

Analysis of the Effect of Medication Adherence on Systolic Blood Pressure in Hypertensive Patients

Moh. Alimansur¹, Eko Winarti², Idola Perdana Sulistyoning Suharto³, Devangga Darma Karingga⁴, Fira Deviyanti Kartikasari⁵

¹ Undergraduate Program of Health Science, University of Kediri, Indonesia

² Master of Public Health program,, University of Kediri, Indonesia

^{3,4,5} Undergraduate Program of Nursing, University of Kediri, Indonesia

ali.mansur75@unik-kediri.ac.id, ekowinarti@unik-kediri.ac.id, idolaperdana@unik-kediri.ac.id, devanggadk@unik-kediri.ac.id, firadevi49@gmail.com

ABSTRACT

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Hypertension is a major public health issue that continues to rise in prevalence, particularly in low- and middle-income countries. Despite the availability of effective medications, low adherence remains a significant barrier to achieving blood pressure control. This study aims to analyze the effect of medication adherence on systolic blood pressure among hypertensive patients. This quantitative study employed a cross-sectional design and involved 86 hypertensive patients in Cengkok Village, Nganjuk Regency, East Java. The sampling technique used was simple random sampling. The independent variable of this study is the compliance of hypertensive patients while the dependent variable is systolic pressure. Medication adherence was assessed using the Morisky Medication Adherence Scale (MMAS-8), while systolic blood pressure was classified into stage 1 and stage 2 hypertension. The data were analyzed using spearman rho and logistic regression tests. The results revealed that most patients with high adherence had stage 1 hypertension (95.2%), while all patients with low adherence had stage 2 hypertension (100%). The spearman rho showed a significant relationship between adherence level and systolic blood pressure ($p \leq 0.05$). Furthermore, logistic regression analysis indicated that patients with low or moderate adherence were 39.09 times more likely to have uncontrolled systolic blood pressure compared to those with high adherence ($p = 0.001$). In conclusion, medication adherence significantly affects systolic blood pressure control among hypertensive patients. Improving adherence through targeted education and community-based interventions is essential to prevent complications such as stroke, heart failure, and kidney disease.

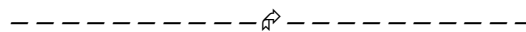
ABSTRAK

Hipertensi merupakan salah satu masalah kesehatan masyarakat yang terus meningkat, terutama di negara berpendapatan rendah dan menengah. Meskipun obat antihipertensi tersedia luas, kepatuhan yang rendah menjadi hambatan utama dalam pengendalian tekanan darah. Penelitian ini bertujuan untuk menganalisis pengaruh kepatuhan pengobatan terhadap tekanan darah sistolik pada pasien hipertensi. Penelitian ini menggunakan pendekatan kuantitatif dengan desain cross sectional dan melibatkan 86 pasien hipertensi di Desa Cengkok, Kabupaten Nganjuk, Jawa Timur. Teknik sampling yang digunakan adalah simple random sampling. Variable independen penelitian ini adalah kepatuhan penderita hipertensi sedangkan variable dependennya adalah tekanan sistolik. Kepatuhan dinilai menggunakan instrumen Morisky Medication Adherence Scale (MMAS-8), sementara tekanan darah sistolik diklasifikasikan dalam hipertensi tingkat 1 dan tingkat 2. Analisis data dilakukan menggunakan uji chi-square dan regresi logistik. Hasil penelitian menunjukkan bahwa sebagian besar pasien dengan kepatuhan tinggi memiliki hipertensi tingkat 1 (95,2%),

sedangkan seluruh pasien dengan kepatuhan rendah mengalami hipertensi tingkat 2 (100%). Uji spearman rho menunjukkan adanya hubungan yang signifikan antara tingkat kepatuhan dan tekanan darah sistolik ($p \leq 0,05$). Analisis regresi logistik menunjukkan bahwa pasien dengan kepatuhan rendah atau sedang memiliki risiko 39,09 kali lebih besar mengalami tekanan darah tidak terkontrol dibandingkan pasien dengan kepatuhan tinggi ($p = 0,001$). Kesimpulannya, kepatuhan pengobatan berpengaruh signifikan terhadap kontrol tekanan darah sistolik pada pasien hipertensi. Upaya peningkatan kepatuhan melalui edukasi dan intervensi berbasis komunitas sangat penting untuk mencegah komplikasi seperti stroke, gagal jantung, dan penyakit ginjal.



