Ahmad Dahlan Medical Journal
VOL 6, No. 2, 222-230
http:// http://journal2.uad.ac.id/index.php/admj

Article

Evaluation of the Rationality of Antihypertensive Drug Use in Hypertension Patients at Bireuen Region

[1]Nuva Adduana, [1]Yuziani*, [1]Vera Novalia
Email (Corresponding Author) : *yuziani@unimal.ac.id
[1]Faculty of Medicine, University of Malikussaleh, Aceh, Indonesia

ARTICLE INFO

Article history
Received 08 Sep 25
Revised 28 Sep 25
Accepted 08 Okt 25

Keywords
Rationality,
Antihypertensive,
Hypertension,
JNC VIII,
Primary Health Center.

(consist of 3 to 5 keywords)

ABSTRACT

Hypertension is a chronic disease with a high prevalence and a significant risk of serious complications if not properly managed. The aim of this study was to evaluate the rational use of antihypertensive drugs in hypertensive patients at Peusangan Siblah Krueng Public Health Center, Bireuen District, based on the criteria of appropriate indication, appropriate patient, appropriate drug, and appropriate dose according to JNC VIII guidelines. This was a descriptive observational study with a retrospective approach using medical records of hypertensive patients in 2023. A total of 185 patients were selected through purposive sampling based on inclusion and exclusion criteria. Data collected included patient identity, diagnosis, type of antihypertensive drugs, dosage, and administration. Rationality was evaluated using the 4T classification (appropriate indication, patient, drug, and dose) in accordance with JNC VIII guidelines. The results showed that appropriateness of indication and patient both reached 100%. Appropriateness of drug was 96.8%, with the majority of patients receiving amlodipine as the main therapy. Appropriateness of dose was 98.9%, with a small proportion of inappropriateness observed in patients with comorbid diabetes mellitus. Overall, the use of antihypertensive drugs in hypertensive patients at Peusangan Siblah Krueng Public Health Center, Bireuen District, can be categorized as rational based on the 4T criteria, although some discrepancies remain in drug selection and dosage, particularly among patients with comorbidities.

INTRODUCTION

Hypertension is defined as a blood pressure equal to or greater than 140/90 mmHg according to the Joint National Committee on Detection, Evaluation and Treatment of High Blood Pressure (JNC). Hypertension is a chronic disease that requires long-term therapy, and if not detected early and not managed appropriately, it can lead to serious health complications and even increase the risk of death. In addition, this condition may also contribute to the development of more severe diseases [1].

According to data from the World Health Organization (WHO) in 2019, the global prevalence

of hypertension is estimated at 22% of the total world population. Africa has the highest prevalence of hypertension, reaching 27%, while Southeast Asia ranks third with a prevalence of 25%. It is estimated that there are 1.13 billion people with hypertension worldwide, with two-thirds of the cases occurring in low- and middle-income countries. This number continues to increase annually, and by 2025 it is projected to reach 1.5 billion cases, with deaths due to hypertension and its complications estimated at 9.4 million people each year [2]. The 2018 Indonesian Basic Health Research (RISKESDAS) reported that the prevalence of hypertension among adults aged ≥18 years was 26.45%. In Aceh Province, the prevalence of hypertension in 2018 based on measurements among adults aged ≥18 years was 26.45%, a sharp increase of 4.95% compared to 2013, where 21.5% were diagnosed. At the district and city level, similar rates were reported, with 21.08% in North Aceh District, 27.43% in Lhokseumawe City, and 27.15% in Bireuen District. According to data from the Bireuen Health Office, hypertension ranks first among non-communicable diseases, with 2,355 recorded cases [3].

Based on these data, there has been a significant increase in hypertension cases, and complications may arise if hypertension is not properly managed. Rational use of antihypertensive drugs is therefore a crucial element in ensuring quality healthcare and medical treatment according to established standards. The purpose of evaluating antihypertensive drug use is to ensure that the drugs are prescribed rationally, appropriately, safely, and effectively for patients with hypertension. Rational drug use is essential to improve therapeutic outcomes. In contrast, irrational drug use can worsen hypertension and increase the risk of related complications [4].

Community health centers (Puskesmas), as the frontline of healthcare services in Indonesia, should implement rational drug use in accordance with existing standards. Inappropriate drug use at the Puskesmas level could be detrimental to the wider community, particularly since many Indonesians—especially those from low- to middle-income groups—seek treatment at Puskesmas. Therefore, evaluating the rationality of antihypertensive drug use at the Puskesmas level is critical [5]. One Puskesmas with a high prevalence of hypertension cases is Peusangan Siblah Krueng Public Health Center, located in Bireuen District, which provides healthcare services to the local community, particularly for patients with hypertension. However, in practice, variations in antihypertensive drug use may occur. Hence, evaluating the rationality of antihypertensive drug use at this health center is essential to improve healthcare quality and optimize therapeutic outcomes for hypertension patients.

