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Factors Associated with Blood Pressure Control Among Hypertensive Patients Enrolled in the National Health Insurance Program at an Affiliated Clinic

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Abstract: Hypertension is a major risk factor for cardiovascular disease and remains a persistent challenge in health systems, including in Indonesia. The Chronic Disease Management Program (Prolanis) under the National Health Insurance scheme (Jaminan Kesehatan Nasional, JKN) aims to improve the control of chronic diseases. However, the achievement of blood pressure control indicators at a clinic affiliated with JKN remains suboptimal. This study aimed to identify factors associated with blood pressure control among hypertensive patients enrolled in the JKN program. A cross-sectional quantitative design was applied to 120 hypertensive patients selected through quota sampling. Data were collected using standardized questionnaires (IPAQ, PSS-10, MMAS-8, and MSPSS) and analyzed using Chi-Square tests and multiple logistic regression. Results showed that 50.8% of respondents had controlled blood pressure. Among all variables examined, only physical activity was statistically associated with blood pressure control ($p = 0.020$; OR = 9.5; 95% CI: 1.74–51.53; $p = 0.009$). These findings highlight the importance of strengthening promotive and preventive approaches—particularly through structured physical activity and health education—as part of the Prolanis service to support sustainable blood pressure control.

Keyword: Hypertension, Blood Pressure, Physical Activity, National Health Insurance, Prolanis (Chronic Disease Management Program).

INTRODUCTION

Blood pressure is a vital indicator in the circulatory system that reflects the force of blood flowing through the vessels. It consists of two components—systolic and diastolic pressure—representing the pressure during heart contractions and relaxation, respectively. Blood pressure is considered high or hypertensive when systolic pressure is ≥ 130 mmHg or diastolic pressure is ≥ 80 mmHg. If this condition persists, it may lead to blood vessel

damage, disruption of oxygen flow to body tissues, and increased risk of complications in vital organs such as the heart and kidneys (Kim, 2023; National Heart, Lung, 2024).

Hypertension is one of the leading causes of cardiovascular disease and premature death. According to the World Health Organization (WHO), more than 1.3 billion adults globally were living with hypertension in 2019, with nearly half of individuals over the age of 50 diagnosed with the condition (World Health Organization (WHO), 2023). In the Southeast Asian region, the age-standardized prevalence of hypertension among adults aged 30–79 reached 32.4% in 2019. In Indonesia, despite the 2023 Indonesia Health Survey (SKI) showing a decrease in prevalence compared to the 2018 Basic Health Research (Riskesdas), hypertension remains prevalent at 30.8% among adults over 18 based on measured blood pressure (Badan Kebijakan Pembangunan Kesehatan, 2023). West Java ranks third among Indonesian provinces with the highest measured hypertension prevalence at 34.4%, following Central Kalimantan (40.7%) and South Kalimantan (35.8%) (Kementerian Kesehatan RI, 2023).

Uncontrolled hypertension presents a major challenge to the health system due to its contribution to morbidity and healthcare costs. Data from the Indonesian National Health Insurance (BPJS Kesehatan) shows that cardiovascular diseases, largely driven by hypertension, accounted for approximately IDR 22.8 trillion of total non-communicable disease costs in 2023 (Kautsar, 2024). Hypertension-related complications such as stroke, kidney failure, and blindness add financial burdens and reduce patients' quality of life. Therefore, understanding the factors associated with blood pressure control among hypertensive patients is critical.

To support sustainable hypertension management, BPJS Kesehatan developed the Chronic Disease Management Program (Prolanis) aimed at improving patient quality of life through integrated interventions at primary healthcare facilities. This program is supported by the Performance-Based Capitation (KBK) payment model, which evaluates service outcomes through key indicators, including the Prolanis Controlled Participant Ratio (RPPT). One of its main indicators is the control of blood pressure in hypertensive patients. However, a KBK performance report from a clinic affiliated with the National Health Insurance Program (Jaminan Kesehatan Nasional, JKN) shows that the RPPT remains below the target at only 3.75%, compared to the expected $\geq 5\%$.

