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Determinants of Hypertension Stage Among Patients in a Primary Health Care Center: A Cross-Sectional Study

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ABSTRACT

Hypertension remains a major public health problem worldwide and is associated with increased risk of cardiovascular complications. Identifying factors associated with the stage of hypertension is important for improving disease management at the primary health care level. This study aimed to identify determinants associated with the stage of hypertension among patients in a primary health care center. A cross-sectional study was conducted at Libano Primary Health Care Center, Morotai Island, Indonesia, in December 2025. A total of 30 hypertensive patients were included in the study. Data on demographic characteristics, clinical factors, and lifestyle behaviors were collected from patient records. Descriptive statistics were used to summarize the data, and bivariate analysis was performed using the Chi-square test or Fisher's exact test when appropriate. Statistical analysis was conducted using SPSS version 26, with a significance level set at $p < 0.05$. The distribution of hypertension stages was equal, with 50.0% classified as Stage 1 and 50.0% as Stage 2 hypertension. Medication adherence was significantly associated with the stage of hypertension ($p = 0.017$). Patients who adhered to antihypertensive medication were more likely to have Stage 1 hypertension, while non-adherent patients were more frequently classified as Stage 2. Other variables, including age, gender, educational level, employment status, family history of hypertension, smoking status, dietary pattern, and physical activity, were not significantly associated with hypertension stage. Medication adherence was the main determinant associated with the stage of hypertension. Strengthening adherence to antihypertensive therapy may help prevent the progression of hypertension.

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INTRODUCTION

Hypertension remains a major global public health problem and is one of the leading causes of cardiovascular morbidity and mortality worldwide. Persistent elevation of blood pressure significantly increases the risk of severe complications, including stroke, coronary heart disease, heart failure, and chronic kidney disease, which contribute substantially to disability and premature death related to cardiovascular conditions (Mills *et al.,* 2020; Zhou *et al.,* 2021). Recent estimates indicate that more than one billion people worldwide are living with hypertension, with prevalence continuing to rise, particularly in low- and middle-income countries (NCD Risk Factor Collaboration, 2021). This growing burden is closely associated with population aging, rapid urbanization, unhealthy diets, sedentary lifestyles, and unequal access to health care services (Carey et al., 2018; Zhou et al., 2021).

In Indonesia, hypertension is one of the most prevalent non-communicable diseases and represents a major challenge for the national health system. Evidence shows that the prevalence of hypertension among adults has increased over the past decade, particularly among older populations (Peltzer & Pengpid, 2018). Although effective antihypertensive medications and clinical management guidelines are available, many patients still experience uncontrolled blood pressure, which may lead to disease progression and an increased risk of cardiovascular complications (Burnier & Egan, 2019). The classification of hypertension stages reflects the degree of blood pressure elevation and serves as an important indicator for determining treatment strategies, monitoring disease progression, and estimating long-term cardiovascular risk (Unger *et al.,* 2020).

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Primary health care centers play an essential role in the prevention, early detection, and long-term management of hypertension. As the first level of health services, these facilities provide routine screening, diagnosis, treatment, and monitoring for patients with chronic diseases, including hypertension (World Health Organization, 2023) Health professionals in primary care are responsible for promoting lifestyle modification, supporting medication adherence, and monitoring blood pressure control. However, a considerable number of patients receiving care in these settings still present with advanced stages of hypertension, suggesting that various demographic, behavioral, and clinical factors may influence disease severity (Carey et al., 2018; Mills et al., 2020). Previous studies have identified several determinants associated with hypertension development and progression. Demographic factors such as age and gender are widely recognized as contributors. Aging is associated with physiological changes in the cardiovascular system, including increased arterial stiffness and reduced vascular elasticity, which contribute to elevated blood pressure (Carey et al., 2018). Gender differences in hypertension prevalence and management have also been reported, potentially related to hormonal factors, lifestyle behaviors, and health-seeking patterns (Zhou et al., 2021).

