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Determinants of Antihypertensive Medication Adherence among Hemodialysis Patients with Chronic Kidney Disease in Jambi Province, Indonesia

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Abstract
Introduction: *Chronic kidney disease patients undergoing hemodialysis commonly experience hypertension requiring long-term antihypertensive therapy. Poor medication adherence may increase complications and mortality.* ***Objective:*** *This study aimed to analyze factors associated with antihypertensive medication adherence among chronic kidney disease patients undergoing hemodialysis in Jambi Province, Indonesia.* ***Method:*** *This analytical observational study used a cross-sectional design. A total of 193 respondents were recruited using consecutive sampling. Data were collected using structured questionnaires, including the Morisky Medication Adherence Scale-8 (MMAS-8), knowledge questionnaire, and family support questionnaire. Data were analyzed using univariate, bivariate, and multivariate logistic regression analyses.* ***Results and Discussion:*** *A total of 53.4% of respondents were non-adherent to antihypertensive medication. Bivariate analysis showed no significant association between independent variables and medication adherence ($p>0.05$). However, knowledge demonstrated a tendency toward association with adherence behavior. Respondents with good knowledge had 2.44 times higher odds of adherence compared with respondents with poor knowledge (Adjusted OR=2.440; 95% CI: 0.887–6.716; $p=0.084$). Family support remained in the final model as a contributing variable.* ***Conclusion:*** *No statistically significant determinants of antihypertensive medication adherence were identified. However, knowledge and family support showed a tendency to contribute to medication adherence among hemodialysis patients and may be important targets for future interventions.*

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Introduction

Chronic kidney disease is a global public health problem with increasing prevalence and mortality rates worldwide. The Global Burden of Disease study reported that chronic kidney disease has become one of the leading causes of death globally, with its burden continuing to increase worldwide (GBD Chronic Kidney Disease Collaborators, 2024). Patients with chronic kidney disease undergoing hemodialysis commonly experience hypertension as a major comorbidity due to impaired fluid balance and vascular dysfunction. Hypertension in hemodialysis patients increases the risk of cardiovascular disease, stroke, hospitalization, and premature death if not properly controlled (Kario et al., 2024; Kidney Disease: Improving Global Outcomes [KDIGO], 2024). Therefore, adherence to antihypertensive medication is essential to maintain blood pressure stability and improve patient outcomes.

Medication adherence among patients undergoing hemodialysis remains a significant challenge in many countries, including Indonesia. Previous studies have shown that non-adherence to antihypertensive therapy among hemodialysis patients is influenced by psychosocial factors, health literacy, family support, and treatment burden (Alhamad et al., 2023; Hamza et al., 2025). In addition, the complex treatment regimen and long-term dependence on hemodialysis may affect patients' psychological and behavioral responses toward medication adherence.

In Indonesia, studies examining determinants of antihypertensive medication adherence among chronic kidney disease patients undergoing hemodialysis are still limited, particularly in Jambi Province. Most previous research focused only on general medication adherence without specifically analyzing antihypertensive therapy and its associated factors among hemodialysis patients. Furthermore, limited local evidence is available to support the development of targeted interventions to improve adherence behavior in this population.

Therefore, this study aimed to analyze the determinants of antihypertensive medication adherence among chronic kidney disease patients undergoing hemodialysis at two hospitals in Jambi Province, Indonesia, in 2026. The findings of this study are expected to provide evidence for healthcare providers in developing educational and supportive interventions to improve medication adherence among hemodialysis patients.

Method

This study used an analytical observational design with a cross-sectional approach to identify determinants of antihypertensive medication adherence among chronic kidney disease patients undergoing hemodialysis in Jambi Province, Indonesia, in 2026. The study was conducted at the hemodialysis units of RSUD Raden Mattaher Jambi and RS Baiturrahim Jambi between March and May 2026.

The study population consisted of chronic kidney disease patients undergoing routine hemodialysis. A total of 193 respondents were recruited using consecutive sampling. Inclusion criteria were patients aged ≥18 years, diagnosed with chronic kidney disease and hypertension, undergoing routine hemodialysis for at least one month, and currently receiving antihypertensive therapy. Patients with severe cognitive impairment, unstable clinical conditions, or unwillingness to participate were excluded from the study.

Data were collected using structured questionnaires. Antihypertensive medication adherence was assessed using the Morisky Medication Adherence Scale-8 (MMAS-8). Knowledge and family support questionnaires were developed by the researchers and

tested for validity and reliability before data collection. Sociodemographic and clinical characteristics including age, sex, education, occupation, duration of hemodialysis, number of medications, and medication side effects were also collected.