This situation indicates that despite the implementation of Prolanis, hypertension control efforts remain suboptimal. Therefore, this study aims to identify factors associated with blood pressure control among hypertensive patients enrolled in the National Health Insurance Program (JKN) at a clinic affiliated with JKN. The findings are expected to provide strategic insights for healthcare facilities in enhancing the effectiveness of hypertension control interventions within the JKN framework.

METHOD

This study employed a quantitative approach with a cross-sectional design to analyze factors associated with blood pressure control among hypertensive patients enrolled in the National Health Insurance Program (Jaminan Kesehatan Nasional, JKN) at a clinic affiliated with JKN in Depok City, West Java Province. The study was conducted from March 14 to April 28, 2025. The target population consisted of all JKN-registered hypertensive patients attending the clinic. The sample size of 120 respondents was determined using a proportion difference hypothesis formula, based on prior studies, and selected using quota sampling. Inclusion criteria included patients aged 18 years or older, while exclusion criteria included pregnant women and newly diagnosed hypertensive patients. Blood pressure control was defined as having systolic pressure < 140 mmHg and/or diastolic pressure < 90 mmHg. Patients with systolic ≥ 140 mmHg and/or diastolic ≥ 90 mmHg were classified as having

uncontrolled hypertension. Ethical approval for this study was obtained from the Ethics Committee of the Faculty of Public Health, Universitas Indonesia (Approval No. Ket-693/UN2.F10.D11/PPM.00.02/2024), and the study adhered to ethical principles including informed consent, privacy, and confidentiality.

Data were collected through face-to-face interviews using standardized and internationally validated questionnaires. The instruments included the International Physical Activity Questionnaire (IPAQ Long Form) to assess physical activity levels, the Perceived Stress Scale (PSS-10) to measure stress levels, the Morisky Medication Adherence Scale (MMAS-8) for medication adherence, and the Multidimensional Scale of Perceived Social Support (MSPSS) to evaluate family support. Data processing was carried out using STATA software, following the stages of editing, coding, data entry, and cleaning. Univariate analysis was performed to describe respondent characteristics. Bivariate analysis using the Chi-Square test examined associations between independent variables and blood pressure control, while multivariate analysis employed multiple logistic regression to identify the most influential variables after adjusting for potential confounders.

RESULT AND DISCUSSION

Result

The characteristics of hypertensive patients enrolled in the National Health Insurance Program (JKN) at a clinic affiliated with JKN are presented in Table 1.

Table 1. Distribution of Respondents by Characteristics

Variable	Frequency	Percentage
Blood Pressure Control		
Uncontrolled	59	49.2 %
Controlled	61	50.8 %
Sex		
Male	57	47.5 %
Female	63	52.5 %
Age		
Adult (18–59 years)	66	55 %
Older Adult (≥60 years)	54	45 %
Education		
School Graduate (Elementary/Junior/Senior/Vocational High School)	35	29.2 %
University Graduate (Bachelor's/Master's/Doctorate Degree)	85	70.8 %
Employment Status		
Unemployed	60	50 %
Employed	60	50 %
Obesity		
No (BMI < 25 kg/m ²)	36	30 %
Yes (BMI ≥ 25 kg/m ²)	84	70 %
Smoking		
No	107	89.2 %
Yes	13	10.8 %
Alcohol Consumption		
No	120	100 %
Yes	0	0 %

Physical Activity		
Low	31	26 %
Moderate	76	63 %
High	13	11 %
Stress		
Low (Score 0–13)	72	60 %
Moderate (Score 14–26)	46	38.3 %
High (Score 27–40)	2	1.7 %
Adherence to Antihypertensive Medication		
Low (Score <6)	64	53.3 %
Moderate (Score 6 to <8)	30	25 %
High (Score 8)	26	21.7 %
Family History of Hypertension		
None	57	47.5 %
Present	63	52.5 %
Family Support		
Low (Score 1–2.9)	3	2.5 %
Moderate (Score 3–5)	24	20 %
High (Score 5.1–7)	93	77.5 %