Socioeconomic characteristics, including education level and employment status, may also influence hypertension outcomes. Higher educational attainment is often associated with better health literacy and improved adherence to treatment recommendations (Kakoma et al., 2026). In addition, employment status may affect stress levels, economic stability, access to health services, and lifestyle behaviors that influence blood pressure control. Individuals who are unemployed or have unstable employment may experience financial constraints that limit their ability to access health services or maintain regular treatment. Furthermore, occupational demands and work-related stress may also influence health behaviors, including diet, physical activity, and adherence to medical recommendations.

Family history is another important determinant of hypertension, reflecting genetic predisposition and shared environmental influences (Zhou et al., 2021). Lifestyle factors such as smoking, unhealthy dietary patterns, excessive salt intake, and low physical activity have also been consistently linked to increased blood pressure and cardiovascular risk (Carey et al., 2018; Unger et al., 2020). In addition, medication adherence plays a crucial role in hypertension management. Consistent use of antihypertensive medication is effective in controlling blood pressure and preventing complications; however, poor adherence remains a major challenge and is strongly associated with uncontrolled hypertension and disease progression (Kakoma et al., 2026; Williams et al., 2019). Despite extensive research on hypertension risk factors, studies specifically examining determinants of hypertension stage among patients receiving care in primary health care settings remain limited, particularly in community-based facilities. Most previous studies have focused on hypertension prevalence or blood pressure control rather than factors associated with different stages of hypertension among diagnosed patients. Moreover, variations in socioeconomic conditions, cultural practices, and health service accessibility across regions may influence hypertension management and outcomes.

Therefore, understanding the determinants of hypertension stage in primary health care settings is essential for developing targeted interventions to prevent disease progression and improve patient outcomes. This study aimed to examine the determinants associated with hypertension stage among patients receiving care at a primary health care center, including demographic characteristics, socioeconomic factors, family history, lifestyle behaviors, and medication adherence. The findings are expected to contribute to improved hypertension management strategies in primary health care settings. In addition, the results may support the development of more effective patient education and adherence-enhancing interventions in hypertension management. Moreover, the findings may help strengthen preventive strategies and guide health care providers in optimizing hypertension control at the primary health care level. These insights may also serve as an evidence base for future research focusing on improving long-term hypertension management and reducing cardiovascular risk in community settings.

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METHODS

Study Design and Setting

This study employed a quantitative cross-sectional design to examine factors associated with the stage of hypertension among patients receiving care at Libano Primary Health Care Center, located on Morotai Island, Indonesia. Data collection was conducted in December 2025. The study setting is a primary health care facility that provides routine monitoring and treatment for patients with hypertension.

Study Population and Sample

The study population consisted of patients diagnosed with hypertension who received treatment at Libano Primary Health Care Center during the study period. A total of 30 patients met the inclusion criteria and were included in the analysis. Eligible participants were adults who had been diagnosed with hypertension and had complete medical records relevant to the study variables.

Variables and Measurements

The primary outcome variable in this study was the stage of hypertension, classified into Stage 1 and Stage 2 based on clinical records. Independent variables included demographic characteristics (age group, gender, educational level, employment status, and marital status), clinical factors (family history of hypertension and medication adherence), and lifestyle-related factors (smoking status, alcohol consumption, dietary pattern, salty food consumption, and physical activity). Age was categorized into adults (<60 years) and older adults (>60 years). Educational level was grouped into low education (elementary to junior high school) and higher education (senior high school). Medication adherence was categorized as adherent or non-adherent based on patient treatment records. Lifestyle factors were classified according to information documented in patient records and health assessments conducted at the health center.

Data Collection Procedure

Data were obtained from patient records and routine health assessments available at Libano Primary Health Care Center. Relevant demographic, clinical, and lifestyle information was extracted and recorded using a structured data collection form. Only records with complete information related to the study variables were included in the analysis.

Statistical Analysis

All data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 26. Descriptive statistics were used to summarize participant characteristics and were presented as frequencies and percentages. Bivariate analysis was performed using the Chi-square test to examine the association between categorical variables and the stage of hypertension. When the expected frequency in any cell was less than five, Fisher's exact test was applied. A p-value of less than 0.05 was considered statistically significant.