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A. INTRODUCTION

Hypertension is one of the major public health problems both globally and nationally. Globally, the number of people with hypertension is projected to increase from 918 million in 2000 to more than 1.5 billion in 2025. This increase is driven by increasing population, urbanization, and unhealthy lifestyles that include consumption of foods high in salt and low in physical activity (Burnier & Egan, 2019). Hypertension is a serious health problem that drastically increases the likelihood of heart, brain, kidney, and other diseases. Worldwide, about 1.28 billion adults between the ages of 30 and 79 have hypertension, and most (two-thirds) are from low- and middle-income countries (WHO, 2023). In Indonesia, the prevalence of hypertension based on the 2018 Basic Health Research (Riskesdas) reached 34.1%, meaning that more than a third of the adult population lives with high blood pressure (Kementrian Kesehatan, 2018).

The main problems in hypertension control are not only related to diagnosis or drug availability, but also to low patient adherence to long-term therapy (Burnier & Egan, 2019). Global studies show that only about 59% of patients remain adherent to taking antihypertensive drugs after one year of treatment (Tania et al., 2019). Adherence is a key factor in achieving optimal blood pressure control and preventing serious complications such as stroke, heart failure, and chronic kidney disease (Souza et al., 2016). Non-adherence to therapy is one of the main factors for treatment failure, which can worsen the patient's condition through increased risk of complications and organ damage (Pujasari et al., 2015).

Treatment adherence is complex and influenced by various factors, including sociodemographic characteristics such as age and gender. Younger patients (<40 years old) have a higher tendency to discontinue treatment early than older age groups (Ernawati et al., 2020; Husnawati et al., 2023). On the other hand, gender also influences attitudes and behaviors towards medication, for example, in terms of perceptions of drug side effects or involvement in therapeutic decision-making (Ernawati et al., 2020; Husnawati et al., 2023; Nurhayati et al., 2023).

Non-compliance is a major problem in the treatment of hypertension; the main reason for non-adherence is that hypertensive patients feel healthy, 62.8% (Kemenkes RI, 2024). The main key in controlling hypertension is adherence to antihypertensive treatment, both in terms of regularity of drug consumption and control visits to health facilities. Unfortunately, many people with hypertension are not compliant with the therapy given, so that blood pressure remains uncontrolled and the risk of complications increases. This non-adherence can be caused by various factors, such as drug side effects, patient confidence, access to health

services, and the perception of feeling “already healthy” (Burnier & Egan, 2019). Systolic blood pressure is of particular concern because, in the elderly population as well as long-standing hypertensives, systolic elevations are often more pronounced than diastolic. Uncontrolled systolic hypertension is consistently associated with increased cardiovascular risk. Systolic blood pressure is of particular concern because, in the elderly population as well as long-standing hypertensives, systolic elevations are often more pronounced than diastolic. Uncontrolled systolic hypertension is consistently associated with increased cardiovascular risk (Yano et al., 2015).

Based on this background, this study aims to analyze the effect of medication adherence on systolic blood pressure in patients with hypertension. The results of this study are expected to contribute to the planning of interventions to improve patient adherence and hypertension control in the community.

B. METHODS

This research is a quantitative study employing a cross-sectional research design, which aims to investigate the relationship between risk factors and their impact. The approach used is observation or data collection simultaneously at one specific time (point in time approach) (Masturoh & Anggita, 2018).