The World Health Organization (WHO) and the Joint National Committee 7 (JNC 7) define hypertension as a systolic blood pressure of ≥ 140 mmHg and/or a diastolic blood pressure of ≥ 90 mmHg (Schwartz dan Sheps, 1999; World Health Organization, 2023). Accordingly, hypertensive patients with systolic blood pressure ≥ 140 mmHg and/or diastolic blood pressure ≥ 90 mmHg are classified as having uncontrolled blood pressure. Conversely, those with systolic blood pressure < 140 mmHg and/or diastolic blood pressure < 90 mmHg are considered to have controlled blood pressure (Hendriyanto, 2021). Table 1 shows that the proportion of respondents with controlled blood pressure is relatively equal to those with uncontrolled blood pressure (50.8% vs. 49.2%).

The results of the bivariate analysis using the Chi-Square test to examine the relationship between variables are presented in Table 2.

Table 2. Bivariate Analysis of Factors Associated with Blood Pressure Control

Variable	Blood Pressure Control				Total		OR (95% CI)	p-value
	Uncontrolled		Controlled					
	n	%	n	%	n	%		
Sex								
Male	26	45.6 %	31	54.4 %	57	100 %	0.7625 (0.3492-1.6626)	0.459
Female	33	52.4 %	30	47.6 %	63	100 %		
Age								
Adult (18-59)	36	54.5 %	30	45.5 %	66	100 %	1.6174 (0.7366-3.5627)	0.193
Older Adult (≥60)	23	42.6 %	31	57.4 %	54	100 %		
Education								
School Graduate	21	60 %	14	40 %	35	100 %	1.8553 (0.7763-4.4980)	0.128
University Graduate	38	44.7 %	47	55.3 %	85	100 %		
Employment Status								
Unemployed	32	53.3 %	28	46.7 %	60	100 %	1.3968	0.361

Employed	27	45 %	33	55 %	60	100 %	(0.6408-3.0503)	
Obesity								
No	15	41.7 %	21	58.3 %	36	100 %	0.6494	0.282
Yes	44	52.4 %	40	47.6 %	84	100 %	(0.2718-1.5332)	
Smoking								
No	54	50.5 %	53	49.5 %	107	100 %	1.6302	0.414
Yes	5	38.5 %	8	61.5 %	13	100 %	(0.4355-6.7321)	
Alcohol Consumption								
No	59	49.2 %	61	50.8 %	120	100 %	-	-
Yes	0	-	0	-	0	-		
Physical Activity								
Low	19	61.3 %	12	38.7 %	31	100 %	-	0.020
Moderate	38	50 %	38	50 %	76	100 %		
High	2	15.4 %	11	84.6 %	13	100 %		
Stress								
Low	33	45.8 %	39	54.2 %	72	100 %	-	0.665
Moderate	25	54.3 %	21	45.7 %	46	100 %		
High	1	50 %	1	50 %	2	100 %		
Adherence to Antihypertensive Medication								
Low	32	50 %	32	50 %	64	100 %	-	0.942
Moderate	15	50 %	15	50 %	30	100 %		
High	12	46.2 %	14	53.8 %	26	100 %		
Family History of Hypertension								
None	29	50.9 %	28	49.1 %	57	100 %	1.1393	0.722
Present	30	47.6 %	33	52.4 %	63	100 %	(0.5231-2.4829)	
Family Support								
Low	1	33.3 %	2	66.7 %	3	100 %	-	0.588
Moderate	10	41.7 %	14	58.3 %	24	100 %		
High	48	51.6 %	45	48.4 %	93	100 %		

The bivariate analysis of 120 hypertensive patients enrolled in the National Health Insurance program at a clinic affiliated with JKN revealed that among all variables analyzed, only physical activity showed a statistically significant association with blood pressure control ($p = 0.020$). Meanwhile, other variables such as gender ($p = 0.459$), age ($p = 0.193$), education ($p = 0.128$), employment status ($p = 0.361$), obesity ($p = 0.282$), smoking behavior ($p = 0.414$), stress level ($p = 0.665$), medication adherence ($p = 0.942$), family history of hypertension ($p = 0.722$), and family support ($p = 0.588$) were not significantly associated with blood pressure control. Additionally, the variable of alcohol consumption could not be further analyzed as none of the respondents reported alcohol use.