Based on the above background, to date there has been no research specifically addressing the rationality of antihypertensive drug use at Peusangan Siblah Krueng Public Health Center. Preliminary studies indicate that hypertension is the most common non-communicable disease

case at this health center, with 343 cases recorded between January and October 2023. Therefore, this study was conducted to assess the patterns and rationality of antihypertensive drug use, including the accuracy of indication, drug selection, patient suitability, and dosage, in accordance with the guidelines of The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC VIII).

METHODS

This research is a descriptive observational study. Data were collected retrospectively through medical records and prescriptions of hypertensive patients in 2023 within the working area of Peusangan Siblah Krueng Public Health Center, Bireuen District. The study was conducted from September to October 2023. The population consisted of all medical records of hypertensive patients at Peusangan Siblah Krueng Public Health Center in 2023, with a total of 343 patient records. The sampling technique used was purposive sampling. The inclusion criteria were all hypertensive patients attending the Non-Communicable Disease (NCD) clinic who were diagnosed with hypertension and received antihypertensive drug therapy, both male and female patients, with complete medical record data, including those with hypertension complications. The exclusion criterion was patients aged ≤18 years. The minimum sample size was calculated using Slovin's formula, resulting in a sample of 185 patients.

The research instrument consisted of a checklist based on JNC 8 guidelines, covering four criteria to assess the appropriateness of antihypertensive therapy: appropriate indication, appropriate drug, appropriate dose, and appropriate patient. Appropriate indication evaluates whether the medication is prescribed based on a valid diagnosis such as hypertension. Appropriate drug refers to the selection of medication in line with JNC VIII recommendations, considering the patient's clinical condition, age, and race. Appropriate dose assesses whether the dosage aligns with standard therapeutic guidelines. Appropriate patient ensures the treatment suits the individual's characteristics without contraindications. Data were analyzed using univariate methods with Microsoft Excel 2010 and SPSS version 25 and presented in tabular form.

RESULTS

The data used in this study were secondary data, obtained from medical records. The secondary data sources were hypertensive patients attending the Non-Communicable Disease (NCD) clinic at Peusangan Siblah Krueng Public Health Center, Bireuen District, during 2023. One of the variables assessed was patient characteristics, which are useful in describing the diversity

of the study sample. These characteristics consisted of age and sex. The distribution of patient characteristics by age and sex is presented in Table 1.

Table 1. Patient Characteristics

Characteristics	Frequency (n)	Percentage (%)
Age		
Late adolescence (20–25 years)	1	0.5
Early adulthood (26–35 years)	5	2.7
Late adulthood (36–45 years)	21	11.4
Early elderly (46–55 years)	62	33.5
Late elderly (56–65 years)	64	34.6
Elderly (>65 years)	32	17.3
Total	185	100
Sex		
Male	74	40.0
Female	111	60.0
Total	185	100

Source: Medical Records 2023, processed by researcher 2025

The table above shows that the largest proportion of patients was in the late elderly group (56–65 years), with 64 patients (34.6%), while the lowest was the late adolescence group (20–25 years), with only 1 patient (0.5%). In terms of sex, female patients accounted for the majority, with 111 patients (60%). In addition, this study also assessed the presence of comorbid diseases in hypertensive patients and the types of antihypertensive drugs prescribed, which are presented in Table 2.

Table 2. Distribution of Comorbid Diseases and Antihypertensive Drugs

Category	Subcategory	Frequency (n)	Percentage (%)
Comorbid Disease	Type 2 Diabetes Mellitus	6	3.2
	None	179	96.8
	Total	185	100
Antihypertensive	Amlodipine	176	95.1
	Captopril	9	4.9
	Total	185	100

Source: Medical Records 2023, processed by researcher 2025

Based on Table 2, out of 185 patients, only 6 (3.2%) had comorbid disease, namely Type 2 Diabetes Mellitus. As shown in Table 2, almost all patients (176 patients; 95.1%) were prescribed Amlodipine, while only 9 patients (4.9%) received Captopril. The main purpose of this study was to evaluate the rationality of antihypertensive drug use, assessed using four criteria: appropriate indication, appropriate patient, appropriate drug, and appropriate dose. The results of this evaluation are presented in Table 4 to Table 7.

