RESEARCH ARTICLE

Study of Drug Use in Ischemic Stroke Patients at Anutapura Hospital

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ABSTRACT

Ischemic stroke is a clinical feature of dysfunction or damage to brain tissue caused by minimal blood flow to the brain, thereby inhibiting the flow of blood and oxygen to the brain. Stroke is one of the diseases which until now has become a health problem globally and nationally because of its increasing prevalence rate. The purpose of this study was to determine the study of drug use and the appropriate use of ischemic stroke medication based on the right patient indicators, the right indication, the right drug, and the right dose in stroke patients at Anutapura General Hospital in Palu in 2021. The subjects of this study were inpatient ischemic stroke patients who met the inclusion criteria. The object of this study was inpatient medical record data diagnosed with ischemic stroke for the January–December 2021 period. The type of research conducted was descriptive research, the results of 30 medical record data showed characteristics of ischemic stroke sufferers, based on gender characteristics showed the highest number with male sex of 17 people (56.67%), characteristics based on age 56–65 years a number of 26 people (86.67%), characteristics of comorbidities a number of 21 people (70.00%). Overall, the most widely used drug class is the nootropic, neurotonic, and cerebral activator, namely, citicoline, followed by the neurotropic and antiplatelet groups. The use of supporting drugs with the highest use of therapy is amlodipine. From this study, it can be concluded that the treatment of ischemic stroke based on the parameters of the right indication, the right drug, the right patient, and the right dose is 100% right.

Keywords: Anutapura General Hospital, Drug use, Inpatients, Ischemic stroke, Study

INTRODUCTION

Stroke is still a major health problem, not only in Indonesia but in the world. Stroke is the second leading cause of death and the third leading cause of disability in the world. A stroke occurs when the veins in the brain are blocked or resulting in part of the brain not getting the blood supply that carries the oxygen it needs so that some tissue in the brain dies.[1] Stroke according to the WHO is a condition in which clinical symptoms that appear quickly are found as damage to the central nervous system and throughout the world, which can become serious and last for 24 h or even more or has the potential for death, for no apparent reason other than vascular.[2] The prevalence of stroke according to data from the World Stroke Organization shows that every year, there are 13.7 million new cases of stroke, and around 5.5 million deaths occur due to stroke.[3] Stroke therapy aims to minimize neurological damage, reduce mortality and prolonged disability, and avoid recurrence of stroke.[4] Based on the research of Nangoy *et al*., 2018, showed the rationality of treatment in stroke patients according

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to the criteria for the right indication (61.%), the right drug (59.5%). According to Putri and Muti 2017, the most commonly used ischemic drug is citicoline.[5] The adverse effects of ischemic stroke can be reduced if the attack is known early and gets help immediately. Stroke patients need proper and fast treatment.[6] Appropriate treatment from medical personnel is expected to reduce the risk of death and permanent disability. Based on the background description above, the researcher is interested in examining the problem with the title Pattern of Drug Use in Ischemic Stroke Patients at Anutapura Hospital, Palu.

MATERIALS AND METHODS

Types of research

This type of research is a non-experimental study that was conducted retrospectively based on medical records of ischemic stroke patients at Anutapura Hospital, Palu, Central Sulawesi Province in 2021.

Tools and materials

The tool used in this study was a data collection sheet (LPD). The materials used in this study were data from medical records of ischemic stroke patients at Anutapura General Hospital, Palu.

Research path

Preparation phase

This stage includes obtaining permits and preparing sheets for recording data on medication use patterns in inpatient ischemic stroke patients. The research permit was submitted to the office of the National Unity and Political Unity Agency, which then received a recommendation from the Office of the National Unity and Political Unity Agency which would be forwarded to the administration section of Anutapura General Public Hospital, Palu.

Stages of data collection

Data collection was taken by taking data from the patient's medical record. During the period

January–December 2021, there were a total of 30 inpatient ischemic stroke patients. All patients met the inclusion criteria so the subjects of this study were 30 patients with the discharge category with the doctor's permission.

Research identification stage

Data on medical records that have been obtained are processed to see patterns of ischemic stroke drug use in inpatient installations at Anutapura General Hospital in Palu, and then compared with the standard research standards used. The collected data will be processed and analyzed then presented in tabular form.