Ethical Considerations and Research Permission

Permission to conduct the study and to access patient medical records was obtained from the management of Libano Primary Health Care Center, Morotai Island (Approval No. 836/355/PKM-LBN/XII/2025). All data were treated with strict confidentiality, and no personal identifiers were included in the dataset to protect participants' privacy. The information collected was used solely for research purposes.

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RESULT AND DISCUSSIONS

Result

Table 1 presents the demographic, clinical, and lifestyle characteristics of hypertensive patients included in the study (n = 30). Most participants were older adults aged >60 years (66.7%) and female (60.0%). The majority had low educational attainment (80.0%) and were employed (66.7%), and all respondents were married.

More than half of the participants reported a family history of hypertension (60.0%). Most patients demonstrated good medication adherence (80.0%). The distribution of hypertension stages was equal, with 50.0% classified as Stage 1 and 50.0% as Stage 2 hypertension.

Regarding lifestyle characteristics, 30.0% of respondents reported smoking, whereas none reported alcohol consumption. Most participants had a less favorable dietary pattern (90.0%), and all respondents reported consuming salty foods. Adequate physical activity was reported by 73.3% of participants.

Table 1. Demographic, Clinical, and Lifestyle Characteristics of Hypertensive Patients at Libano Primary Health Care Center, Morotai Island (n = 30)

Variable	Frequency (n)	Percent (%)
Age Group		
Adults (<60 years)	10	33.,3
Older adult (>60 years)	20	66,7
Gender		
Male	12	40,0
Female	18	60,0
Educational Level		
Low education (elementary to junior high school)	24	80,0
Higher education (Senior High School)	6	20,0
Employment Status		
Employed	20	66,7
Unemployed	10	33,3
Marital Status		
Married	30	100,0
Unmarried (single/widowed/ or divorced)	0	0,0
Family History of Hypertension		
Yes	18	60,0
No	12	40,0
Medication Adherence		
Adherent	24	80,0
Non-adherent	6	20,0
Stage of Hypertension		
Stage 1	15	50,0
Stage 2	15	50,0
Smoking Status		
Yes	9	30,0
No	21	70,0
Alcohol Consumption		
Yes	0	0

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No	30	100,0
Dietary Pattern		
Less favorable	27	90,0
Unfavorable	3	10,0
Salty food consumption		
Yes	30	100,0
No	0	0
Physical Activity		
Adequate	22	73,3
Inadequate	8	26,7

Table 2 shows the association between demographic, clinical, and lifestyle factors and the stage of hypertension among patients. Medication adherence was the only factor significantly associated with hypertension stage (p = 0.017). Patients who adhered to antihypertensive medication were more likely to have Stage 1 hypertension, whereas all non-adherent patients were classified as having Stage 2 hypertension.

No significant associations were observed between hypertension stage and age group (p = 0.121), gender (p = 0.456), educational level (p = 0.651), employment status (p = 0.439), or family history of hypertension (p = 1.000). Similarly, lifestyle factors, including smoking status (p = 1.000), dietary pattern (p = 1.000), and physical activity (p = 0.215), were not significantly associated with hypertension stage.

Table 2. Factors Associated with the Stage of Hypertension Among Patients at Libano Primary Health Care Center, Morotai Island (n = 30)

Variable	Stage of Hypertension				p-value
	Stage 1		Stage 2		
	n	%	n	%	
Age Group					**0.121**
Adults (<60 years)	7	(23,3)	3	(10,0)	
Older adult (>60 years)	8	(26,7)	12	(40,0)	
Gender					**0.456**
Male	7	(23,3)	5	(16,7)	
Female	8	(26,7)	10	(33,3)	
Educational Level					**0.651**
Low education (elementary to junior high school)	11	(36,7)	13	(43,3)	
Higher education (Senior High School)	4	(12,3)	2	(6,7)	
Employment Status					**0.439**
Employed	9	(30,0)	11	(36,7)	
Unemployed	6	(20,0)	4	(13,3)	
Family History of Hypertension					**1.000**
Yes	9	(30,0)	9	(30,0)	
No	6	(20,0)	6	(20,0)	
Medication Adherence					**0.017***
Adherent	15	(50,0)	9	(30,0)	
Non-adherent	0	(0,0)	6	(20,0)	
Smoking Status					**1.000**
Yes	5	(16,7)	4	(13,3)	

