



## THE RELATIONSHIP BETWEEN THE ACCURACY OF ANTIHYPERTENSIVE DRUG SELECTION AND THE ACHIEVEMENT OF PATIENTS' TARGET BLOOD PRESSURE

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### ABSTRACT

Hypertension is an important risk factor for cardiovascular morbidity and mortality that is often found in geriatrics. Inappropriate medication use in geriatrics will have a greater negative impact. The occurrence of Drug-related problems (DRPs) in the category of appropriate antihypertensive drug selection is one of the factors that can cause failure to achieve blood pressure targets in geriatrics, due to physiological, pharmacokinetic, pharmacodynamic changes, as well as complications and polypharmacy in geriatrics. The purpose of this study was to analyze the relationship between the appropriateness of antihypertensive drug selection and the achievement of blood pressure targets in geriatric patients at the Mojogedang Community Health Center. This study was a descriptive study using an analytical cross-sectional observational design. The variables in this study consisted of the independent variable, namely the appropriateness of antihypertensive drug selection, and the dependent variable, namely the achievement of geriatric blood pressure targets. Sampling used a purposive sampling technique. The samples taken must meet the inclusion and exclusion criteria, and a total of 12 patients were eligible for sampling in this study. The results of the study showed that the results of Hypertension patients at the Mojogedang Community Health Center which were the research sample were dominated by Stage 2 Hypertension patients, namely 91.67%, while the remaining 8.33% entered Stage 1 Hypertension. The next data reported in this study was the accuracy of antihypertensive selection and the achievement of blood pressure targets. As many as 83.33% of patients who were samples in this study had received the right antihypertensive and 75% of patients were able to achieve blood pressure targets, so that statistically it can be concluded that there is a significant relationship between the accuracy of antihypertensive selection and the achievement of blood pressure targets ( $p$  value = 0.007).

Keywords: accuracy of drug selection; hypertension; target blood pressure

### How to cite (in APA style)

Anggraini, T., & Adiningsih, R. (2026). The Relationship Between the Accuracy of Antihypertensive Drug Selection and the Achievement of Patients' Target Blood Pressure. *Indonesian Journal of Global Health Research*, 8(1), 831–836. <https://doi.org/10.37287/ijghr.v8i1.597>.

### INTRODUCTION

Developing countries. geriatric population caused by decline number fertility (birth), mortality (death), And increase in life expectancy (number hope life) (American Geriatrics Society, 2019). According to Body Center Statistics (2021), projected on year 2045 geriatric population in Indonesia will reach fifth amount resident (Aronow et al, 2011). The existence of change physiological, pharmacokinetics, pharmacodynamics, as well as complications And polypharmacy on geriatrics causes problems related use drug (Drug Related Problems) (Cipolle et al, 2004). Hypertension is one of the non-communicable diseases that causes main death early throughout world. World Health Organization (WHO) estimates that 1.13 billion people worldwide suffer from hypertension, most of whom stay in low and middle income areas. The results of the 2018 Basic Health Research showed the incidence of hypertension in Hypertension is a health problem in Indonesia with a high prevalence of 34.1%. also ranks 2nd out of the 10 most common diseases in outpatients in hospitals in Indonesia with prevalence as big as 4.67%. According to attachment The Joint The National Committee (JNC 7 ) on Prevention, Detection, Evaluation and Treatment of High Blood pressure, more from two thirds individuals over the age of 65 year experience hypertension. Data reported by Framingham Heart Studies show that men and women aged 55 years without hypertension have a risk of developing hypertension at the age of 80 years, respectively. 93

and 91% respectively. In other words, by the age of 55 more than 90% of people without hypertension will experience high blood pressure along increase age (Aronow et al, 2011).

