takase et al., 2025; Zappa et al., 2024). However, not all studies have reported a significant association. For example, several community-based studies conducted in Southeast Asia found that family history was not independently associated with blood pressure control after adjustment for medication adherence and lifestyle-related factors, suggesting that the influence of hereditary predisposition may vary across populations and healthcare settings. These inconsistencies indicate that the impact of family history may depend on the interaction between genetic susceptibility and modifiable risk factors.

The finding that longer duration of hypertension was independently associated with uncontrolled blood pressure is biologically plausible and consistent with evidence from several recent studies. Patients living with hypertension for many years may experience progressive vascular remodeling, arterial stiffness, endothelial dysfunction, and target-organ damage, which can reduce responsiveness to antihypertensive therapy and make blood pressure more difficult to control. In addition, prolonged treatment may lead to medication fatigue, declining adherence, or therapeutic inertia, whereby treatment regimens are not intensified despite inadequate control. Similar associations have been reported in studies from Ethiopia, China, and other low- and middle-income countries (Fekadu et al., 2020; Zheng et al., 2022). Nevertheless, some studies have reported no significant association between duration of hypertension and blood pressure control after adjusting for age, comorbidities, and treatment intensity (Hamrahian et al., 2022).. Such discrepancies may reflect variation in study populations, healthcare access, treatment protocols, and definitions of hypertension control. The present findings underscore the need for regular clinical reassessment and treatment optimization strategies among patients with longstanding hypertension.

Treatment adherence was significantly associated with uncontrolled hypertension in the bivariate analysis but did not remain significant in the multivariable model. This may indicate that the relationship between adherence and blood pressure control is partly explained by other factors, including disease duration and family history. Nevertheless, the direction of the association remains clinically important because numerous studies published during the last five years have consistently demonstrated that poor adherence is one of the strongest predictors

of uncontrolled blood pressure (Tatar et al., 2025; Zhou et al., 2024). In contrast, some recent studies have reported weak or non-significant associations after adjustment for socioeconomic status, health literacy, and healthcare access, indicating that adherence may operate through complex pathways involving multiple patient- and system-level determinants (Ojangba et al., 2023). Therefore, interventions to improve adherence should remain a key component of hypertension management even when adherence does not emerge as an independent predictor in multivariable analyses.

This study has several limitations that should be considered when interpreting the findings. First, its cross-sectional design limits the ability to establish temporal relationships or draw causal inferences between the identified factors and uncontrolled hypertension. Second, the reliance on self-reported behavioral data may have introduced recall bias or social desirability bias, potentially affecting the accuracy of the measurements. Despite these limitations, the study provides useful evidence on the magnitude of uncontrolled hypertension and its associated factors, offering useful insights to inform clinical practice, public health interventions, and policy decisions aimed at improving blood pressure control.

4. CONCLUSION

The prevalence of uncontrolled hypertension was high among adult hypertensive patients. Multiple modifiable factors (family history and hypertension duration) were associated with poor blood pressure control. Interventions focusing on medication adherence, lifestyle modification, and regular follow-up are crucial to improve hypertension management. Future studies should examine additional behavioral, clinical, and health system factors influencing blood pressure control and evaluate the effectiveness of targeted interventions for high-risk hypertensive patients.

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