



Demographic Characteristics and Cardiometabolic Risk Profiles of Ischemic Stroke Patients

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Abstract

Ischemic stroke remains a leading cause of morbidity and mortality globally and in Indonesia, with multifactorial risk factors involving vascular, metabolic, and lipid disorders. Understanding patient characteristics at the regional healthcare level is essential to support targeted clinical interventions. Bangli Regional General Hospital, as a referral hospital in Bali, has not yet systematically published data on ischemic stroke patient profiles, making this study important for local clinical planning. This retrospective descriptive observational study analyzed medical records of 160 ischemic stroke patients treated at Bangli Regional General Hospital throughout 2024. Variables included age, gender, hypertension, type 2 diabetes mellitus, history of heart disease, onset of arrival to the emergency department (<4.5 hours), and laboratory parameters comprising total cholesterol, LDL, HDL, triglycerides, and uric acid levels. Data were analyzed descriptively using frequencies, percentages, means, and standard deviations. Most patients were male (64.4%), with the largest proportion aged 60–75 years (38.75%), followed by middle-aged patients (32.5%). Hypertension was present in 67.5% of patients, type 2 diabetes mellitus in 15.6%, and a history of heart disease in 34.4%. Only 18.1% of patients arrived at the emergency department within 4.5 hours of symptom onset. Mean lipid values were 178.62 mg/dL for total cholesterol, 116.69 mg/dL for LDL, 45.31 mg/dL for HDL, and 123.35 mg/dL for triglycerides. Hyperuricemia was identified in 28.16% of men and 24.56% of women. Overall, ischemic stroke patients at Bangli Regional Hospital were predominantly elderly men with a high prevalence of hypertension and cardiometabolic abnormalities, reflecting national epidemiological patterns.

Introduction

Stroke is a global health problem that causes long-term disability and death, with a significant impact on quality of life and individual independence. Ischemic stroke occurs due to a blockage in cerebral blood flow, unlike hemorrhagic stroke, which involves cerebral bleeding, and both have distinct clinical profiles (Hairani, 2022; Amaliah et al., 2020). In a clinical context, identifying patients by stroke subtype is crucial for management and prognosis (Hermawan, 2021; Patricia et al., 2015). Pharmacologically, the management of ischemic stroke is closely related to the use of medications such as antiplatelet and antihypertensive agents (Anggraini et al., 2016; Megawati et al., 2021; Fitriani, 2019), while lipid profile modulation through atorvastatin and chronopharmacology contributes to improving patient lipid status (Akbari, 2024). Comorbidities such as coronary heart disease and vascular stenosis also have a pathophysiological relationship with stroke, as described in atherosclerosis-related renal

insufficiency (Antaresta Naisa, 2022; Sofian et al., 2017). Stroke is not only a neurological clinical entity, but also a systemic biological-metabolic phenomenon that requires a thorough evaluation of risk factors.

The prevalence of stroke in Indonesia continues to rise, particularly in the elderly, with a widening economic and social impact on families and healthcare services (Bariroh et al., 2016; Putri, 2015; Rochmah et al., 2021; Adityasiwi et al., 2025; Kalita et al., 2023; He & Tang, 2021). Advanced age has implications for functional and prognostic outcomes, as demonstrated in studies examining the characteristics of stroke in young and elderly patients (Mahendrakrisna et al., 2019; Putri et al., 2017). The national epidemiological profile of stroke also underscores the dominance of hypertension as a major risk factor, reinforcing the clinical basis that preventive hypertension interventions are a key strategy for stroke management (Laily, 2017; Firmansyah et al., 2016; Pistoia et al., 2016; Ding et al., 2025; Feigin et al., 2016). The role of timely access to healthcare facilities and delays in arrival at the emergency department (ED) are significant factors influencing outcomes, as onset <4.5 hours is the critical golden period for acute stroke management (Trisniawati, 2022). Clinical management guidelines for older adults with cardiovascular comorbidities reinforce the importance of a continuous care system (O'Neill & Forman, 2021; Guasti et al., 2022; Damluji et al., 2023; Writing Committee et al., 2023).

Metabolic risk factor management is a central aspect of understanding ischemic stroke. The role of total cholesterol, LDL, HDL, triglycerides, and uric acid as metabolic variables directly related to atherosclerosis has been reported in various studies (Dewi et al., 2014; Amaliah et al., 2020; Hairani, 2022). A study by Mahendrakrisna & Soedomo (2020) demonstrated a correlation between uric acid levels and the clinical outcome of ischemic stroke, where hyperuricemia can worsen vascular inflammation and endothelial status. This metabolic imbalance can also be influenced by renal insufficiency and peripheral arterial disease (Antaresta Naisa, 2022; Sofian et al., 2017). Neurocardiovascular studies in patients with ischemic and hemorrhagic stroke (Familah et al., 2024) and the influence of lipid profiles on vascular injury (Dewi et al., 2014) demonstrate the need for biochemical panel monitoring as part of standard clinical assessment. This is in line with recommendations for community health development and early detection of non-communicable diseases at the population level (Maitri & Lasmi, 2025; Maharani, 2022; Habib & Saha, 2010; Barouki et al., 2012; Rayner et al., 2017; Atun et al., 2013).