Data analysis was performed using SPSS software. Univariate analysis was used to describe respondent characteristics. Bivariate analysis was conducted using the chi-square test or Fisher's exact test where appropriate to assess associations between independent variables and medication adherence. Variables with $p<0.25$ in bivariate analysis and variables considered clinically relevant were included in multivariate logistic regression analysis. Results were presented as odds ratios (ORs) and adjusted odds ratios (AORs) with 95% confidence intervals (95% CI). Statistical significance was determined at $p<0.05$.

This study received ethical approval from the Health Research Ethics Committee prior to data collection, and all respondents provided written informed consent before participation.

Result and Discussion

1. Result

Univariate Analysis

A total of 193 chronic kidney disease patients undergoing hemodialysis at two hospitals in Jambi Province participated in this study. The proportion of respondents adherent to antihypertensive medication was 46.6%, while 53.4% were categorized as non-adherent.

Table 1
Distribution of Antihypertensive Medication Adherence among Chronic Kidney Disease Patients Undergoing Hemodialysis in Two Hospitals in Jambi Province, Indonesia, 2026

Variable	n	%
Adherence		
Adherent	90	46.6
Non-adherent	103	53.4

Source: Primary Data Processed, 2026.

Most respondents were aged 18–59 years (68.9%), female (50.3%), had higher educational levels (51.8%), and were unemployed (65.3%). The majority had undergone hemodialysis for less than three years (67.9%), consumed 0–5 medications daily (59.6%), did not experience medication side effects (86.0%), had good knowledge (70.5%), and reported high family support (87.0%).

Table 2
Characteristics of Respondents among Chronic Kidney Disease Patients Undergoing Hemodialysis in Two Hospitals in Jambi Province, Indonesia, 2026

Variable	n	%
Age		
18–59 years	133	68.9
≥60 years	60	31.1
Sex		
Male	96	49.7
Female	97	50.3
Education		
Low	93	48.2
High	100	51.8
Occupation		
Unemployed	126	65.3
Employed	67	34.7
Duration of Hemodialysis		
<3 years	131	67.9
3–5 years	33	17.1
>5 years	29	15.0
Number of Medications		
0–5 medications	115	59.6
>5 medications	78	40.4
Medication Side Effects		
No	166	86.0
Yes	27	14.0
Knowledge		
Good	136	70.5
Moderate	38	19.7
Poor	19	9.8
Family Support		
Low	3	1.6
Moderate	22	11.4
High	168	87.0

Source: Primary Data Processed, 2026.

Descriptive analysis showed that respondents had a mean age of 53.18 years and an average hemodialysis duration of 30.87 months. The mean adherence score was 5.10, indicating relatively low levels of medication adherence among respondents.

Table 3
Descriptive Statistics of Numerical Variables among Chronic Kidney Disease Patients Undergoing Hemodialysis in Two Hospitals in Jambi Province, Indonesia, 2026

Variable	Min	Max	Mean ± SD	95% CI
Age (years)	22	76	53.18 ± 11.81	51.51–54.86
Duration of hemodialysis (months)	0	192	30.87 ± 37.05	25.61–36.13
Number of medications	0	12	5.05 ± 1.85	4.79–5.31
Knowledge score	0	11	2.78 ± 2.04	2.49–3.07
Knowledge percentage	15.38	100	78.60 ± 15.67	76.37–80.82
Family support score	3	36	30.77 ± 5.94	29.92–31.61
Adherence score	0	8	5.10 ± 2.08	4.80–5.39

Source: Primary Data Processed, 2026.

Bivariate Analysis

Bivariate analysis showed that none of the independent variables were significantly associated with antihypertensive medication adherence (p>0.05). However, knowledge demonstrated a tendency toward association with medication adherence. Respondents with good knowledge had 2.55 times higher odds of adherence compared with respondents with poor knowledge (OR=2.550; 95% CI: 0.932–6.976; p=0.068).

Table 4
Association between Respondent Characteristics, Knowledge, Family Support, and Antihypertensive Medication Adherence among Chronic Kidney Disease Patients Undergoing Hemodialysis in Two Hospitals in Jambi Province, Indonesia, 2026

Variable	OR (95% CI)	p-value
Age (18–59 years)	1.053 (0.755–1.467)	0.881
Female sex	1.035 (0.765–1.399)	0.939
Low education	1.124 (0.831–1.520)	0.538
Unemployed	1.177 (0.843–1.644)	0.406
Duration of HD <3 years	1.383 (0.702–2.515)	0.383
0–5 medications	0.972 (0.715–1.319)	0.970
No medication side effects	1.301 (0.776–2.181)	0.384
Good knowledge	2.550 (0.932–6.976)	0.068
Moderate family support	0.460 (0.187–1.134)	0.092

Source: Primary Data Processed, 2026.

