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ANALYSIS OF THE RATIONALITY OF ANTIPLATELET USE IN ISCHEMIC STROKE PATIENTS AT "X" HOSPITAL, SEMARANG CITY

Analisis Rasioalitas Penggunaan Antiplatelet pada Pasien Stroke Iskemik di Rumah Sakit "X" Kota Semarang

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ABSTRACT
Ischemic stroke accounts for approximately 85% of all stroke cases and remains a major global health problem. Antiplatelet agents are key for secondary prevention, but irrational use may reduce effectiveness and increase bleeding risk. This retrospective descriptive study evaluated the rationality of antiplatelet use in ischemic stroke patients at "X" Hospital, Semarang City, from January to July 2024. Patients aged ≥26 years with complete medical records were included. Rationality was assessed based on PNPK Stroke Guidelines (2019), AHA/ASA Guidelines (2021), and AHFS Drug Information (2024) using three indicators: appropriate drug, dose, and patient. A total of 111 patients (113 cases) met the inclusion criteria. Most were male (58.56%) and aged >65 years (36.04%), with hypertension, diabetes, and hyperlipidemia as common comorbidities. Aspirin was the most used monotherapy (38.05%), and aspirin–clopidogrel the most frequent combination (37.17%). Drug selection accuracy was high (96.46%), while dose accuracy was low (44.25%). Antiplatelet use at "X" Hospital demonstrated rational drug selection but suboptimal dosing. Improved adherence to dosing guidelines and periodic prescription review are needed to enhance patient safety and treatment outcomes.

Keywords: *Antiplatelet, Evaluation, Ischemic Stroke, Rational Drug Use, Semarang City*

ABSTRAK
Stroke iskemik mencakup sekitar 85% dari seluruh kasus stroke dan tetap menjadi masalah kesehatan global yang signifikan. Obat antiplatelet berperan penting dalam pencegahan sekunder, namun penggunaan yang tidak rasional dapat menurunkan efektivitas dan meningkatkan risiko perdarahan. Penelitian deskriptif retrospektif ini mengevaluasi rasionalitas penggunaan antiplatelet pada pasien stroke iskemik di Rumah Sakit "X", Kota Semarang, selama Januari hingga Juli 2024. Pasien berusia ≥26 tahun dengan rekam medis lengkap diikutsertakan. Penilaian rasionalitas mengacu pada PNPK Stroke (2019), Pedoman AHA/ASA (2021), dan AHFS Drug Information (2024) dengan tiga indikator: ketepatan obat, dosis, dan pasien. Sebanyak 111 pasien (113 kasus) memenuhi kriteria inklusi. Sebagian besar berjenis kelamin laki-laki (58,56%) dan berusia >65 tahun (36,04%), dengan komorbiditas utama berupa hipertensi, diabetes melitus, dan hiperlipidemia. Aspirin merupakan terapi tunggal yang paling sering digunakan (38,05%), sedangkan kombinasi aspirin–clopidogrel merupakan kombinasi paling umum (37,17%). Ketepatan pemilihan obat tergolong tinggi (96,46%), sedangkan ketepatan dosis masih rendah (44,25%). Penggunaan antiplatelet di Rumah Sakit "X" menunjukkan ketepatan pemilihan obat yang baik namun ketepatan dosis yang belum optimal. Peningkatan kepatuhan terhadap pedoman dosis dan evaluasi resep secara berkala diperlukan untuk meningkatkan keamanan pasien dan hasil terapi.

Kata Kunci: *Antiplatelet, Evaluasi, Kota Semarang, Penggunaan Obat Rasional, Stroke Iskemik*

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INTRODUCTION

Stroke is a major global health problem and the second leading cause of death after heart disease. According to the World Stroke Organization (2022), stroke incidence increased by more than 50% over the last two decades. In Indonesia, stroke prevalence remains high, with an estimated 800–1,000 new cases each year (Venketasubramanian et al. 2022)

Approximately 85% of all stroke cases are ischemic strokes, caused by arterial blockage leading to brain ischemia (Ariani et al. 2023). Antiplatelet therapy is a cornerstone of secondary prevention in ischemic stroke (Bushnell et al. 2024). However, inappropriate antiplatelet prescribing—particularly dosing errors—can result in reduced efficacy or increased bleeding risk (Tamara 2023)

Stroke is the second leading cause of death after heart disease and the third leading cause of disability worldwide. Based on the Global Stroke Factsheet report from WHO in 2022, there has been an increase in stroke cases of more than 50% in the last 17 years (World Stroke Organization 2022). In Indonesia, it is estimated that there are 800 to 1,000 cases of stroke each year. Previous studies in Indonesia have shown varying levels of rationality in antiplatelet use, but evaluation data specific to Central Java remain limited (Andrajati et al. 2024). Identifying rationality gaps in clinical practice is crucial for improving patient safety and optimizing therapy outcomes.