Table 3. Distribution of Appropriate Indication, Appropriate Patient, Appropriate Drug, And Appropriate Dose

Criteria		Frequency (n)	Percentage (%)
Appropriate Indication	Appropriate	185	100
	Inappropriate	0	0
	Total	185	100
Appropriate Patient	Appropriate	185	100
	Inappropriate	0	0
	Total	185	100
Appropriate Drug	Appropriate	179	96.8
	Inappropriate	6	3.2
	Total	185	100
Appropriate Dose	Appropriate	183	98.9
	Inappropriate	2	1.1
	Total	185	100

Source: Medical Records 2023, processed by researcher 2025

As shown in Table 3, the appropriateness of antihypertensive therapy based on patient factors reached 100%, indicating that all prescribed medications were consistent with the patients' identities and clinical conditions. In terms of drug selection, 179 patients (96.8%) received appropriate medications, while 6 patients (3.2%) did not. These six patients had Type 2 Diabetes Mellitus, for which clinical guidelines such as WHO and JNC recommend ACE inhibitors (ACEi) or angiotensin receptor blockers (ARB) as first-line therapy; however, these were not prescribed. Regarding dosage, 183 patients (98.9%) received appropriate doses, whereas 2 patients (1.1%) received incorrect regimens. The deviations involved the underdosing of Captopril (12.5 mg once daily instead of 2–3 times daily) and the overdosing of Amlodipine (10 mg twice daily instead of once daily), both of which diverged from standard dosing recommendations.

DISCUSSION

The sample in this study consisted of 185 individuals diagnosed with hypertension in the working area of Peusangan Siblah Krueng Public Health Center. The characteristics of patients by age, as shown in Table 1, indicate that most respondents were in the late elderly category (56–65 years). This can be explained by the fact that with increasing age, blood vessels tend to lose their elasticity, making them stiffer. In the use of antihypertensive drugs, age is an important factor to consider. For elderly patients with primary hypertension, diuretics or calcium channel blockers (CCBs) are highly recommended as first-line therapy in addition to lifestyle management [6]. The British Hypertension Society guidelines state that blood pressure response to antihypertensive agents A (ACE inhibitors and ARBs) or B (beta blockers) is better in patients <55 years, whereas agents C (CCBs) or D (diuretics) are more effective in patients ≥55 years [7]. The findings of this study are consistent with Mukti's research, which showed that most hypertensive patients sampled were in the elderly age group over 60 years [8]. Similar findings were also reported by Diwati, where the majority of patients were over 60 years old [9]. Likewise, Yuswar's study revealed that most samples were in the 56–65 years age group [10].

The patient characteristics by gender showed that almost all patients were female. Physiologically, before menopause, women tend to have lower blood pressure compared to men of the same age. However, after menopause, women are at a higher risk of developing hypertension due to hormonal changes such as decreased estrogen levels [11]. The management of hypertension does not differ significantly between men and women except in cases of pregnancy-induced hypertension. Although there are no major differences in drug selection, some studies suggest that certain side effects of antihypertensives may occur more frequently in women. One such example is CCBs. The vasodilatory effect of CCBs can cause side effects such as dizziness, facial flushing, headaches, and tibial edema, which are more commonly experienced by women. Nevertheless, CCBs, especially nifedipine, are considered safe during pregnancy. These drugs are also appropriate for the treatment of Raynaud's phenomenon, which is more prevalent in women [12]. The findings of this study are in line with those of Winanti, who reported that the majority of hypertensive patients in her study were female [13]. Conversely, Gabriella's study showed that most respondents were male [8].

Table 2 shows that most hypertensive patients were in a condition requiring pharmacological therapy, indicating that their blood pressure was not yet fully controlledß. WHO recommends initiating antihypertensive pharmacological treatment in individuals with confirmed hypertension and systolic blood pressure ≥140 mmHg or diastolic blood pressure ≥90 mmHg. Moreover, WHO recommends a treatment target of <140/90 mmHg in all patients with hypertension without comorbidities. According to the 2019 ACC/AHA Guideline on the Primary

Prevention of Cardiovascular Disease, patients with stage 1 hypertension are recommended to start antihypertensive therapy if they have a 10-year ASCVD (Atherosclerotic Cardiovascular Disease) risk of 10% or higher, with a target blood pressure of less than 130/80 mmHg to prevent cardiovascular disease [14]. Several classes of antihypertensive agents may be used. For adults requiring pharmacological treatment, WHO recommends initiating therapy with one of the following first-line classes: thiazide-type diuretics, calcium channel blockers, ACE inhibitors, or angiotensin II receptor blockers (ARBs) [15].