A literature gap emerges when reviewing district- or regional-hospital-level data, as most stroke publications in Indonesia have been conducted at provincial hospitals or academic centers, such as studies at Ibnu Sina Hospital in Makassar (Amaliah et al., 2020), Budhi Asih Hospital in Jakarta (Hairani, 2022), Kandou Hospital in Manado (Patricia et al., 2015), or Surakarta Hospital (Mahendrakrisna et al., 2019). Regional health facilities such as Bangli Regional Hospital (RSUD Bangli) have not yet published systematically on the demographic profile and clinical characteristics of stroke patients, including lipid distribution, hyperuricemia severity, hypertension prevalence, type 2 diabetes, and the onset of patient visits to the emergency department (ED). Documentation of local prescribing patterns in the context of ischemic stroke, as conducted in Bone Regency (Rasyid et al., 2025), demonstrates the importance of regional hospital-based studies to support local policy improvements. In-depth analysis based on local epidemiological data will provide a strong foundation for developing preventive and curative programs tailored to the population context.

The urgency of this research lies in its contribution to establishing the basis for clinical strategies and hospital policies in specific geographic areas. Data on the characteristics of ischemic stroke patients at Bangli Regional Hospital will be useful for developing hospital policy-based interventions, including routine hypertension screening, lipid management, and uric acid control within a pharmacotherapy framework (Anggraini et al., 2016; Megawati et

al., 2021; Fitriani, 2019). The results of this study will help formulate clinical recommendations for physicians, pharmacists, and other healthcare professionals, while also supporting education of patient families and the community regarding the early signs of stroke (Trisniawati, 2022). Furthermore, given the economic burden of stroke on the healthcare system (Firmansyah et al., 2016), this research has strategic implications for the efficiency of medical financing and improved patient outcomes. With proper documentation, Bangli Regional Hospital can develop evidence-based clinical protocols, aligned with national epidemiological trends in prescribing responses (Rasyid et al., 2025), so that the final results of this study will provide tangible clinical and operational benefits.

This study aims to describe the demographic profile and clinical parameters of ischemic stroke patients at Bangli Regional General Hospital in 2024, including the distribution of age, gender, prevalence of hypertension, type 2 diabetes mellitus, history of heart disease, onset of patient arrival to the emergency department, and lipid profile characteristics including total cholesterol, HDL, LDL, triglycerides, and uric acid levels, so that a comprehensive understanding of the patient's risk factors and metabolic conditions can be obtained which can be the basis for clinical evaluation, identification of high-risk groups, and planning more effective prevention strategies and medical interventions in the local hospital environment.

Methods

Research Design

This study employed a descriptive observational study design with a retrospective approach, utilizing medical records of ischemic stroke patients at Bangli Regional Hospital. This approach was chosen to obtain a comprehensive overview of the patients' demographic characteristics and clinical parameters without intervening or manipulating variables. Data were obtained from medical records, laboratory test results, and other relevant medical documentation to ensure the clinical validity of the collected data. This design enabled analysis of variable distribution by emphasizing clinical trends emerging from the population of ischemic stroke patients studied.

Population and Research Sample

The population in this study was all ischemic stroke patients who were treated or admitted to Bangli Regional Hospital between January and December 2024. A total sampling technique was used to select 160 patients, with all ischemic stroke patients who met the inclusion criteria. Inclusion criteria included patients with a confirmed clinical and imaging diagnosis of ischemic stroke, complete laboratory data, and documented in the hospital's medical record system. Exclusion criteria included patients with an unclear diagnosis of stroke, hemorrhagic stroke, or incomplete laboratory data. This sampling strategy ensured that all relevant patient data were comprehensively analyzed.

Variables and Operational Definitions

The study variables consisted of demographic variables (age and gender) and clinical variables including hypertension, type 2 diabetes mellitus, history of heart disease, onset of emergency room visit, total cholesterol, HDL, LDL, triglycerides, and uric acid levels. Each variable had a clear operational definition to avoid bias in data interpretation. For example, hypertension was defined based on a medical diagnosis or previous use of antihypertensive therapy, type 2 diabetes mellitus based on glucose testing or history of antidiabetic therapy, and hyperuricemia was defined based on uric acid levels exceeding the normal limit for gender. Lipid variables were also classified into clinical categories according to laboratory standards so that data interpretation was based on valid reference ranges.

