Medication Adherence Remains a Challenge Among Hypertensive Patients in Primary Healthcare: Evidence from West Java, Indonesia

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ABSTRACT

Background: *Hypertension is a chronic disease that requires long-term treatment to prevent cardiovascular complications. Medication adherence plays a crucial role in blood pressure control; however, adherence remains suboptimal among many patients. This study aimed to examine the association between patient characteristics and medication adherence among hypertensive patients in primary healthcare settings.*
Method: *A cross-sectional study was conducted in April 2026 at Batujajar Primary Health Center, West Bandung Regency, and a primary clinic in Cimahi City, Indonesia. A total of 178 hypertensive patients were recruited using total sampling. Data were collected using a respondent characteristics questionnaire and the Indonesian version of the 8-item Morisky Medication Adherence Scale (MMAS-8). Data were analyzed using Chi-square tests and binary logistic regression, with a significance level of $p<0.05$.*
Result: *Only 26.4% of respondents were categorized as adherent to antihypertensive medication. Bivariate analysis showed significant associations between age ($p=0.019$), educational level ($p=0.017$), duration of hypertension ($p=0.012$), and medication adherence. Younger patients, those with higher educational attainment, and those who had lived with hypertension for at least five years demonstrated higher adherence rates. Sex was not significantly associated with medication adherence ($p=0.405$). In multivariable analysis, no factor remained statistically significant after adjustment. Although duration of hypertension had the largest adjusted odds ratio (OR=2.056; 95% CI=0.948–4.456), the association did not reach statistical significance ($p=0.068$).*

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INTRODUCTION

Hypertension is one of the leading non-communicable diseases contributing to morbidity and mortality worldwide. The World Health Organization (WHO) estimates that approximately 1.28 billion adults aged 30–79 years are living with hypertension, with nearly two-thirds residing in low- and middle-income countries. However, only about 54% of individuals with hypertension are diagnosed and receive treatment, while merely 21% achieve adequate blood pressure control. Poor blood pressure control remains a major contributor to cardiovascular disease, stroke, heart failure, chronic kidney disease, and premature mortality globally.(1–4)

In Indonesia, hypertension continues to be a significant public health concern. According to the 2023 Indonesian Health Survey (Survei Kesehatan Indonesia/SKI), the prevalence of hypertension increases with age, reaching 49.5% among individuals aged 55–64 years and 57.8% among those aged 65–74 years. Despite its high prevalence, hypertension management remains challenging. Approximately 13.3% of individuals with hypertension reported not taking antihypertensive medication, while 32.3% reported irregular medication use.(2)(5)These findings indicate that medication adherence remains a critical challenge in hypertension management. West Java, one of the provinces with a high burden of hypertension, faces similar challenges, highlighting the need to strengthen adherence-promoting interventions in primary healthcare settings.(5)(6)

The success of antihypertensive therapy depends not only on accurate diagnosis and appropriate treatment but also on patients' ability to adhere to prescribed medications consistently.(7)(8) Medication adherence plays a crucial role in achieving target blood pressure levels, preventing complications, and improving quality of life.(9) According to Orem's Self-Care Theory, individuals are

responsible for engaging in self-care activities to maintain health and manage chronic conditions. Adherence to prescribed medication is an important component of self-care behaviour among patients with hypertension. Inadequate self-care capacity may lead to poor adherence and suboptimal blood pressure control.(10)(11)

Medication non-adherence among patients with hypertension remains a challenge in many countries. Vaidya and Pol(12) reported that nearly half of older adults with hypertension demonstrated low medication adherence, and only a minority achieved optimal blood pressure control. These findings suggest that sustaining long-term adherence remains a major challenge in hypertension management.(13)

Several studies have identified patient characteristics associated with medication adherence among individuals with hypertension. Age, sex, educational level, and duration of hypertension are frequently examined because they may influence an individual's ability to understand health information, make treatment-related decisions, and maintain self-care behaviours over time.(14–16)

Several studies have investigated factors associated with medication adherence among patients with hypertension. However, evidence regarding the influence of basic sociodemographic characteristics remains inconsistent across different settings. While some studies have reported significant associations between age, educational level, and duration of hypertension with medication adherence, others have found weak or non-significant relationships, suggesting that contextual differences may influence adherence behaviour.(15)(17–19) In addition, evidence from Indonesian primary healthcare settings remains limited, particularly in West Java where hypertension constitutes a substantial public health burden. Understanding whether basic patient characteristics are associated with medication adherence at the primary healthcare level may help identify groups requiring targeted health promotion interventions. Therefore, this study aimed to examine the association between age, sex, educational level, and duration of hypertension with medication adherence among hypertensive patients receiving care in primary healthcare facilities. By comparing crude and adjusted associations, this study also provides evidence regarding the extent to which demographic characteristics independently explain medication adherence.