Table 2 shows that six respondents had type 2 diabetes mellitus as a comorbidity. Hypertension remains a growing public health issue and contributes significantly to morbidity and mortality. It is a common condition that frequently coexists with diabetes. Hypertension drastically increases the risk of peripheral vascular disease, stroke, retinopathy, and nephropathy in diabetic patients. WHO recommends pharmacological antihypertensive treatment for individuals without cardiovascular disease but with high cardiovascular risk, diabetes mellitus, or chronic kidney disease, even with systolic blood pressure between 130–139 mmHg. Furthermore, WHO suggests a treatment target of systolic blood pressure <130 mmHg in high-risk patients with hypertension (CVD risk, diabetes mellitus, chronic kidney disease). For diabetic patients, ACE inhibitors or ARBs are the preferred first-line antihypertensive therapy[15].

In this study, most patients received CCBs, specifically amlodipine, as antihypertensive therapy. This drug class is among the recommended first-line therapies. Amlodipine is widely used in healthcare facilities in Indonesia and is preferred since captopril is often associated with side effects such as dry cough. CCBs are recommended by JNC VIII guidelines as first-line therapy alone or in combination with other antihypertensives for all hypertensive patients regardless of age or race, except in those with chronic kidney disease where ACE inhibitors or ARBs are preferred [16]. These findings are consistent with those of Winanti, who reported that most patients received CCB monotherapy for hypertension [13]. Similar results were reported by Diwati, showing that amlodipine was the most frequently used monotherapy for hypertension [9].

The rationality of drug use in this study was assessed based on four criteria: appropriate indication, appropriate patient, appropriate drug, and appropriate dose. Table 3 shows that all patients were categorized as appropriate indication. Meanwhile, Table 6 indicates that the use of antihypertensives was appropriate for all patients, meaning that the drugs given were fully aligned with the clinical indication and to patients who required such therapy. Ensuring appropriate indication and patient selection in prescribing antihypertensives is critical to optimizing patient outcomes and reducing cardiovascular risk. These findings are consistent with Winanti's study, which showed that all respondents met the appropriate indication criteria, although 6% did not meet the appropriate patient criteria [13].

The results in Table 3 show that most patients were in the appropriate drug category, though six patients (3.2%) were in the inappropriate drug category. This occurred because these patients, who had type 2 diabetes mellitus, were prescribed amlodipine. According to WHO and JNC VIII, ACE inhibitors or ARBs are the recommended first-line therapy for hypertensive patients with diabetes [15]. The concern with using amlodipine in diabetic patients is its potential to cause hyperglycemia [17]. Amlodipine may impair insulin release from the pancreas, potentially raising blood glucose levels, although this occurrence is rare. Its antihypertensive effect is mediated by blocking calcium channels in peripheral smooth muscle, thereby reducing vascular resistance and lowering blood pressure. However, by blocking L-type calcium channels in the pancreas, amlodipine may interfere with insulin secretion, potentially leading to hyperglycemia [18]. These findings are in line with Yuswar's study, which reported 12.7% of patients receiving inappropriate drug therapy, a higher percentage compared to this study [10].

Table 3 also shows the results for appropriate dosing, with most patients categorized as appropriate dose. However, two patients (1.1%) were in the inappropriate dose category because they were prescribed captopril 12.5 mg once daily, whereas the recommended dosing frequency for captopril 12.5 mg is two to three times daily. Inappropriate dosing can result in poor blood pressure control and increase the risk of cardiovascular complications. Moreover, subtherapeutic dosing makes treatment less effective [15]. This dosing error may result from human error or prescription writing mistakes. These findings are consistent with Winanti's study, which showed that 6% of patients received inappropriate dosing [13]. However, they differ from Mukti's study, which reported that 100% of patients received appropriate dosing.

CONCLUSION

Based on the study conducted, it can be concluded that the assessment of the rational use of antihypertensive drugs in patients at Peusangan Siblah Krueng Public Health Center, Bireuen District, showed that 100% of prescriptions met the criteria of appropriate indication and appropriate patient. A total of 96.8% were categorized as appropriate drug, while 3.2% were inappropriate drug. In terms of dosing, 98.9% were categorized as appropriate dose and 1.1% as inappropriate dose.