RESULTS AND DISCUSSION

Ischemic stroke occurs due to obstruction in the blood vessels in the cerebrum. Obstruction occurs due to the expansion of blood vessels fat layer or atherosclerosis. Atherosclerosis will cause cerebral thrombosis and cerebral embolism.[7] Based on the sex characteristics in this study, Table 1 and Figure 1 shows that ischemic stroke was recorded in 17 men (56.67%) and 13 women (43.33%).

Patient data based on gender

The results showed that most ischemic stroke patients were men. Stroke sufferers in men are

Table 1: Distribution of ischemic stroke patients by sex

Gender	Amount	Percentage
Man	17	56.67
Woman	13	43.33
Total	30	100.00

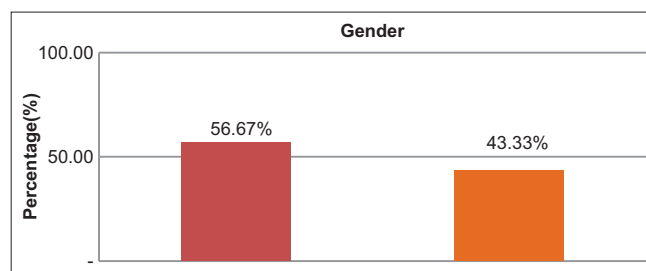Source: Anutapura Hospital Palu Medical Record Data for 2021

Figure 1: Presentation of ischemic stroke patients by gender at Anutapura Hospital in Palu in 2021

more likely to occur more (1.8%) than female sufferers.[8] In addition, this is also associated with the neuroprotective effect of the hormone estrogen secreted by women before the menopause phase.[2]

Patient data based on age

Based on the results of the study in Table 2 and Figure 2, it was obtained data on the number of patients for the highest percentage of ages, namely ages 56–65 years, as many as 15 patients with a percentage of 50.00%. This study shows that the majority of ischemic stroke patients occur in the age group between 56 and 65 years because stroke occurs after productive age and old age which is one of the elements in the incidence of stroke.[9] The incidence of ischemic stroke is more common in old age because with age there is a decrease in the function of organs in the body, one of which is a decrease in blood flow to the brain and a decrease in the elasticity of the arteries so that the blood vessels will gradually narrow and become stiff. This results in an increased risk of hypertension and atherosclerosis which can lead to ischemic stroke.[10] Age 56–65 years is the most common age to experience ischemic stroke because in this age range a person experiences a lot of worry, anxiety, and fear for his fate which can cause emotional balance disturbances and will be manifested in various health problems, both physical and mental health. Mentally, this condition is often known as post-power syndrome.[11]

Patient data based on disease history

Based on the results of the study in Table 3 and Figure 3, it is known that the history of disease in most ischemic stroke patients is hypertension as many as 25 patients 86.67%. This shows that a history of hypertension has a significant relationship with the incidence of ischemic stroke. Hypertension has a major effect on the vascular structure of the brain.[4]

Patient data based on concomitant diseases

Based on the results of the study in Table 4 and Figure 4, it is known that the most

Table 2: Distribution of ischemic stroke patients by age

Age	Amount	Percentage
36–45 years	3	10.00
46–55 years	3	10.00
56–65 years	15	50.00
>66 years	9	30.00
Total	30	100.00

Source: Anutapura Hospital Palu Medical Record Data for 2021

Table 3: Distribution of ischemic stroke patients based on medical history

Disease history	Amount	Percentage
Hypertension	26	86.67
Strokes	9	30.00
Diabetes mellitus	5	16.67
Bell's palsy	1	3.33
Heart disease	1	3.33

Source: Anutapura Hospital Palu Medical Record Data for 2021

Table 4: Distribution of ischemic stroke patients based on comorbidities

Associated disease	Amount	Percentage
Hypertension	21	70.00
Hemiparesis	17	56.67
Dyslipidemia	13	43.33
hyperuricemia	2	6.67
Typ 2 diabetes mellitus	2	6.67
Ulcus decubitus	1	3.33