Knowledge and family support were retained as candidate variables for multivariate analysis because of their clinical and statistical relevance.

Multivariate Analysis

Multivariate logistic regression analysis identified knowledge and family support as variables retained in the final model. Respondents with good knowledge had 2.44 times higher odds of adherence compared with respondents with poor knowledge after controlling for family support.

Table 5
Final Multivariate Logistic Regression Model of Antihypertensive Medication Adherence among Chronic Kidney Disease Patients Undergoing Hemodialysis in Jambi Province, Indonesia, 2026

Variables	B	Adjusted OR (95% CI)	p-value
Good knowledge	0.892	2.440 (0.887–6.716)	0.084
Moderate knowledge	0.485	1.625 (0.526–5.018)	0.399
Low family support	0.399	1.490 (0.364–6.108)	0.579
Moderate family support	-0.675	0.509 (0.206–1.260)	0.144

Omnibus test p=0.101
Source: Primary Data Processed, 2026.

Multivariate logistic regression analysis showed that no variables were significantly associated with antihypertensive medication adherence after adjustment. However, respondents with good knowledge had 2.44 times higher odds of adherence compared with respondents with poor knowledge (Adjusted OR=2.440; 95% CI: 0.887–6.716; p=0.084). Family support was retained in the final model because of its potential confounding role. The omnibus test result (p=0.101) indicated that the final regression model was not statistically significant.

2. Discussion

Univariate Analysis

This study found that 53.4% of chronic kidney disease patients undergoing hemodialysis were non-adherent to antihypertensive medication, while only 46.6% were adherent. This finding indicates that medication adherence remains a major challenge among hemodialysis patients. Poor adherence among patients with chronic kidney disease may increase the risk of uncontrolled hypertension, cardiovascular complications, hospitalization, and mortality. Similar findings were reported by Suryaman et al. (2025), who explained that poor medication adherence among hemodialysis patients is associated with adverse clinical outcomes and worsening disease progression.

Most respondents in this study were aged 18–59 years, female, had higher educational levels, and were unemployed. The majority had undergone hemodialysis for less than three years and consumed fewer than five medications daily. Chronic kidney disease patients undergoing hemodialysis frequently experience reduced physical capacity, fatigue, and dependence on routine treatment, which may contribute to reduced productivity and unemployment. Puspitasari et al. (2024) reported that long-term hemodialysis patients commonly experience physical and psychosocial burdens that affect daily functioning and quality of life.

The majority of respondents demonstrated good knowledge regarding chronic kidney disease and antihypertensive medication. However, misconceptions regarding antihypertensive therapy were still identified, including beliefs that medication only needs to be taken when blood pressure increases and that missing medication occasionally does not affect health outcomes. These misconceptions may contribute to inconsistent medication-taking behavior. Hamza et al. (2025) reported that health literacy and illness perception strongly influence medication adherence among hemodialysis patients because patients with poor understanding tend to underestimate treatment importance.

Family support in this study was generally high. Most respondents reported receiving emotional, informational, and instrumental support from family members, including reminders to take medication, accompaniment during hemodialysis sessions, and financial assistance. Similar findings were reported by Alatawi et al. (2024), who found that social support positively influences adherence to treatment regimens among hemodialysis patients by improving patient motivation and emotional stability during long-term therapy.

Bivariate Analysis

Bivariate analysis showed that age, sex, education, occupation, duration of hemodialysis, number of medications consumed, medication side effects, knowledge, and family support were not significantly associated with antihypertensive medication adherence ($p>0.05$). However, knowledge showed a tendency toward association with medication adherence. Respondents with good knowledge had 2.55 times higher odds of adherence compared with respondents with poor knowledge.

Although the association was not statistically significant, this finding remains clinically meaningful because knowledge appears to contribute to adherence behavior among patients with chronic diseases. Patients who understand disease progression, treatment benefits, and medication consequences are more likely to maintain adherence to antihypertensive therapy. Similar findings were reported by Sajjadi et al. (2024), who demonstrated that individualized educational interventions improved treatment adherence

among hemodialysis patients by increasing patient understanding regarding disease management.

Family support also showed a contributory tendency toward medication adherence, although statistical significance was not achieved. Patients receiving stronger family support may feel more motivated and emotionally supported in maintaining treatment routines. Family members may help patients through medication reminders, accompaniment during healthcare visits, and emotional encouragement. Social and family support have been recognized as important facilitators of treatment adherence among individuals with chronic diseases because they can improve motivation, self-management, and persistence with long-term therapy (Patel et al., 2025).