The results of the multivariate analysis using multiple logistic regression to identify the most influential factors after controlling for potential confounders are presented in Table 3.

Table 3. Multivariate Logistic Regression Analysis

Variable	B	p-value	OR	95% CI
Education	0.702	0.100	2.019	0.873 – 4.668
Moderate Physical Activity	0.501	0.255	1.651	0.697 – 3.911

High Physical Activity	2.249	0.009	9.479	1.744 – 51.525
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The results of the multiple logistic regression analysis showed that high physical activity was significantly associated with blood pressure control. Respondents with high levels of physical activity were 9.5 times more likely to have controlled blood pressure compared to those with low physical activity ($p = 0.009$; 95% CI: 1.744–51.525). Moderate physical activity and education level did not show a statistically significant association; however, education was retained in the model as it influenced the relationship between physical activity and blood pressure control (OR change >10%).

Discussion

This study revealed that the proportion of hypertensive patients enrolled in the National Health Insurance (JKN) program at a JKN-affiliated clinic with controlled blood pressure (50.8%) was relatively similar to those with uncontrolled blood pressure (49.2%). The average systolic and diastolic blood pressure readings were 137.48 mmHg and 84.28 mmHg, respectively—both below the threshold for uncontrolled hypertension (<140/90 mmHg). These findings differ from previous studies such as (Kusumah, 2024) and (Lubis, Siregar dan Simanjuntak, 2022), which reported a higher proportion of uncontrolled blood pressure. This suggests that the implementation of hypertension control programs at the JKN-affiliated clinic, particularly the Prolanis activities, has contributed positively to blood pressure control. This aligns with the World Health Organization (WHO) recommendation that consistent interventions at the primary healthcare level can improve blood pressure control and prevent further cardiovascular complications (Schwartz dan Sheps, 1999; World Health Organization, 2023).

The findings also indicated no significant association between sex and blood pressure control among hypertensive patients in the JKN program at the JKN-affiliated clinic ($p = 0.459$), which is consistent with (Astuti, 2021), who similarly found no meaningful difference in blood pressure control between male and female patients. Physiologically, estrogen in premenopausal women may protect the cardiovascular system and help lower blood pressure, but after menopause, the risk of hypertension increases and may even exceed that of men (Reckelhoff, 2001; Sandberg dan Ji, 2012). Although there are known biological differences in blood pressure regulation between sexes (Song *et al.*, 2020), the current findings suggest that similarities in lifestyle and treatment adherence between male and female respondents may be key factors in the lack of a significant relationship.

Moreover, no significant relationship was observed between age and blood pressure control among hypertensive patients enrolled in the JKN program at the JKN-affiliated clinic ($p = 0.193$). This contrasts with existing theories and prior research, which assert that aging leads to physiological changes such as decreased vascular elasticity and renal function, making blood pressure more difficult to control (Whelton *et al.*, 2018). For example, the study by (Darussalam dan Warseno, 2019) found a significant association between age and blood pressure control ($p = 0.008$). The discrepancy may stem from the homogeneity of respondent characteristics or the implementation of relatively uniform hypertension management strategies across age groups within the JKN-affiliated clinic.

This study found no significant association between educational attainment and blood pressure control among hypertensive patients enrolled in the National Health Insurance (JKN) program at a JKN-affiliated clinic ($p = 0.128$). This finding contradicts the theoretical assumption that education enhances individuals' health knowledge and literacy, which in turn influences health behaviors, including adherence to treatment (Cutler dan Lleras-Muney, 2010; Notoatmodjo, 2014). It also differs from the study by (Lubis, Siregar dan Simanjuntak, 2022), which reported a significant association between education and blood pressure control

($p = 0.002$). This discrepancy may be explained by the equal access to information and health education provided through Prolanis activities at the JKN-affiliated clinic, enabling patients from various educational backgrounds to manage their blood pressure effectively.