Drug related problems (DRPs) are an unexpected event from the drug experience. patients or suspected to be due to drug therapy so that it has the potential to interfere with the success of the healing process. DRPs consist of adverse reactions, drug selection, dosage, drug use and drug interactions drug (Cipolle et al, 2004). Incident case DRPs on the accuracy of the selection drug hypertension own connection regarding the incident of failure to achieve targets pressure blood patient optimal (Cipolle et al, 2004). Geriatric patients (>60 years) are very susceptible to hypertension because increasing age causes improvement pressure blood. Patient geriatrics experience thickening room arteries as well as cause collagen buildup in the muscle structure. Causes narrowing of blood vessels and stiffness (Central Statistics Agency, 2021). Problems in the form of physiological, pharmacokinetic, pharmacodynamic changes in geriatrics cause risk of Drug Related Problems category of appropriate drug selection related to achievement of geriatric blood pressure. Community health centers as one of the front lines of health services for Indonesian society should implement rational use of drugs according to established standards. There is. Inappropriate use of drugs at the community health center level can have detrimental consequences for the community. wide community. This study aims to determine the relationship between the accuracy of selecting antihypertensive drugs and achievement pressure target blood geriatric patients at Mojogedang Community Health Center so that it can be used as a basis for policy election drug Which appropriate on geriatrics.

## METHOD

This research is a descriptive study using an analytical, cross-sectional observational design. The independent variables are the appropriateness of antihypertensive drug selection, and the dependent variable is the achievement of geriatric blood pressure targets. Sampling was conducted using a purposive sampling technique. Samples must meet inclusion and exclusion criteria, and the total number of samples obtained in this study was 12. This research has passed the ethics approval application under the permit number KEPK/UMP/29/XI/2024, issued on November 11, 2024. Data analysis used is univariate and bivariate analysis. Univariate analysis for describe characteristics variables Which researched, whereas analysis bivariate on study This using chi-square with a 95% confidence level to determine whether there is a relationship between two variables variables. Connection it is said means if less significant value from 0.05

## RESULT

Table 1.  
Patient Characteristics Based on Hypertension Stage

Hypertension Stage	Amount	Percentage (%)
HT Stage 1	1	8.33
HT Stage 2	11	91.67
Amount	12	100

The first characteristic data analyzed was the percentage of patients who entered stage 1 and stage 2 hypertension, which is presented in table 1. Hypertension patients at the Mojogedang Community Health Center who were the research sample were dominated by *Stage 2* Hypertension patients, namely 91.67%, while the remaining 8.33% entered *Stage 1* Hypertension.

Table 2.  
Accuracy of Antihypertensive Selection

Accuracy of Antihypertensive Selection	Amount	Percentage (%)
Appropriate	10	83.33
Not exactly	2	16.67
Amount	12	100

83.33% of the patients sampled in this study received appropriate antihypertensive therapy. Appropriate parameters include patients receiving antihypertensive therapy that matches their hypertension *stage classification* and the antihypertensive therapy is not contraindicated for their condition. Two patients receiving inappropriate antihypertensive therapy are described in table 3.

Table 3.  
Patients Receiving Inappropriate Antihypertensives

Patient Name	Blood pressure (mmHg)	Comorbidities	Antihypertensive regimen obtained	Information
S	180/90	Cerebral Infarction	Amlodipine 5 mg	The right therapy is a combination of thiazide diuretics and ACEIs.
N	170/90	-	Amlodipine 5 mg	The appropriate therapy is a combination of 2 antihypertensives because the patient is in the HT Stage 2 category.

Bivariate analysis in this study was conducted to determine whether there was a relationship between the accuracy of antihypertensive selection and the achievement of blood pressure targets.

Table 4.

The Relationship between the Accuracy of Antihypertensive Selection and the Achievement of Blood Pressure Targets

Accuracy of Antihypertensive Selection	Achieving Blood Pressure Targets		<i>p-value</i> = 0.007
	Achieved	Not achieved	
Appropriate	9	1	
Not exactly	0	2	

he results in table 4 show a relationship between the accuracy of antihypertensive selection and the achievement of blood pressure targets.