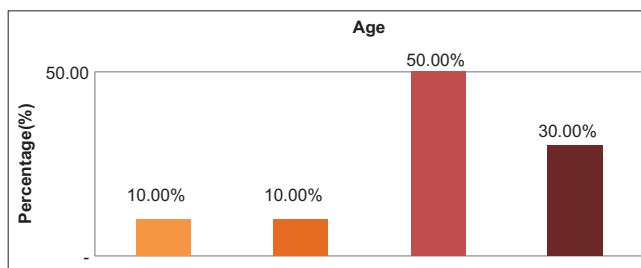Source: Anutapura Hospital Palu Medical Record Data for 2021

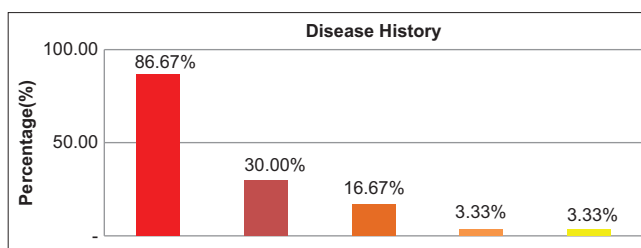**Figure 2:** Ischemic stroke patients by age at Anutapura Hospital in Palu in 2021

Figure 3: Ischemic stroke patients based on medical history at Anutapura Hospital in Palu in 2021
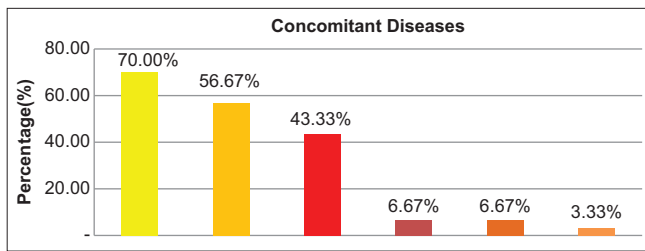
Figure 4: Ischemic stroke patients based on comorbidities at Anutapura Hospital in Palu in 2021

Figure 5: Ischemic stroke patients based on drug class at Anutapura Hospital in Palu in 2021

common comorbidities in ischemic stroke patients are hypertension with 21 patients (70.00%), followed by hemiparesis with 17 patients (56.67%), and dyslipidemia with 13 patients (43.33%). Uncontrolled hypertension is one of the most common risk factors for ischemic stroke.[12] The higher the patient's blood pressure, the greater the chance of stroke, because damage to the walls of blood vessels makes it easier for them to block and cause rupture of blood vessels in the brain. Assuming that strokes occur frequently, the chances of recovery and survival will be even smaller. By knowing the impact of hypertension on the incidence of ischemic stroke, it is believed that all ischemic stroke events can be prevented.[7] Patients with stroke susceptibility experience decreased muscle strength in certain organs or experience hemiparesis. The condition of stroke patients does not require more regular exercise to meet patient safety because patients experience weakness or loss of limb movement.[5] Ischemic strokes are caused by very high levels of cholesterol in the blood.[6] Atherosclerosis causes blood flow to become thick, causing blockages and fat deposits or blood clots. In the blood vessels, there are influences that interfere with the flow of blood and oxygen in the body, if this happens to the channels that trigger the brain, an ischemic stroke can occur.[13] Increased levels of cholesterol in the blood, causing an increase in pulse rate. The higher the cholesterol level, the higher the risk of *atherosclerosis* in the blood vessels, causing high baseline vascular obstruction and triggering a more severe increase in blood pressure (hypertension).[14]

Patient data based on drug use

Based on the data obtained, it can be seen in Table 5 and Figure 5, it was found that the use
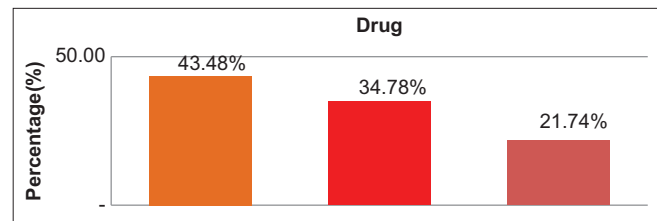
Table 5: Distribution of ischemic stroke patients by class and type of drug

Drug class	Drug type	Total	Percentage
Nootropic, Neurotonic, and Cerebral Activator	Citicoline	30	43.48
	Piracetam		
Neurotropic	Mecobalamin	24	34.78
	Neurosanbe		
Antiplatelet	Pletaal	15	21.74
	Clopidogrel		
	Aspilet		
Total		69	100.00