Treatment of a disease must be carried out rationally to achieve therapeutic effects with minimal side effects (Makkiyah et al. 2023). Negative impacts on patients can occur if the use of drugs is irrational because the expected therapeutic effects cannot be achieved, in addition (American Society of Health System Pharmacists 2024) it can have an impact on the community and health service institutions including in the aspects of providing therapy and service providers, the quality of drug availability, and the expenditure used for treatment increases (Safouris et al. 2024).

Based on the background that mentions the high prevalence of stroke in Indonesia, especially in Central Java, and the occurrence of side effects of antiplatelet administration, such as bleeding, it is one of the reasons for choosing stroke as a research subject. Therefore, This study aimed to analyze the rationality of antiplatelet therapy in ischemic stroke patients at “X” Hospital, Semarang City, focusing on drug accuracy, dose accuracy, and patient appropriateness.

MATERIALS AND METHODS

Study Design and Setting

This study was a non-experimental, retrospective, descriptive study conducted in the inpatient installation of “X” Hospital, Semarang City, from January to July 2024.

Population and Sample

Patients aged ≥26 years diagnosed with ischemic stroke (with or without comorbidities) who received antiplatelet therapy and had complete medical records were included. Exclusion criteria were pregnancy, patient death, forced discharge, or referral to another hospital. Sampling was purposive.

Data Sources and Materials

Data were obtained from medical records of 111 patients (113 cases). Literature references included PNPK Stroke Guidelines (2019), AHA/ASA Guidelines (2021), and the AHFS Drug Information (2024).

Evaluation Parameters

Right drug: appropriateness of antiplatelet selection according to guidelines.

Right dose: accuracy of prescribed dose compared to guideline-recommended doses.

Right patient: suitability of therapy with patient characteristics (age, comorbidity, contraindication).

Ethical Consideration

This study obtained ethical clearance from the Institutional Review Board of Stifar Yayasan Pharmasi Semarang (Approval No: 708/EVM-NA/KEPK/STIFAR/EC/XI/2024).

Data Analysis

Data were analyzed descriptively and presented in frequency tables and percentages using Microsoft Excel.

RESULTS AND DISCUSSION

Ischemic stroke occurs when blood flow to a certain area of the brain is inadequate due to a blockage in a cerebral artery, which can reduce or even completely eliminate the oxygen needed by brain cells (Aulyra Familah et al. 2024). Based on the research results shown in Table 1, ischemic stroke patients aged > 65 years who are included in the elderly patient category have the highest percentage, reaching 36.04%. Elderly patients are at higher risk of ischemic stroke due to vascular changes and comorbidities (Xie et al. 2025).

Table 1. Characteristics of Ischemic Stroke Patients Based on Age and Gender in Inpatient Installation of "X" Hospital, Semarang City.

Age (years)	Male	Female	Total	Percentage (%)
26 – 35	1	0	1	0.90
36 – 45	6	2	8	7.21
46 – 55	16	11	27	24.32
56 – 65	21	14	35	31.53
>65	21	19	40	36.04
Total	65	46	111	100

This happens because the elasticity of blood vessels in the brain decreases due to the thickening of the endothelium in the intima, so the blood vessels experience narrowing which affects reduced blood flow to the brain (Nadhifah and Sjarqiah 2022). This is related to the aging process, a complex process that results in changes in the innate immune environment in the brain, leading to higher activation of central pro-inflammatory cytokines at both baseline and stimulus-induced levels compared to young brains (MohanKumar et al. 2023).

Based on gender characteristics, ischemic stroke patients with male gender (58.56%) are more numerous than female patients (41.44%). Male predominance may be linked to hormonal and lifestyle factors, including smoking and alcohol use (Bushnell et al. 2024)

One of the reasons underlying this difference is hormonal factors, where in men there is the hormone testosterone which affects lipid metabolism including increasing LDL levels, in addition there are lifestyles in men and women that have differences such as smoking habits and consuming alcohol which also contribute to the high incidence of ischemic stroke (Oliveira et al. 2023).

Table 2. Characteristics of Ischemic Stroke Patients Based on With and Without Accompanying Diseases of Patients in the Inpatient Installation of "X" Hospital, Semarang City

Diagnosis	Number of Cases	Percentage (%)
Ischemic stroke without accompanying disease	9	7.96
Ischemic stroke with concomitant disease	104	92.04
Total	113	100

Based on the results of Table 2, it shows that ischemic stroke can occur even without comorbid factors, because it can be influenced by predisposing factors such as stress and depression (Lengga 2023). The most common comorbid diseases are high blood pressure, hyperlipidemia, and diabetes mellitus. Most patients (92.04%) had comorbidities, mainly hypertension, diabetes mellitus, and hyperlipidemia, consistent with known stroke risk factors (Arin Nurtya et al. 2023). Hyperlipidemia is a condition

where the level of fat in the blood exceeds normal limits, resulting in plaques that can accumulate in the blood vessels so that blood flow is obstructed, and has the potential to rupture, which can trigger thrombosis, which can lead to ischemic stroke (Ruslim et al. 2023). Diabetes mellitus is a condition with high blood sugar levels that can cause atherosclerosis in large and small blood vessels to progress rapidly, so that it can worsen infarction.