## DISCUSSION

This study examined the relationship between appropriate antihypertensive medication selection and blood pressure target achievement in geriatric patients at Mojogedang Community Health Center, a crucial topic given the increasing geriatric population and the complexity of hypertension management in this age group (Central Bureau of Statistics, 2021; World Health Organization, 2021). The results showed that the majority of geriatric patients sampled at Mojogedang Community Health Center (91.67%) had Stage 2 Hypertension, with only a small proportion (8.33%) having Stage 1 Hypertension. These findings indicate that most of the geriatric patients studied had higher levels of hypertension severity, a condition that requires more aggressive management to prevent serious cardiovascular complications (Chobanian et al., 2003). The prevalence of hypertension does tend to increase with age, and geriatric patients are often diagnosed at a more advanced stage due to various factors, including lack of routine screening or nonspecific symptoms (Vasan et al., 2002). Data from the Framingham Heart Study consistently show that the lifetime risk of developing hypertension is very high in individuals who reach old age, even if they were not hypertensive in middle age (Vasan et al., 2002). This predominance of Stage 2 hypertension highlights the importance of early detection and effective management in the geriatric population, as well as the need for more intensive blood pressure screening programs and education regarding the importance of early blood pressure control in primary health care facilities such as the Mojogedang Community Health Center.

Nevertheless, this study found that 83.33% of geriatric patients received the correct antihypertensive medication selection, based on compliance with the hypertension stage classification and the absence of contraindications for the patient's condition. This high rate of appropriate drug selection is a positive indicator that most health workers at the Mojogedang Community Health Center have made efforts to provide antihypertensive therapy in accordance with clinical guidelines (Ministry of Health of the Republic of Indonesia, 2018). Inappropriate drug use in geriatrics can have greater negative impacts due to physiological, pharmacokinetic, and pharmacodynamic changes in this age group, which include decreased kidney and liver function, changes in body composition, and different drug receptor sensitivities (Mangoni & Jackson, 2004; Turnheim, 2003). The occurrence of Drug Related Problems (DRPs) in the appropriate antihypertensive drug selection category is one factor that can cause failure to achieve blood pressure targets in geriatrics (Cipolle et al., 2004; Hepler & Strand, 1990). Therefore, this high level of accuracy is crucial for the success of therapy and prevention of DRPs.

However, 16.67% of patients (2 patients) received inappropriate antihypertensives. The first case involved a patient with a blood pressure of 180/90 mmHg and a history of cerebral infarction who was only given Amlodipine 5 mg, even though the appropriate therapy should be a combination of Thiazide Diuretics and ACEIs. The second case was a patient with a blood pressure of 170/90 mmHg without comorbidities who was also only given Amlodipine 5 mg, even though the appropriate therapy should be a combination of two antihypertensives because the patient was categorized as Stage 2 Hypertension. These two cases show that although Amlodipine is a common and effective antihypertensive drug, in certain conditions, combination therapy is more advisable, especially in Stage 2 Hypertension or with comorbidities such as cerebral infarction (James et al., 2014; Weber et al., 2014). The JNC 7 guidelines recommend combination therapy for patients with stage 2 hypertension or very high blood pressure to achieve blood pressure goals more quickly and reduce the risk of complications (Chobanian et al., 2003). This inaccuracy can be caused by various factors, such as a lack of understanding of the latest treatment guidelines, medication availability, or other clinical considerations that may not be documented in the medical record. Therefore, it is important to continuously improve healthcare professionals' understanding of the latest antihypertensive therapy guidelines, especially for geriatric patients with comorbidities or advanced hypertension, through ongoing education and prescription audits to reduce the incidence of inappropriate medication selection.

The target blood pressure achievement rate in this study also showed positive results, with 75% of geriatric patients successfully achieving their target blood pressure. This relatively high target blood pressure achievement rate demonstrates the effectiveness of the therapy regimen and patient compliance with treatment. Achieving target blood pressure is crucial to reduce the risk of cardiovascular complications in hypertensive patients, particularly in geriatric patients, who are more susceptible to stroke, myocardial infarction, heart failure, and chronic kidney disease (World Health Organization, 2021; Klag et al., 1996). Poor blood pressure control is a major cause of cardiovascular-related morbidity and mortality worldwide (Lim et al., 2012). This 75% figure is relatively good compared to global data, which often shows lower levels of hypertension control, particularly in developing countries, where access to healthcare and medications remains a challenge (Mills et al., 2016). This success needs to be maintained and enhanced, by identifying and strengthening the factors that contribute to this success, such as effective patient education, adequate medication availability, and structured routine monitoring.