Data collection technique

Data were collected using medical record extraction methods documented in the hospital information system. Each patient's data was then recorded on a data collection sheet, coded according to categories, and verified by two researchers to prevent entry errors. Laboratory data, such as total cholesterol, HDL, LDL, triglycerides, and uric acid, were obtained from blood chemistry tests during patient medical assessments. This process ensured that the data used were accurate and scientifically sound primary clinical data.

Data Analysis Techniques

Data analysis was conducted descriptively using frequency distribution, percentage, minimum-maximum value, mean, and standard deviation to describe the general pattern of demographic variables and clinical parameters of ischemic stroke patients. Numerical data such as lipid profiles and uric acid levels were analyzed to observe the population's biological value trends, while categorical data such as gender, history of hypertension, and diabetes were analyzed to observe the distribution and proportion of patients in each variable. Data processing was performed using SPSS statistical software so that the entire analysis process was systematic and structured. The results of the analysis were then used to generate clinical interpretations presented in the form of tables, graphs, and scientific narratives in the research results chapter, thus providing a comprehensive visualization and understanding of the profile of ischemic stroke patients at Bangli Regional Hospital.

Result and Discussion

Demographic Characteristics of Ischemic Stroke Patients at Bangli Regional Hospital

Characteristics of Ischemic Stroke Patients Based on Age

The age distribution of ischemic stroke patients provides important insights into the age groups most vulnerable to stroke, as vascular degenerative processes and risk factors increase with age. Age classification was performed to identify the proportion of patients according to clinically relevant age groups.

Table 1. Distribution of Ischemic Stroke Patients by Age Category

No	Age Category	Number (n)	Percentage (%)
1	Young age (25–44 years)	8	5.00
2	Middle age (44–60 years)	52	32.50
3	Old age (60–75 years)	62	38.75
4	Dementia (75–90 years)	33	20.63
5	Seniors (> 90 years)	5	3.13
	Total	160	100.00
	Average (Mean)	65.06	
	Minimum	28	
	Maximum	95	
	Standard deviation	12.90	

The age distribution shows that the majority of ischemic stroke patients are in the elderly age group (60–75 years) at 38.75%, followed by middle-aged age (44–60 years) at 32.5%, which indicates that stroke does not only occur in the elderly population but also begins to threaten the late productive age group. The senile age group (75–90 years) also recorded a large proportion of 20.63%, indicating the increasing incidence of stroke as neurological function and vascular conditions decline in the geriatric phase. The number of elderly patients (> 90 years) is small (3.13%), but this remains epidemiologically relevant because it shows that stroke can occur up to extreme old age. The mean patient age of 65 years with a variation in distribution (SD 12.90) shows that the incidence of stroke has a fairly wide age range from

young adults (28 years) to very old age (95 years), which emphasizes that ischemic stroke is a clinical condition that is not only influenced by age factors but also possibly influenced by accompanying metabolic and cardiovascular comorbidities.

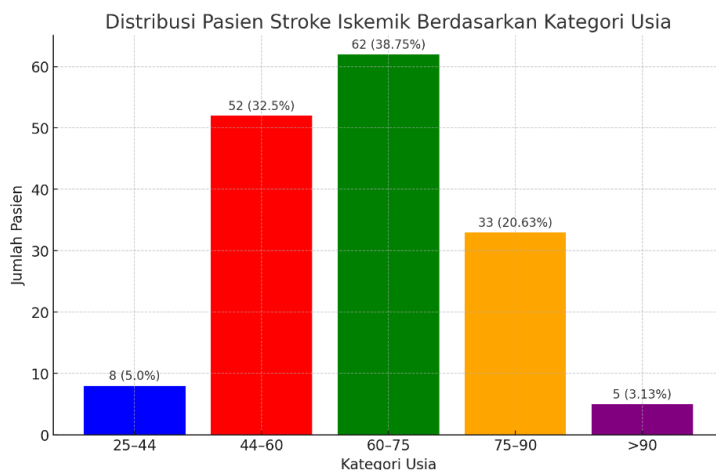


Figure 1. Distribution of Ischemic Stroke Patients Based on Age Category

Patient Characteristics Based on Gender

Gender distribution in ischemic stroke patients provides information regarding gender susceptibility tendencies to stroke events and may reflect physiological, hormonal, and cardiometabolic risk factor differences between men and women.