The population in this study was all hypertension patients in Cengkok Village, Ngronggot District, Nganjuk Regency in 2023, totaling 114 respondents. The inclusion criteria of the study include: patients with a history of hypertension, living in Cengkok Village, aged 45 - ≤ 90, can read and write, willing to become respondents. The sample in this study was some patients with hypertension in Cengkok Village, Ngronggot District, Nganjuk Regency, totaling 86 respondents. The sampling technique used was simple random sampling, which is a sample selection method in which each individual in the population has an equal opportunity to become part of the sample (Notoadmojo, 2014).

The independent variable in this study is hypertension treatment adherence, while the dependent variable is the systolic blood pressure of hypertensive patients. The instrument used to evaluate compliance is Morisky Medication Adherence (Morisky et al., 2008). Data analysis with inferential methods to find the influence between independent and dependent variables. After the data was processed and organized, linear regression testing was conducted using IBM SPSS Statistics 24 software.

C. RESULT AND DISCUSSION

1. Result

The study included 86 respondents with hypertension who had complete data on medication adherence and systolic blood pressure. Systolic pressure was categorized into two groups: HT 1 (Grade 1 Hypertension) and HT 2 (Grade 2 Hypertension). The characteristics of the respondents are presented in the following table:

Table 1. Characteristics of Hypertension Patients in Cengkok Village, Ngronggot District, Nganjuk Regency in 2023

Variables	Category	Grade 1	Grade 2
		Hypertension n(%)	Hypertension n(%)
Gender	Male	5 (11.9%)	10 (22.7%)
	Female	37 (88.1%)	34 (77.3%)
Education	Not in school	0 (0%)	3 (6.8%)
	Elementary (elementary/middle school)	5 (11.9%)	34 (77.3%)

Variables	Category	Grade 1 Hypertension n(%)	Grade 2 Hypertension n(%)
Jobs	Senior high school	34 (81.0%)	7 (15.9%)
	Higher education	3 (7.1%)	0 (0.0%)
	Not working / housewife	18 (42.9%)	22 (50.0%)
	Farmer / Laborer	5 (11.9%)	11 (25.0%)
	Self-employed	17 (40.5%)	11 (25.0%)
Age	Civil servant / military / police officer	2 (4.8%)	0 (0,0%)
	Middle Age (45-59 years)	28 (66.7%)	20 (45.5%)
	Elderly (60-69 years)	11 (26.2%)	15 (34.1%)
	Old (70-90 years)	3 (7.1%)	9 (20.5%)

Based on Table 1, it was found that the majority of patients with Grade 1 Hypertension and Grade 2 Hypertension were female. Based on the latest education, most patients with Grade 1 Hypertension (81%) have secondary education (SMA), most patients with Grade 2 Hypertension (77.3%) have basic education (SD / SMP). Based on occupation, patients who do not work / housewives tend to experience Grade 1 Hypertension and Grade 2 Hypertension. Based on age, the majority of those who experience grade 1 hypertension are 45-59 years old, and those who experience grade 2 hypertension are partly 45-59 years old.

Table 2. Relationship between compliance level and systolic pressure of hypertensive patients

Variables	Category	Grade 1 Hypertension n(%)	Grade 2 Hypertension n(%)	Total n(%)	p-value
Adherence Level	High	20 (95.2%)	1 (4.8%)	21 (100%)	0.000*
	Medium	22 (55 %)	18 (45 %)	40 (100%)	
	Low	0 (0%)	25 (100%)	25(100%)	

* Uji spearman rho

Based on Table 2, it can be seen that patients who have a high level of compliance with systolic blood pressure will be in Grade 1 hypertension (95.2%), while patients with a low level of compliance with systolic pressure can reach Grade 2 hypertension (100%). The results of the Spearman Rho test showed a p-value $\leq \alpha$ (0.05), which means H_0 is rejected, so it can be concluded that there is a relationship between the level of compliance and the systolic blood pressure of hypertensive patients. To see more specifically the effect of the level of compliance on the systolic blood pressure of hypertensive patients, a logistic regression test was performed.