Additionally, the study found no significant association between employment status and blood pressure control ($p = 0.361$). Although employment theoretically influences blood pressure through factors such as stress, physical activity, and access to healthcare services (Landsbergis *et al.*, 2013), this result aligns with (Astuti, 2021), who also reported no significant relationship among Prolanis participants in Semarang ($p = 1.000$). The lack of association in this context might be due to equal access to health education and services at the JKN-affiliated clinic, allowing both employed and unemployed patients to manage their blood pressure equally well.

Furthermore, the analysis revealed no significant association between obesity and blood pressure control ($p = 0.282$), despite most respondents being classified as obese. This finding contradicts the theoretical understanding that obesity can elevate blood pressure by increasing blood volume, peripheral resistance, and neurohormonal activation (Hall dan Hall, 2021), and also contrasts with findings by (Maulidina, Harmani dan Suraya, 2019), who reported a significant association between obesity and hypertension. The absence of a relationship in this study may be attributed to similar characteristics among respondents or the stronger influence of other factors such as medication adherence, physical activity, and social support. Therefore, interventions aimed at controlling hypertension should adopt a comprehensive approach that considers multiple contributing factors, rather than focusing solely on obesity.

The majority of respondents in this study were non-smokers (89.2%), and bivariate analysis showed no significant association between smoking habits and blood pressure control ($p = 0.414$). Theoretically, smoking is known to increase blood pressure through sympathetic nervous system activation and norepinephrine release (Adrogué dan Madias, 2017). However, this result aligns with the findings of (Kusumah, 2024), which also found no significant association. The lack of a relationship in this study may be due to the low proportion of smokers in the sample, which limited data variability. Therefore, interventions at a clinic affiliated with the JKN program should focus more on other factors that have demonstrated a stronger contribution to blood pressure control among hypertensive patients.

All respondents in this study reported no alcohol consumption, resulting in no data variation to allow for statistical analysis using the Chi-Square test. Nevertheless, existing literature indicates that alcohol consumption can increase the risk of hypertension through mechanisms such as elevated plasma catecholamines, increased calcium influx into smooth muscle cells, and sympathetic nervous system activation (Kaplan, Victor dan Flynn, 2010b; A R Siyad, 2011; Sliwa, Stewart dan Gersh, 2011; Sutters, 2011). The absence of alcohol consumption in this population may reflect the social and cultural characteristics of the respondents at a JKN-affiliated clinic, as well as the potential effectiveness of health education in discouraging such habits. Thus, this variable could not be assessed in terms of its contribution to blood pressure control in the context of this study.

Physical activity was found to be significantly associated with blood pressure control among hypertensive patients enrolled in the JKN program at a JKN-affiliated clinic, with those engaging in high levels of physical activity having 9.5 times higher odds of achieving controlled blood pressure compared to those with low activity levels. This finding is consistent with theoretical frameworks and previous research indicating that regular physical activity improves vascular elasticity, reduces peripheral resistance, and enhances insulin sensitivity, all of which contribute to lowering blood pressure (Cornelissen dan Smart, 2013). A meta-analysis by (Monfared *et al.*, 2024) also supports this, showing that physical activity significantly reduced systolic blood pressure by 7.70 mmHg and diastolic blood pressure by 3.60 mmHg. In line with WHO recommendations of at least 150 minutes of moderate-

intensity activity per week, Prolanis programs at JKN-affiliated clinics should continue to emphasize the promotion of physical activity as a key strategy to achieve optimal blood pressure control.