Bivariate analysis using chi-square showed a significant relationship between the appropriateness of antihypertensive drug selection and the achievement of blood pressure targets ( $p$ -value = 0.007). A  $p$ -value of less than 0.05 indicates that this relationship is not due to chance, but rather indicates that the appropriate selection of antihypertensive drugs significantly increases the likelihood of patients achieving blood pressure targets. Of the 10 patients receiving appropriate antihypertensive drugs, 9 patients (90%) successfully achieved blood pressure targets, while of the 2 patients receiving inappropriate antihypertensive drugs, none (0%) successfully achieved blood pressure targets. These data clearly show a strong correlation: when drug selection is appropriate, the likelihood of achieving the target is very high; when drug selection is inappropriate, the likelihood of achieving the target is very low. This finding is consistent with the literature stating that the occurrence of DRPs in the appropriate selection of hypertension drugs is related to the incidence of not achieving optimal patient blood pressure targets (Cipolle et al., 2004; Hepler & Strand, 1990). Physiological, pharmacokinetic, and pharmacodynamic changes in geriatric patients make them more susceptible to DRPs, making appropriate medication selection even more crucial (Mangoni & Jackson, 2004; Turnheim, 2003). Community health centers, as the frontline healthcare providers, must implement rational medication use in accordance with existing standards, as inappropriate medication use can have detrimental consequences for the wider community (Ministry of Health of the Republic of Indonesia, 2018). These results reinforce the argument that appropriate antihypertensive medication selection is a key factor in hypertension management in geriatric patients. Healthcare professionals should always adhere to clinical guidelines and consider the individual characteristics of geriatric patients, such as comorbidities, renal/liver function, potential drug interactions, and patient

preferences, when selecting an antihypertensive regimen (American Geriatrics Society, 2019; Aronow et al., 2011). Policies that support the availability of appropriate medications and ongoing training for healthcare professionals are essential to ensure optimal prescribing practices.

However, this study has several limitations that should be acknowledged. First, the small sample size, involving only 12 geriatric patients, may limit the generalizability of the study results to a broader population. Although a significant association was found, this result may not be fully representative of the entire geriatric population with hypertension at the Mojogedang Community Health Center or other health facilities (Portney & Watkins, 2009). Second, the cross-sectional observational design used in this study only measured variables at a single point in time. This design does not allow for definitively establishing cause-and-effect relationships or observing changes over time (Levin, 2006). To understand the dynamics of the relationship between appropriate medication selection and achievement of blood pressure targets, a longitudinal study would be more appropriate, which can track patients over time and observe the effects of interventions or changes in condition (Hulley et al., 2007). Third, there are likely confounding factors not measured in this study, such as patient adherence to treatment, lifestyle factors (diet, physical activity), family support, other comorbidities not documented in detail, or interactions with other medications the patient may be taking (Sarafino & Smith, 2014; Osterberg & Blaschke, 2005). These limitations may impact the interpretation of the results, and other variables may be contributing to the observed associations. Therefore, future research should consider these factors to provide a more comprehensive understanding.

As a recommendation, a continuous education program is needed for healthcare workers at the Mojogedang Community Health Center regarding the latest guidelines for selecting antihypertensive medications, particularly for geriatric patients with multiple comorbidities and polypharmacy (Scott & Gray, 2015). Conducting regular prescription audits is also important to identify and correct inaccuracies in antihypertensive medication selection, as well as to provide constructive feedback to prescribers (Bond et al., 2001). Further research with a larger sample size and a longitudinal design is strongly recommended to strengthen the evidence of the association found and identify other factors that influence the achievement of blood pressure targets (Polit & Beck, 2010). Finally, a holistic approach to managing hypertension in geriatrics should be encouraged, focusing not only on medication selection but also on patient education regarding adherence, lifestyle modification, self-monitoring of blood pressure, and psychosocial support (Choban et al., 2003; Sarafino & Smith, 2014). Thus, it is hoped that the quality of care and health outcomes for geriatric patients with hypertension can continue to improve.

## **CONCLUSION**

The majority of geriatric hypertensive patients at Mojogedang Community Health Center were in Stage 2 (91.67%), with the accuracy of antihypertensive drug selection reaching 83.33% and the achievement of blood pressure targets of 75%. There is a significant relationship between the accuracy of drug selection and the achievement of blood pressure targets ( $p$ -value = 0.007), where the correct drug selection increases the chance of success by up to 90%.

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