Source: Anutapura Hospital Palu Medical Record Data for 2021

of drugs in ischemic stroke patients at Anutapura General Hospital, Palu, showed the types and classes of drugs, namely the Nootropic, Neurotonic, and Cerebral Activator groups of 30 prescriptions (43.48%), the neurotropic group of 24 prescriptions (34.78%). Citicoline is a drug that is used to treat patients with cognitive impairment which causes a decrease in thinking ability. The task of citicoline is to repair the cell layer by enhancing the incorporation of phosphatidylcholine which is a major part of the cell film, especially considering that expanding the phosphatidylcholine combination will affect the enhancement of the ability of the cell film to promote cell repair.[13] At the vascular level, citicoline plays a role in expanding cerebral blood flow, increasing oxygen use, and reducing vascular obstruction. Piracetam is a derivative of inhibitory gamma-aminobutyric corrosive synapse which can work on the mental abilities of the brain that decreases with age and plays a role in repairing nerves and blood vessels which may be related to the restoration of light film.[15] Mecobalamin is a type of Vitamin B12 with an active methyl group that plays a role in the transmethylation response. Mecobalamin is used as a supplement to improve metabolic function. A decrease in the absorption of Vitamin B12 occurs with age and an increase

in homocysteine levels which is a predictor of recurrent stroke.[16]

Patient data based on complementary drug use

The results of the study are in Table 6 and Figure 6. The most widely used type of companion drug at Anutapura General

Table 6: Distribution of ischemic stroke patients based on adjuvant drugs

Drug class	Drug type	Total	Percentage
Gout	Allopurinol	2	1.90
CCB	Amlodipine	15	14.29
ARB	Candesartan	4	3.81
ACEI	Captopril		8.57
	Lisinopril	9	
Statins	Atorvastatin	10	9.52
Fibrates	Fenofibrate	3	2.86
H2 antagonists	Ranitidine	14	13.33
PPI	Omeprazole	12	11.43
	Pantoprazole		
Antipyretic Analgesics	Paracetamol	7	6.67
Antiemetic	Ondansetron	5	4.76
OAINS	Ketorolac	5	4.76
Insulin	NovoRapid	4	3.81
	Levemir		
Cephalosporin	Cefoperazone	3	2.86
	Ceftriaxone		
Antimigraine	Flunarizine	1	0.95
Meropenem	Betalactam	1	0.95
Diuretic	Furosemide	2	1.90
Vertigo	Betahistine	4	3.81
	Vastigo		
Albumin Supplements	Vipalbumin	1	0.95
Corticosteroids	Methylprednisolone	1	0.95
Nitroimidazole	Metronidazole	1	0.95
Potassium Supplements	Aspar K	1	0.95
Total		105	100.00

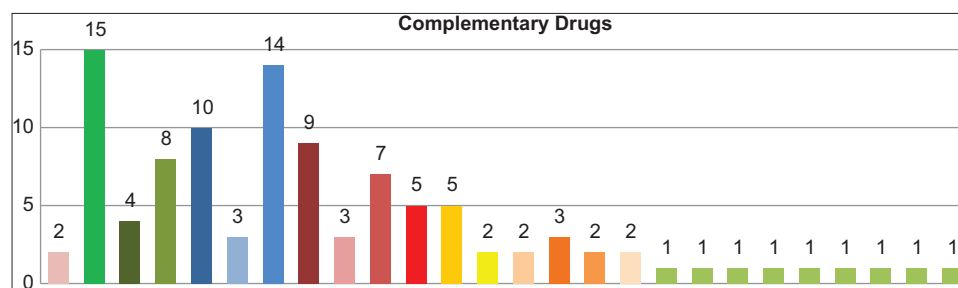Source: Anutapura Hospital Palu Medical Record Data for 2021