METHOD

Study Design and Participants

This analytical observational study employed a cross-sectional design. The study was conducted in April 2026 at Batujajar Primary Health Center, West Bandung Regency, and a primary clinic in South Cimahi District, Cimahi City, West Java Province, Indonesia. The source population consisted of all registered hypertensive patients receiving routine antihypertensive treatment at Batujajar Primary Health Center and the participating primary clinic during the study period. Prior to data collection, the minimum required sample size was estimated separately for each study site using the Slovin formula based on the registered hypertensive patient population. The calculated minimum sample sizes were 92 respondents for Batujajar Primary Health Center and 86 respondents for the primary clinic. During data collection, a total sampling approach was implemented, whereby all eligible hypertensive patients attending each facility during the study period who met the inclusion criteria were invited to participate until the required sample size was achieved. Consequently, 178 respondents were included in the final analysis.

The inclusion criteria were, aged 18 years or older; diagnosed with hypertension by a healthcare professional, currently receiving antihypertensive medication, able to communicate effectively, and willing to participate by providing written informed consent. Patients with cognitive impairment, communication difficulties that interfered with the interview process, or incomplete questionnaire responses were excluded.

Variables and Data Collection

The dependent variable was medication adherence among patients with hypertension. Medication adherence was defined as patients' behaviour in taking antihypertensive medication according to healthcare providers' recommendations regarding dosage, frequency, and timing. Adherence was assessed using the Indonesian version of the 8-item Morisky Medication Adherence Scale (MMAS-8). The Indonesian version of the MMAS-8 has demonstrated acceptable validity and reliability for assessing medication adherence among Indonesian hypertensive patients and has been widely used in hypertension research.(20)(21) The MMAS-8 consists of eight questions designed to evaluate adherence behaviour toward prescribed medication regimens. The MMAS-8 was selected because it is brief, practical for primary healthcare settings, and has been validated among Indonesian hypertensive patients.

The independent variables included age, sex, educational level, and duration of hypertension. Data on respondent characteristics were collected through interviewer-administered questionnaires.

For descriptive analysis, age was categorized as <60 years and ≥60 years; educational level was classified as elementary school, junior high school, senior high school, and higher education; and duration of hypertension was categorized as <5 years, 5–10 years, and >10 years. Medication adherence was categorized as low, medium, and high according to MMAS-8 scoring guidelines.

For bivariate and multivariable analyses, educational level was recategorized into low education (elementary and junior high school) and high education (senior high school and higher education). Duration of hypertension was recategorized into <5 years and ≥5 years. Medication adherence was dichotomized into adherent (medium and high adherence) and non-adherent (low adherence). This categorization was performed because only one respondent was classified as having high medication adherence according to the MMAS-8 scoring criteria, making separate analysis statistically unreliable. The dichotomized outcome was therefore considered appropriate for binary logistic regression analysis.

Data were collected through face-to-face interviews using structured questionnaires. Before participation, all respondents received information regarding the study objectives, procedures, potential benefits, and their rights as participants. Written informed consent was obtained from all respondents prior to data collection.

Data Analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS). Descriptive statistics were used to summarize respondent characteristics and medication adherence levels, and the results were presented as frequencies and percentages.

Bivariate analysis was performed using the Chi-square test to examine the association between age, sex, educational level, duration of hypertension, and medication adherence. Variables with a p-value <0.25 in bivariate analysis were subsequently entered into a binary logistic regression model to evaluate the simultaneous association between patient characteristics and medication adherence. The adequacy of the logistic regression model was evaluated using the Hosmer–Lemeshow goodness-of-fit test, while multicollinearity among independent variables was assessed using variance inflation factors (VIF). The results of multivariable analysis were presented as odds ratios (ORs), 95% confidence intervals (95% CIs), and p-values. Statistical significance was set at $p<0.05$.

Ethical Considerations

This study was approved by the Health Research Ethics Committee of STIKes Budi Luhur Cimahi, Indonesia (Approval No. 001996/STIKes Budi Luhur Cimahi/2026). All respondents voluntarily participated in the study and provided written informed consent prior to data collection. Confidentiality and anonymity of participants were maintained throughout the study.

RESULT AND DISCUSSION

A total of 178 hypertensive patients participated in this study. Most respondents were aged ≥60 years (70.8%), female (71.9%), had low educational attainment (69.6%), and had lived with hypertension for at least five years (59.0%). Regarding medication adherence, 73.6% of respondents were categorized as having low adherence, 25.8% had moderate adherence, and only 0.6% demonstrated high adherence (Table 1).