Table 3. Characteristics of Ischemic Stroke Patients Based on Type of Antiplatelet Drug Use in Inpatient Installation of "X" Hospital, Semarang City.

Type of Use	Number of Cases	Percentage (%)
Aspirin	43	38.05
Clopidogrel	3	2.65
Ticagrelor	4	3.54
Loading dose Aspirin + Clopidogrel	42	37.17
Maintenance dose Aspirin + Clopidogrel	4	3.54
Aspirin + Ticagrelor	1	0.88
Aspirin + Clopidogrel > Clopidogrel	3	2.65
Aspirin + Ticagrelor > Ticagrelor	1	0.88
Aspirin + Clopidogrel > Aspirin	4	3.54
Aspirin > Aspirin + Clopidogrel	5	4.42
Clopidogrel > Aspirin + Clopidogrel	2	1.77
Aspirin > Clopidogrel	1	0.88
Total	113	100

Aspirin was the most common monotherapy (38.05%), while aspirin + clopidogrel was the most frequent combination (37.17%). This is consistent Johnston et al (Hen, et al. 2024), showing better outcomes with dual therapy compared to single aspirin use. Aspirin is the most common single antiplatelet therapy, reaching 38.05%. This is because the use of aspirin can be accessed at first-level health facilities available for all groups in society (Kemenkes RI, 2023). Aspirin is also the main choice in the treatment of acute ischemic stroke, using an initial dose of 160-325 mg (Kemenkes RI, 2019). Based on the results shown in table 3, there were 109 cases (96.46%) of appropriate medication in the use of antiplatelet drugs, the administration of drugs had been adjusted to the administration of therapy for ischemic stroke cases and 4 cases (3.54%) of inappropriate medication, where this case involved the single use of ticagrelor.

Table 4. Percentage of Correct Parameters of Antiplatelet Drug Use in Ischemic Stroke Patients at the Inpatient Installation of "X" Hospital, Semarang City

Drug Accuracy	Number of Cases	Percentage (%)
Right medicine	109	96.46
Not the right medicine	4	3.54
Total	113	100

The correct dose is the dose given by considering the condition of each patient, which is adjusted based on existing guidelines (Kemenkes RI 2011). Based on the data obtained in Table 5, drug accuracy was high (96.46%), indicating good adherence to guideline-recommended agents. However, dose accuracy was only 44.25%, with underdosing observed in aspirin + clopidogrel loading regimens and overdosing in clopidogrel and ticagrelor. Such deviations from guidelines may compromise efficacy or increase bleeding risk.

Similar findings were reported by Andrajati et al. (2024), who observed frequent dosing errors in several Indonesian hospitals, indicating a nationwide challenge in medication accuracy. In comparison with the AHA/ASA (2021) and PNPK (2019) stroke management guidelines, the inappropriate dosing identified in this study reflects a critical gap between clinical recommendations and real-world practice at “X” Hospital. This discrepancy underscores the need for enhanced adherence to standardized dosing protocols and continuous professional education to optimize pharmacotherapy outcomes.

The finding of low dose accuracy highlights the importance of improving prescribing practices and implementing robust monitoring systems in stroke management. Strengthening the role of pharmacists in dose verification and therapeutic monitoring could reduce medication errors and enhance patient safety. Regular prescription audits, adherence checks, and multidisciplinary collaboration between physicians, pharmacists, and nurses are essential to ensure compliance with evidence-based stroke treatment guidelines. These measures may ultimately contribute to better clinical outcomes and reduced risk of recurrent cerebrovascular events.

CONCLUSION

This study found that while the selection of antiplatelet drugs for ischemic stroke patients at “X” Hospital was largely appropriate (96.46%), dosing accuracy remained suboptimal (44.25%). Such inappropriate dosing may compromise treatment efficacy and patient safety. To address this issue, hospitals should strengthen adherence to the PNPK (2019), AHA/ASA (2021), and AHFS Drug Information (2024) guidelines, conduct routine prescription audits, and enhance the role of clinical pharmacists in stroke management. Future research should involve larger multi-center and interventional studies to evaluate effective strategies for improving dosing accuracy and optimizing patient outcomes.

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