Table 3. Results of logistic regression analysis of the effect of the level of compliance on the systolic pressure of hypertensive patients

Independent Variable	B	p-value	OR (Exp(B))
Adherence Level (low/medium)	3.666	0.001*	39.09

* Logistic Regression Test

Based on Table 3, the result of $\text{Exp}(B) = 39.09$ means that patients with low/moderate compliance have a 39.09 times greater chance of experiencing uncontrolled systolic blood pressure (grade 2 hypertension) than patients with high compliance. The results of the logistic regression test also obtained a p-value $(0.001) \leq \alpha (0.05)$, which means that there is a significant influence on the level of treatment compliance with an increase in systolic blood pressure in patients with hypertension.

2. Discussion

The results of this study indicate that there is a significant relationship between the level of medication adherence and systolic blood pressure in hypertensive patients. This finding is consistent with previous literature emphasizing that adherence to antihypertensive treatment is a major determinant in achieving optimal blood pressure control (Burnier & Egan, 2019). Patients with high adherence tended to have lower systolic blood pressure (grade 1 hypertension), whereas patients with low adherence were all in the grade 2 hypertension category, indicating higher and uncontrolled systolic pressure.

Logistic regression analysis showed that patients with low or moderate adherence were 39.09 times more likely to have grade 2 hypertension than patients with high adherence. This high odds ratio confirms the importance of adherence behavior to pharmacological therapy in controlling hypertension. Similar studies by (Tania et al., 2019) dan (Souza et al., 2016) also showed that non-adherent patients are at higher risk of uncontrolled hypertension, even when drugs are available and access to health facilities is not a barrier.

The impact of non-adherence to antihypertensive treatment is serious. When blood pressure is not controlled in the long term, the risk of cardiovascular complications such as stroke, myocardial infarction, heart failure, and chronic kidney disease increases significantly (Whelton et al., 2018). In addition, poorly managed hypertension can lead to progressive target organ damage, including damage to the retina of the eye, decreased cognitive function, and premature death (Mills et al., 2016). This shows that non-adherence not only affects blood pressure numbers but also the quality of life and life expectancy of patients.

In the context of the demographic characteristics of the respondents, the majority of people with hypertension are women, and those with low education are found more in the level 2 hypertension group. Education has an important role in improving health literacy, including an understanding of the importance of taking medication regularly and following the recommendations of health workers (Ernawati et al., 2020). Low levels of education can lead to a lack of awareness about the dangers of hypertension and the importance of adherence to long-term treatment.

In addition, occupation is also a factor that needs to be considered. The majority of respondents who were not working or housewives experienced grade 2 hypertension, which could be attributed to domestic stress levels, lack of physical activity, and limited access to information. A study (Husnawati et al., 2023) mentioned that employment status affects access to health resources, including information and health services.

One factor that may explain low adherence is patients' subjective perception that they have recovered or feel healthy, thus unilaterally stopping treatment. The Indonesian Ministry of Health (2024) noted that 62.8% of patients discontinued medication because they felt healthy (Kemenkes RI, 2024). This shows the importance of continuous education to patients that hypertension is a chronic disease that requires long-term therapy even though symptoms are not felt immediately (Tan et al., 2019).

These results confirm the need for community-based interventions that emphasize not only medication administration but also ongoing education on the importance of adherence, as

well as family involvement in supporting patient treatment (Chobanian et al., 2003; Ha et al., 2014; Husnawati et al., 2023). Chronic disease management programs (prolanis), health cadres, and reminder technology (SMS reminders, health apps) can be utilized to systematically improve patient adherence.

D. CONCLUSION AND SUGGESTIONS

The study revealed that there is a meaningful impact of medication adherence and systolic blood pressure in patients with hypertension. Patients with low or moderate adherence had a significantly greater risk of uncontrolled blood pressure (grade 2 hypertension) than those with high adherence. Sociodemographic factors such as low education and not working contributed to low adherence. Health workers need to increase patient education about the importance of adherence in hypertension treatment, especially in groups with low education. Monitoring and medication reminder programs need to be developed, including through digital media or the involvement of health cadres. Village governments and health centers can organize routine counseling activities and periodic blood pressure screening to increase public awareness. There is a need for an individualized approach that considers the patient's social and psychological factors in adherence improvement interventions.

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