Hospital in Palu was the use of amlodipine for 15 prescriptions 14.29%, ranitidine for 14 prescriptions 13.33%, atorvastatin for 10 prescriptions (9.52%), and omeprazole as many as 9 prescriptions (8.57%). Most of the ischemic stroke patients in this study received the calcium channel blocker (CCB) antihypertensive class, namely, amlodipine specifically. In addition to reducing circulatory pressure, antihypertensive drugs from the CCB class are also useful in preventing *atherothrombotic strokes* in the large tracts of the brain.[17] Amlodipine has a place with the antihypertensive drug class of CCB recommended by PERDOSSI in administering hypertension to stroke patients. This drug is a potent restorative specialist in reducing systolic and diastolic pulses compared to other antihypertensive drugs in stroke patients.[6] Ranitidine is a class of H2 receptor antagonist (AH2) drugs, which act by misleadingly and reversibly blocking H2 receptors. Ranitidine is usually given as a preventive treatment for peptic ulcers in stock patients who are currently undergoing treatment and subsequently have gastric problems and to reduce stomach upset due to the use of antiplatelet and non-steroidal drugs or NSAIDs. Stroke Management by Forced Lowering of Cholesterol Levels and Treat Stroke to Target found that standard use of atorvastatin 80 mg reduced stroke recurrence in patients without past signs because statins work by reducing atherosclerotic plaque and reducing the development of hydroxymethylglutaryl catalysts. -coenzyme A (HMG-CoA), which is a compound that helps regulate cholesterol.[18] Given the rules, statin treatment has a reasonable effect in reducing the risk of death and recurrent stroke.

Figure 6: Ischemic stroke patients based on ancillary drugs at Anutapura Hospital in Palu in 2021

Table 7: The distribution of ischemic stroke patients is based on the exact patient

Right patient	Number of patients	Percentage
Appropriate	30	100
Not exactly	0	0
Total	30	100

Table 8: Distribution of ischemic stroke patients based on appropriate medication

Right medicine	Number of patients	Percentage
Appropriate	30	100
Not exactly	0	0
Total	30	100

Table 9: Distribution of ischemic stroke patients based on the right dose

Right patient	Number of patients	Percentage
Appropriate	30	100
Not exactly	0	0
Total	30	100

Table 10: Distribution of ischemic stroke patients based on appropriate indications

Correct dosage	Number of patients	Percentage
Appropriate	30	100
Not exactly	0	0
Total	30	100

Patient data based on exact patient

Based on Table 7, the correct percentage of ischemic stroke patients obtained the results of 30 patients as much as 100%. Because all drugs are in accordance with the patient's obsessive and physiological state and do not cause contraindications for the patient.

Patient data based on the right drug

Based on Table 8, It shows the correct percentage of medication in ischemic stroke patients, the results obtained were 100% for 30 patients. Due to the suitability of the use of the drug, it chosen with the decision drug that is safe to use for ischemic stroke patients.

Patient data based on the exact dose

Based on Table 9, showing the correct percentage of ischemic stroke patient doses, the results obtained were 30 patients (100%). Because the right dose is in accordance with the standard of therapy used. The reference standards for determining the right dosage for ischemic stroke medication are the National Drug Information Center (Pionas) 2015, Drug Specialist Information (ISO) Volume 53 for 2021 and MIMS 2021/2022 Edition 21 and PERDOSSI for 2011.

Patient data based on the right indication

Based on Table 10, Shows the percentage of correct indications in ischemic stroke patients, the results obtained were 30 patients (100%). Assessment of the accuracy of the sign must be seen from the patient's need to be given the drug considering the conclusions and course of the disease. In this study, it was assessed that the correct indication was 100% compared to the reference for Drug Specialist Information (ISO) Volume 53 of 2021 and MIMS 2021/2022 Edition 21.[19]

CONCLUSION

In this study, the results showed that the majority of ischemic stroke patients in Anutapura Palu General Hospital, namely, demographic data on ischemic stroke patients, was the highest, namely, male patients with 17 patients with a percentage (56.67%), the age of the late elderly category (56–65 years) was 15 patients with a percentage (50.00%). The pattern of use of ischemic stroke medication that is most widely used is citicoline in as many as 20 absorptions with a percentage (29.41%), supporting drugs with the highest use of therapy, namely amlodipine in 15 patients with a percentage (14.29%), ischemic stroke treatment based on parameters exact indication, right medicine, right patients, and right dosage as much as 100%.

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DECLARATION OF CONFLICT OF INTEREST

All authors declare no conflict of interest in this manuscript.