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No	10	(33,3)	11	(36,7)	
Dietary Pattern					**1.000**
Less favorable	14	(46,7)	13	(43,3)	
Unfavorable	1	(3,3)	2	(6,7)	
Physical Activity					**0.215**
Adequate	13	(43,3)	9	(30,0)	
Inadequate	2	(6,7)	6	(20,0)	

Notes:

Chi-square or Fisher's exact test was used to examine associations between categorical variables and hypertension stage. Statistical significance was set at $p < 0.05$. Variables with no variability (marital status, alcohol consumption, and salty food consumption) were excluded from the analysis.

Discussion

This study investigated the relationship between demographic characteristics, clinical conditions, and lifestyle behaviors with the stage of hypertension among patients receiving treatment at a primary health care center. The results indicated that most of the examined variables, including age, gender, education level, employment status, family history of hypertension, smoking behavior, dietary pattern, and physical activity, did not show a statistically significant association with the stage of hypertension. In contrast, medication adherence was found to be significantly related to hypertension severity, underscoring its central role in effective hypertension management.

The analysis revealed that older participants tended to have a higher proportion of Stage 2 hypertension compared with individuals younger than 60 years; however, this relationship did not reach statistical significance. Evidence from previous research suggests that blood pressure generally rises with advancing age as a result of structural and functional changes in the cardiovascular system, particularly increased arterial stiffness and reduced vascular elasticity (Carey et al., 2018; Mills et al., 2020). The absence of statistical significance in the present study may partly be explained by the relatively limited sample size, which may reduce the ability to identify meaningful differences between age groups. A similar pattern was observed in relation to gender. Although women in this study showed a slightly greater proportion of Stage 2 hypertension than men, the difference was not statistically significant. Existing literature indicates that gender-related variations in hypertension may be influenced by hormonal mechanisms, lifestyle differences, and patterns of health service utilization (Unger et al., 2020; Zhou et al., 2021). Nevertheless, gender alone may not serve as a strong predictor of hypertension severity when other behavioral and treatment-related variables are taken into account.

Educational attainment and employment status were also not significantly associated with hypertension stage in this investigation. Despite the absence of statistical significance, individuals with lower educational backgrounds demonstrated a somewhat higher proportion of Stage 2 hypertension. Educational level is closely linked with health literacy, which influences a patient's ability to understand medical instructions, follow treatment recommendations, and adopt healthy lifestyle practices (Gebremichael et al., 2019). In the same way, employment status may affect stress exposure, socioeconomic conditions, and access to health services; however, its influence on blood pressure control may differ depending on individual circumstances and environmental context (Mills et al., 2020).

The findings further indicated that a family history of hypertension was not significantly related to hypertension stage. Although genetic predisposition is recognized as a major contributor to the development of hypertension, the severity of the disease after diagnosis may be more strongly affected by modifiable factors, including lifestyle behaviors and adherence to treatment (Carey et al., 2018; Zhou et al., 2021).

Lifestyle-related variables, namely smoking status, dietary pattern, and physical activity, were likewise not significantly associated with hypertension stage in this study. Smoking has long been recognized as a contributor to cardiovascular risk due to its damaging effects on vascular function,

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although its direct association with hypertension severity has shown inconsistent results across different populations (WHO, 2023). Dietary habits also play a crucial role in blood pressure regulation. In particular, excessive sodium intake and inadequate consumption of fruits and vegetables have been consistently associated with elevated blood pressure (Unger et al., 2020). Even though dietary patterns were not significantly linked to hypertension stage in this study, the relatively high proportion of participants with unhealthy dietary habits highlights the continued need for nutritional education and counseling. Likewise, insufficient physical activity was more frequently observed among patients with Stage 2 hypertension, although the association did not reach statistical significance. Regular physical activity is widely recognized for its ability to improve vascular function and support blood pressure regulation (Piercy et al., 2018).