Table 1. Characteristics of respondent (n=178)

Variables	n	%
Age		
<60 years	52	29.2
≥60 years	126	70.8
Sex		
Male	50	28.1
Female	128	71.9
Education		
Elementary school	88	49.4
Junior high school	36	20.2
Senior high school	35	19.7
Higher education	19	10.7
Duration of hypertension		
<5 years	73	41.0
5-10 years	59	33.1
>10 years	46	25.8
Medication adherence		
Low	131	73.6
Moderate	46	25.8
High	1	0.6
Total	**178**	**100**

Bivariate analysis showed that age (p=0.019), educational level (p=0.017), and duration of hypertension (p=0.012) were significantly associated with medication adherence. Younger patients (<60 years), those with higher educational attainment, and those who had lived with hypertension for at least five years demonstrated higher adherence rates. Sex was not significantly associated with medication adherence (p=0.405) (Table 2).

Table 2. Association Between Respondent Characteristics and Medication Adherence

Variables	Non-adherent		Adherent		Crude OR (95% CI)		P-value
	n	%	n	%			
Age							
<60 years	32	61.5	20	38.5	Ref		0.019
≥60 years	99	78.6	27	21.4	0.44	(0.22-0.88)	
Sex							
Male	39	78.0	11	22.0	Ref		0.405
Female	92	71.9	36	28.1	1.39	(0.65-2.97)	
Education							
Low	97	78.9	26	21.1	Ref		0.017
High	34	61.8	21	38.2	2.30	(1.15-4.62)	
Duration of hypertension							
<5 years	61	83.6	12	16.4	Ref		0.012
≥5 years	70	66.7	35	33.3	2.54	(1.21-5.33)	

Table 3. Multivariable Logistic Regression Analysis of Factors Associated with Medication Adherence

Variable	B	Sig.	Exp(B)	95% CI	95% CI	P-value
				Lower	Upper	
Age (≥60 years)	-0.518	0.190	0.596	0.275	1.292	0.190
Education (High)	0.446	0.261	1.562	0.717	3.402	0.261
Duration of hypertension (≥5 years)	0.721	0.068	2.056	0.948	4.456	0.068

Variables with p<0.25 in the bivariate analysis were entered into a binary logistic regression model. After adjustment, none of the variables remained significantly associated with medication adherence. However, duration of hypertension showed the strongest tendency toward adherence (OR=2.056; 95%CI=0.948–4.456; p=0.068), indicating that patients who had lived with hypertension for at least five years were more likely to adhere to treatment than those with a shorter disease duration, although the association did not reach statistical significance (Table 3).

The logistic regression model demonstrated an acceptable fit based on the Hosmer–Lemeshow goodness-of-fit test (χ^2 = 4.481; p = 0.345). Multicollinearity diagnostics indicated no evidence of problematic collinearity among the independent variables, with VIF values ranging from 1.102 to 1.253.

Discussion

This study found that medication adherence among hypertensive patients in primary healthcare settings was generally low, with nearly three-quarters of respondents categorized as non-adherent. This finding is consistent with previous studies reporting that maintaining long-term adherence remains a major challenge in hypertension management. Poor medication adherence may reduce the effectiveness of antihypertensive therapy and increase the risk of uncontrolled blood pressure and cardiovascular complications.(12)(14) The high proportion of non-adherent patients observed in this study also highlights the continuing challenge of achieving effective hypertension management in Indonesian primary healthcare settings.

Age, educational level, and duration of hypertension were significantly associated with medication adherence in the bivariate analysis. Younger patients, those with higher educational attainment, and those who had lived with hypertension for at least five years demonstrated higher adherence than their counterparts. However, none of these variables remained statistically significant after adjustment in the multivariable model, suggesting that the observed bivariate associations may partly reflect the interrelationships among patient characteristics rather than independent effects. Medication adherence is a multidimensional behaviour that cannot be adequately explained by basic sociodemographic characteristics alone. This interpretation is consistent with Orem's Self-Care Theory, which proposes that successful self-care depends not only on individual characteristics but also on a person's self-care agency, knowledge, motivation, and ability to perform health-related behaviours consistently.(10)(11) From this perspective, medication adherence represents an important self-care behaviour, and the absence of independent predictors in the adjusted model suggests that broader behavioural and psychosocial factors may have greater influence than demographic characteristics alone.