Other variables, including age, sex, education, occupation, duration of hemodialysis, number of medications, and medication side effects, showed no statistically significant relationship with medication adherence. This finding suggests that adherence behavior among hemodialysis patients is multifactorial and may not depend solely on demographic or clinical characteristics. Rondhianto et al. (2024) explained that psychosocial factors, emotional condition, self-efficacy, and patient coping ability also influence adherence behavior among chronic kidney disease patients undergoing hemodialysis.

Multivariate Analysis

Multivariate logistic regression analysis showed that knowledge demonstrated the strongest tendency toward association with antihypertensive medication adherence after adjustment for family support. Respondents with good knowledge had 2.44 times higher odds of adherence compared with respondents with poor knowledge (Adjusted OR=2.440; 95% CI: 0.887–6.716), although the association did not reach statistical significance (p=0.084). Despite the lack of statistical significance, this finding suggests that knowledge may play an important role in influencing medication adherence behavior among hemodialysis patients. Patients with better understanding of hypertension, antihypertensive therapy, and the consequences of non-adherence may be more likely to follow prescribed treatment regimens consistently.

Adequate knowledge may improve patient awareness regarding the importance of blood pressure control, regular medication use, and prevention of complications related to chronic kidney disease. Patients with better understanding regarding their condition are more likely to demonstrate positive self-management behavior and maintain treatment adherence. Van den Oever et al. (2025) reported that medication-related health literacy among hemodialysis patients strongly influences patient ability to understand treatment instructions and maintain adherence behavior.

Family support remained in the final multivariate model because of its potential confounding role. Variations in family support categories may reflect the small number of respondents in certain subgroups, which could affect estimate stability. Nevertheless, family involvement may strengthen patient motivation and psychological adaptation during long-term treatment. Alatawi et al. (2024) explained that emotional and practical support from family members improve adherence behavior by reducing psychological stress and treatment burden among hemodialysis patients. This finding indicates that family involvement may strengthen patient motivation and psychological adaptation during long-term treatment. Alatawi et al. (2024) explained that emotional and practical

support from family members improves adherence behavior by reducing psychological stress and treatment burden among hemodialysis patients.

Another important consideration in this study is the relatively unequal distribution of several categorical variables, particularly family support categories, where most respondents reported high family support while only a small proportion reported low support. This imbalance may have reduced the statistical power of the regression model and contributed to wide confidence intervals in several estimates. Consequently, potentially meaningful associations may not have reached statistical significance. In addition, the relatively small number of respondents in certain subgroups may have limited the stability of the multivariate model. Future studies with larger and more balanced sample distributions are recommended to improve model precision and strengthen statistical inference.

The absence of statistically significant associations in the multivariate model may be related to the relatively uneven distribution of several variables, particularly family support categories, as well as the multifactorial nature of medication treatment adherence in this population.

The omnibus test result (p=0.101) indicated that the final regression model was not statistically significant. Despite the absence of statistical significance, this finding suggests that knowledge may contribute to medication adherence behavior among hemodialysis patients. Win et al. (2025) explained that treatment adherence among long-term hemodialysis patients is influenced by multiple factors, including depression, treatment fatigue, healthcare accessibility, self-efficacy, and communication with healthcare providers.

Despite these limitations, this study provides important evidence regarding antihypertensive medication adherence among chronic kidney disease patients undergoing hemodialysis in Indonesia, particularly in Jambi Province where local evidence remains limited. The findings emphasize the importance of strengthening educational interventions and involving family members in chronic disease management programs to improve medication adherence and treatment outcomes among hemodialysis patients.

Conclusion

This study found that 53.4% of chronic kidney disease patients undergoing hemodialysis at two hospitals in Jambi Province were non-adherent to antihypertensive medication, while only 46.6% demonstrated adherence. Most respondents had good knowledge regarding chronic kidney disease and antihypertensive therapy (70.5%) and reported high family support (87.0%). Bivariate analysis showed that knowledge demonstrated a tendency toward antihypertensive medication adherence (OR=2.550; 95% CI: 0.932–6.976; p=0.068). Multivariate analysis indicated that respondents with good knowledge tended to have higher odds of adherence than those with poor knowledge (Adjusted OR=2.440; 95% CI: 0.887–6.716; p=0.084), although the association was not statistically significant. Although the associations were not statistically significant, knowledge and family support remained clinically important factors contributing to medication adherence among hemodialysis patients. These findings indicate the importance of strengthening patient education and family-based support interventions to improve antihypertensive medication adherence among chronic kidney disease patients undergoing hemodialysis.

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