Among all examined variables, medication adherence emerged as the only factor significantly associated with hypertension stage. Patients who consistently followed their prescribed antihypertensive treatment were more likely to remain in Stage 1 hypertension, whereas all patients who were classified as non-adherent were found to have Stage 2 hypertension. This result emphasizes the crucial importance of consistent medication use in preventing the progression of hypertension to more severe stages.

A substantial body of literature has identified medication adherence as a key determinant of effective blood pressure control. Non-adherence to antihypertensive therapy is widely acknowledged as one of the primary causes of uncontrolled hypertension and treatment failure (Burnier & Egan, 2019). Several factors may contribute to poor adherence, including limited patient knowledge, adverse medication effects, complicated treatment regimens, and inadequate follow-up from health care providers. Research has also demonstrated that patients who do not adhere to antihypertensive therapy are more likely to experience persistently elevated blood pressure and poorer long-term cardiovascular outcomes (Algabbani & Algabbani, 2020; Peng et al., 2025). In addition, strengthening patient education, providing counseling, and ensuring regular follow-up within primary health care systems have been shown to significantly improve medication adherence and blood pressure management (Abegaz et al., 2017).

In summary, the findings of this study suggest that although demographic and lifestyle characteristics remain relevant considerations in hypertension management, adherence to antihypertensive medication represents the most influential factor associated with hypertension severity among patients receiving care in primary health care settings. This study has several limitations that should be considered when interpreting the findings. First, the relatively small sample size may have limited the statistical power to detect significant associations between several variables and hypertension stage. Some variables, including age, physical activity, and dietary pattern, showed differences in distribution between groups but did not reach statistical significance, which may be related to the limited number of participants.

Second, several variables were obtained through self-reported data, particularly lifestyle behaviors such as smoking status, dietary pattern, and physical activity. Self-reported information may introduce recall bias and social desirability bias, which could influence the accuracy of the responses.

Third, the study was conducted in a single primary health care center, which may limit the generalizability of the findings to broader populations or other health care settings with different demographic and socioeconomic characteristics. In addition, this study did not include several potential factors that may influence hypertension severity, such as duration of hypertension, comorbidities, types of antihypertensive medications, and psychosocial factors.

Despite these limitations, the findings provide important implications for hypertension management in primary health care settings. The significant association between medication adherence and hypertension stage highlights the critical role of consistent antihypertensive treatment in blood pressure control. Health care providers, particularly nurses, play an important role in improving adherence through continuous patient education, counseling, and routine monitoring of medication use. Patient-centered approaches such as clear health education, medication reminder systems, and regular

follow-up visits may help improve adherence and prevent the progression of hypertension. Strengthening patient education and chronic disease management programs in primary health care is therefore essential to improve long-term hypertension outcomes.

CONCLUSION

This study examined the association between demographic characteristics, clinical factors, and lifestyle behaviors with the stage of hypertension among patients in a primary health care center. The findings showed that most variables, including age, gender, educational level, employment status, family history of hypertension, smoking status, dietary pattern, and physical activity, were not significantly associated with hypertension stage. However, medication adherence demonstrated a significant relationship with hypertension severity. These results highlight the crucial role of adherence to antihypertensive medication in preventing the progression of hypertension to more severe stages. Patients who consistently follow their prescribed treatment are more likely to achieve better blood pressure control and reduce the risk of complications. Therefore, strengthening interventions that promote medication adherence should be prioritized in primary health care settings. Health care providers, particularly nurses, play an important role in supporting patients through continuous education, counseling, and regular monitoring of treatment adherence. Future studies with larger sample sizes and broader settings are recommended to further explore the determinants of hypertension severity and to support the development of effective hypertension management strategies in primary health care.

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