REFERENCES

1. Thayabaranathan T, Kim J, Cadilhac DA, Thrift AG, Donnan GA, Howard G, *et al*. Global stroke statistics 2022. Int J Stroke 2022;17:946-56.
2. Balqis B, Sumardiyono S, Handayani S. Relationship between hypertension prevalence, Dm prevalence and stroke prevalence in Indonesia (Riskesdas data analysis and health profile. Public Health J 2018 2022;10:379-84.
3. Kim J, Thayabaranathan T, Donnan GA, Howard G, Howard VJ, Rothwell PM, *et al*. Global stroke statistics 2019. Int J Stroke 2020;15:819-38.
4. Markus HS, De Leeuw FE. Cerebral small vessel disease: Recent advances and future directions. Int J Stroke 2023;18:4-14.
5. Putri VA, Muti AF. Profile of the use of neuroprotectors in ischemic stroke patients at the gatot soebroto army Hospital, Jakarta. Sainstech Farm 2017;10:13-20.
6. Suprapti T, Murtini G, Masfiah. Evaluation of drug-related problems in ischemic stroke patients undergoing inpatients at the national brain center hospital (RSPON) in 2018. Asian J Appl Sci 2020;8:247-59.
7. Nainggolan AF, Batubara CA, Balatif R. Description of blood pressure and lipid profile in acute ischemic stroke patients. Res Art 2021;44:236-41.
8. Azzahra V, Ronoatmodjo S. Factors associated with the incidence of stroke in populations aged ≥15 years in the special province of Yogyakarta (Rikesdas data analysis 2018). J Indones Health Epidemiol 2023;6:2.
9. Assaufi MH. Evaluation of Antiplatelet Drug Therapy in the Treatment of Stroke Patients at the Inpatient Installation of Tenggarong AM Parikesit Hospital in 2014. In: Proceedings of the 4th National Seminar on Pharmacy. Vol. 8. Indonesia: Mulawarman University Samarinda; 2014. p. 40.
10. Kamajaya AW. Relationship between lipid profile and hypertension in ischemic stroke patients at sanglah hospital, Denpasar, 2014. E-J Med 2016;5:2-4.
11. Laily RS. Relationship between patient characteristics and hypertension with ischemic stroke. J Berk Epidemiol 2017;5:48-59.
12. Meila O, Rochana HI. Study of drug related problems (DRPs) on the treatment of ischemic stroke patients at the Jakarta National brain center hospital for the period of January-December 2015 S. Pharmacon J Farm Indones 2019;14:48-53.
13. Wahidin S. Profile of treatment of ischemic stroke in patients undergoing hospitalization at Ibnu Sina Hospital YW-Muslim University of Indonesia. Wal'afiat Hosp J 2022;3:165-71.
14. Rafieian-Kopaei M, Setorki M, Doudi M, Baradaran A, Nasri H. Atherosclerosis: Process, indicators, risk factors and new hopes. Int J Prev Med 2014;5:927-46.
15. Said H, Syamsul D, Siregar RT. Profile of drug use in ischemic stroke patients in patients in neurology poly 1. Borneo Nurs J (BNJ) 2023;5:36-45.
16. Rakasiwi R, Ikawati Z, Setyopranoto I. Effectiveness of using folic acid in improving functional outcomes of acute ischemic stroke patients. Pharm Mag 2022;18:280-9.
17. Muhlis M, Muslimah LI, Soepomo JP. The relationship between rational prescribing of antihypertensive drugs and clinical outcomes in inpatient ischemic stroke patients at Dr. regional hospital. Soegiri Lamongan. Pharmacon J Farm Indones 2021;18:47-59.
18. Santoso E, Haryadi D, Louisa M. Efficacy of folic acid supplementation on stroke incidence in hyperhomocysteinemic patients with a history of coronary heart disease-evidence-based case review. Mirror World Kedokt 2022;49:155.
19. Kleindorfer DO, Towfighi A, Chaturvedi S, Cockroft KM, Gutierrez J, Lombardi-Hill D, *et al*. Guideline for the prevention of stroke in patients with stroke and transient ischemic attack: A guideline from the American heart association/American stroke association. Strokes 2021;52:e364-467.