REFERENCES

1. Iqbal M, Triyandi R, Sukoha A, et al. Bahaya Hipertensi dan Komplikasinya : Sebuah Penyakit Pemutus Kebahagian dan Harapan Hidup. *J Pengabdi Masy Ruwa Jurai*. Published online 2019:127.
2. Asyura F. Hubungan Dukungan Keluarga Dengan Derajat Hipertensi Pada Pasien Hipertensi Di Gampong Meunasah Tambo Kecamatan Peudada Kabupaten Bireuen. *J Keperawatan STIKES Muhammadiyah Lhokseumawe*. 2015;2:1-2.
3. Badan Penelitian dan Pengembangan Kesehatan. Laporan Provinsi Aceh Riskesdas 2018. Jakarta: Lembaga Penerbit Badan Penelitian dan Pengembangan Kesehatan; 2019. 502 p.

4. Ocak, A., & Inal, A. (2025). A cross-sectional assessment of rational use of antihypertensive medications in central Kayseri. *EXPERIMENTAL BIOMEDICAL RESEARCH*, *8*(3), 173–187. https://doi.org/10.30714/j-ebr.2025.247
5. Ekaningtyas A, Wiyono W, Mpila D. Evaluasi Penggunaan Obat Antihipertensi pada Pasien Hipertensi di Puskesmas Kolongan Kabupaten Minahasa Utara. *Pharmacon– Progr Stud Farm Fmipa, Univ Sam Ratulangi*. 2021;10(4):1215-1221.
6. Aronow WS. Managing Hypertension in the elderly: What's new? *Am J Prev Cardiol*. 2020;1:100001. doi:10.1016/j.ajpc.2020.100001
7. Sari DP. Evaluasi Penggunaan Obat Rasional di Puskesmas Kabupaten Pasuruan Tahun 2019 berdasarkan Indikator Pencapaian Kementerian Kesehatan. Farm J Sains Farm [Internet]. 2020;1(1):2.
8. Mukti G, Harsono SB, Cahyo LM. Analisis Rasionalitas Penggunaan Obat Antihipertensi Pada Pasien Geriatri di Rumah Sakit X Periode Tahun 2023. 2024;10(2):389-396.
9. Diwati A, Sofyan O. Profil dan Rasionalitas Penggunaan Obat Antihipertensi Pada Pasien Hipertensi Di Fasilitas Kesehatan Tingkat Pertama Periode Mei - Juli 2021. *Maj Farm*. 2023;19(1):1. doi:10.22146/farmaseutik.v19i1.80153
10. Muhammad Akib Yuswar. The Relationship Between The Rationality Of Prescribing And The Quality Of Life Of Hypertension Patients At The Central Siantan Health Center In Pontianak. *Media Farm Indones*. 2024;19(1). doi:10.53359/mfi.v19i1.251
11. Sari YK, Susanti ET. Hubungan jenis kelamin dengan kejadian hipertensi pada lansia di puskesmas nglegok kabupaten blitar. Jurnal Ners Dan Kebidanan (Journal of Ners and Midwifery). 2016 Dec 1;3(3):262-5.
12. Bager JE, Manhem K, Andersson T, et al. Hypertension: sex-related differences in drug treatment, prevalence and blood pressure control in primary care. *J Hum Hypertens*. 2023;37(8):662-670. doi:10.1038/s41371-023-00801-5
13. Winanti Setia P, Arisandi D, Sari Wulan S. Evaluasi Rasionalitas Penggunaan Obat Antihipertensi Pada Pasien Hipertensi Di Instalasi Rawat Jalan RSUD Dr . R . Goeteng Keejadian kasues peendeerita hipeerteensi di. *Bina Cipta Husada*. 2024;XX(2):1-14.
14. Whelton PK, Carey RM, Aronow WS, et al. Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. *Hypertens (Dallas, Tex 1979)*. 2018;71(6):e13-e115. doi:10.1161/HYP.0000000000000065
15. WHO. *Guideline for the Pharmacological Treatment of Hypertension in Adults*. Vol 11. WHO; 2021.
16. Bager JE, Manhem K, Andersson T, Hjerpe P, Bengtsson-Boström K, Ljungman C, et al. Hypertension: sex-related differences in drug treatment, prevalence and blood pressure control in primary care. J Hum Hypertens. 2023;37(8):662–70. doi:10.1038/s41371-023-00801-5.
17. Jain AB, Jayaraman A, Yadav D, Misra A. Medication-induced hyperglycemia and diabetes mellitus: A review. Cureus. 2024;16(3):e57481. doi:10.7759/cureus.57481.
18. DeGeeter M, Taylor SR, Cress J. Amlodipine-induced hyperglycaemia. *Pract Diabetes*. 2018;35(5):181-183. doi:10.1002/pdi.2189