The majority of hypertensive patients enrolled in the JKN program at a JKN-affiliated clinic in this study were found to have low stress levels, and the analysis revealed no statistically significant association between stress levels and blood pressure control ($p = 0.665$). This finding contradicts theoretical frameworks suggesting that stress, particularly when accompanied by negative emotions, can gradually elevate blood pressure (Light, Oparil dan Weber, 2005; Kaplan, Victor dan Flynn, 2010a). Previous studies have reported mixed results; for instance, (Lubis, Siregar dan Simanjuntak, 2022) found a significant association between stress and uncontrolled hypertension, while (Kusumah, 2024) reported similar findings to this study. The absence of a significant association here may be influenced by the homogeneity of respondent characteristics or their effective stress management abilities. Therefore, despite the lack of statistical significance, stress management education remains essential within the Prolanis program to support blood pressure control.

A large proportion of respondents in this study exhibited low adherence to antihypertensive medication (53.3%), yet the bivariate analysis found no significant association between medication adherence and blood pressure control ($p = 0.942$). This finding contrasts with theoretical perspectives and literature emphasizing adherence as a key determinant in hypertension management (Burnier dan Egan, 2019), although it aligns with (Kusumah, 2024), who also found no such association. The lack of a significant relationship may be due to the influence of other, more dominant factors, such as physical activity or stress levels, which may also affect blood pressure outcomes. Nevertheless, ongoing education on the importance of consistent antihypertensive medication use should remain a priority in Prolanis activities, as proper adherence still plays a critical role in long-term quality of life and the prevention of hypertension-related complications.

Although most respondents in this study reported a family history of hypertension (52.5%), bivariate analysis showed no significant association between family history and blood pressure control ($p = 0.722$). This contrasts with established theories that emphasize genetic predisposition as a major factor in the development of hypertension, wherein individuals with a family history are twice as likely to develop the condition (Machsus *et al.*, 2020). However, because family history is a non-modifiable factor, it does not necessarily correlate directly with treatment outcomes, especially when other modifiable factors such as lifestyle and medication adherence are effectively managed. It is therefore recommended that the JKN-affiliated clinic continue to provide equitable health education to all hypertensive patients, regardless of family history, to enhance overall blood pressure control.

The majority of respondents in this study reported a high level of family support (77.5%); however, the Chi-Square test indicated no statistically significant association between family support and blood pressure control ($p = 0.588$). This finding is inconsistent with previous studies which suggested that both emotional and practical family support can enhance the success of blood pressure management (Chacko dan Jeemon, 2020; Priyono, Ardiyansyah dan Naryati, 2022). Conversely, it aligns with the findings of (Astuti, 2021), who also reported no significant relationship in a similar context. The lack of association in this study may be attributed to the homogeneous characteristics of respondents or the influence of other more dominant factors. Therefore, although family support did not show a statistically significant effect, the JKN-affiliated clinic is still encouraged to expand the scope of Prolanis activities as a form of systemic support, particularly for patients who may lack adequate support from their families.

CONCLUSION

This study revealed that half of the hypertensive patients enrolled in the National Health Insurance (JKN) program at an affiliated clinic had controlled blood pressure (50.8%). Among various factors examined—including age, gender, education, employment, obesity, smoking, alcohol consumption, stress, medication adherence, family history, and family support—only physical activity was found to have a statistically significant association with blood pressure control ($p = 0.020$). The multivariate analysis further indicated that patients with a high level of physical activity were 9.5 times more likely to achieve blood pressure control ($OR = 9.5$; 95% CI: 1.74–51.53; $p = 0.009$).

These findings suggest that hypertension management at the JKN-affiliated clinic is relatively effective, particularly in implementing the Chronic Disease Management Program (Prolanis). Nonetheless, there remains a need to strengthen non-clinical aspects, especially those related to healthy lifestyle behaviors. Physical activity has proven to be a key component that can be further optimized in primary healthcare strategies for controlling blood pressure.

In the context of health insurance, particularly the JKN program, this study underscores the importance of promotive and preventive approaches by enhancing Prolanis services. Prioritizing health education, routine blood pressure monitoring, and structured physical activities such as group exercise is essential. Active participation can be improved through personalized communication and the reinforcement of health literacy, helping to ensure sustainable blood pressure control and reducing the healthcare burden associated with hypertension.

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