The association between age and medication adherence may be explained by several behavioural and psychosocial mechanisms. Older adults often experience multimorbidity, polypharmacy, declining cognitive function, or physical limitations that may complicate long-

term medication management.(15)(22)(23) Conversely, younger patients may have better cognitive capacity and greater independence in managing treatment routines. Nevertheless, previous studies have reported inconsistent findings regarding age and medication adherence, indicating that chronological age alone is unlikely to determine adherence behaviour. Factors such as self-management ability, family support, health literacy, and patients' beliefs about medication may play more important roles in supporting sustained adherence.(13)(15)(23) Because these factors were not measured in the present study, they should be considered as possible explanations rather than definitive conclusions.

Respondents with higher educational attainment demonstrated better medication adherence in the bivariate analysis. Individuals with higher education may have greater access to health information and a better understanding of the benefits of long-term antihypertensive therapy.(14)(15)(23)(24)However, this association disappeared after multivariable adjustment, suggesting that educational level alone may not independently determine adherence behaviour. Rather, education may facilitate the development of health literacy and self-management skills that support medication adherence. These findings highlight the importance of providing patient-centred health education that is tailored to patients' educational backgrounds so that health information can be understood and applied effectively regardless of formal educational attainment.

Duration of hypertension was another factor significantly associated with medication adherence in the bivariate analysis. Patients who had lived with hypertension for at least five years were more likely to adhere to medication than those with a shorter disease duration. However, although duration of hypertension showed the highest adjusted odds ratio in the multivariable analysis (OR = 2.056), the association did not reach statistical significance (p = 0.068). Therefore, this finding should be interpreted as indicating a tendency toward better adherence rather than an independent predictor of medication adherence. Longer experience with hypertension may help some patients establish medication-taking routines and increase awareness of the consequences of uncontrolled blood pressure, whereas others may experience treatment fatigue over time. These contrasting findings reported in previous studies further support that adherence behaviour is influenced by multiple interacting factors rather than disease duration alone.(17)(19)(25)

The findings of this study have important implications for hypertension control programs in Indonesian primary healthcare settings. The high prevalence of medication non-adherence indicates that routine prescribing alone is insufficient to ensure successful long-term hypertension management. Strengthening patient-centred counselling, individualized health education, regular assessment of medication adherence, and family involvement may improve patients' ability to maintain long-term treatment. These interventions are consistent with health promotion approaches that emphasize empowering patients to develop sustainable self-care behaviours and actively participate in managing their chronic conditions. Routine assessment of medication adherence using simple validated instruments such as the MMAS-8 may help primary healthcare providers identify patients requiring additional counselling and behavioural support.

This study has several strengths. First, medication adherence was assessed using the Indonesian version of the MMAS-8, a validated instrument widely used in hypertension research. Second, respondents were recruited from two primary healthcare facilities, enhancing the applicability of the findings to routine primary care settings. The use of multivariable logistic regression also allowed the simultaneous assessment of several patient characteristics while controlling for potential confounding. Finally, this study provides context-specific evidence regarding medication adherence among hypertensive patients in West Java, which may support the development of targeted health promotion interventions in Indonesian primary healthcare.
This study has several limitations that should be considered when interpreting the findings. First, medication adherence was assessed using the self-reported MMAS-8 questionnaire, which may be subject to recall bias and social desirability bias, potentially leading to overestimation of adherence. Second, because this study employed a cross-sectional design, causal relationships between patient characteristics and medication adherence cannot be established. The findings may also have limited generalizability because participants were recruited from only two primary healthcare facilities in West Java. Finally, behavioural and psychosocial factors, such as health literacy, medication beliefs, self-efficacy, family support, and patient–provider communication, were not directly measured,although these factors may substantially influence medication adherence. Future studies incorporating these variables are warranted to provide a more comprehensive understanding of adherence behaviour among patients with hypertension.

CONCLUSION

Medication adherence among hypertensive patients receiving care- in primary healthcare settings

remained low, with nearly three-quarters of participants classified as non-adherent. Although age, educational level, and duration of hypertension were associated with medication adherence in the bivariate analysis, none of these characteristics remained independently associated after multivariable adjustment. These findings suggest that medication adherence is a complex behaviour that cannot be adequately explained by basic sociodemographic characteristics alone and is likely influenced by broader behavioural and psychosocial factors. Routine adherence assessment using validated tools should be incorporated into primary healthcare services to facilitate early identification of patients requiring adherence support. Future studies should incorporate behavioural and psychosocial determinants to better understand factors influencing medication adherence.

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Conflict of Interest

The authors declare that there are no conflicts of interest related to this study or the preparation of this manuscript.

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