Table 2. Distribution of Ischemic Stroke Patients by Gender

No	Gender	Number (n)	Percentage (%)
1	Man	103	64.40
2	Woman	57	35.60
	Total	160	100.00

The proportion of ischemic stroke patients is dominated by men at 64.4%, while women account for 35.6%. This pattern indicates a tendency for men to have a higher risk of ischemic stroke, which can be physiologically linked to the prevalence of risk factors such as hypertension, diabetes mellitus, smoking, and dyslipidemia, which are more common in the male population. Women still show a significant incidence rate, indicating that age, postmenopausal hormonal status, and metabolic comorbidities also play a role in stroke risk. This distribution provides an initial indication that further risk factor analysis needs to consider differences in clinical characteristics based on gender to understand the epidemiological profile of stroke more comprehensively.

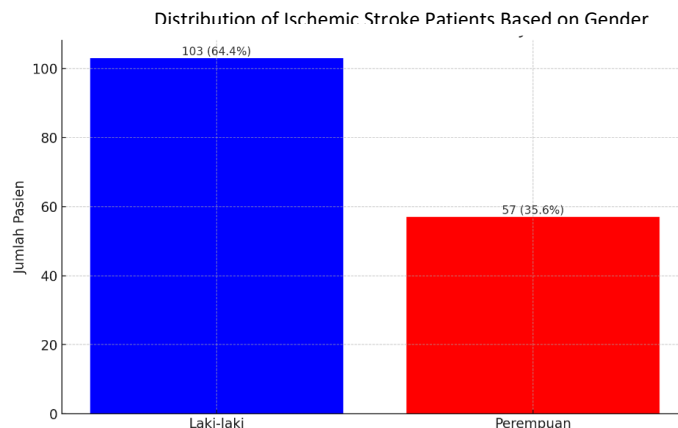


Figure 2. Distribution of Ischemic Stroke Patients Based on Gender

Clinical Parameter Profile of Ischemic Stroke Patients

Hypertension

Hypertension is a major risk factor for ischemic stroke because it is directly related to vascular endothelial damage, increased arterial pressure, and the development of atherosclerosis. Identifying a patient's hypertension status provides important clinical insights into the etiology and potential for stroke recurrence.

Table 3. Distribution of Ischemic Stroke Patients Based on Hypertension Status

No	Hypertension Status	Number (n)	Percentage (%)
1	No hypertension	52	32.50
2	Hypertension	108	67.50
	Total	160	100.00

The majority of ischemic stroke patients (67.5%) had a history of hypertension, while 32.5% did not experience hypertension. This pattern aligns with clinical evidence that hypertension is a dominant determinant of ischemic stroke through mechanisms such as increased mechanical stress on blood vessel walls, impaired cerebral vessel function, and increased susceptibility to vascular occlusion. These findings suggest that blood pressure control through pharmacological interventions and lifestyle modifications is highly significant in primary and secondary stroke prevention.

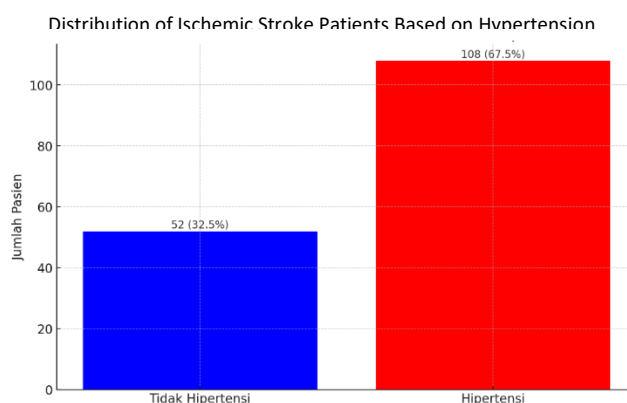


Figure 3. Distribution of Ischemic Stroke Patients Based on Hypertension Status

Type 2 Diabetes Mellitus

Type 2 diabetes mellitus is a vascular risk factor that increases susceptibility to ischemic stroke through mechanisms such as chronic hyperglycemia, endothelial dysfunction, accelerated atherosclerosis, and impaired cerebral microcirculation regulation. Identifying a patient's diabetes status helps understand the extent to which metabolic comorbidities influence their stroke risk profile.

Table 4. Distribution of Ischemic Stroke Patients Based on Type 2 Diabetes Mellitus

No	Type 2 DM Status	Number (n)	Percentage (%)
1	No Type 2 DM	135	84.40
2	Type 2 DM	25	15.60
	Total	160	100.00

The majority of ischemic stroke patients in this study (84.4%) had no history of type 2 diabetes mellitus, while 15.6% of patients were recorded as having type 2 diabetes mellitus. These findings illustrate that although the proportion of patients with diabetes is relatively lower than hypertension, the presence of diabetes still has a significant contribution to stroke incidence through its long-term effects on blood vessels and lipid metabolism. In a clinical context, these

results demonstrate the urgency of glycemic management in patients at risk of stroke and the need for metabolic screening programs to prevent chronic vascular complications that can trigger ischemic stroke.

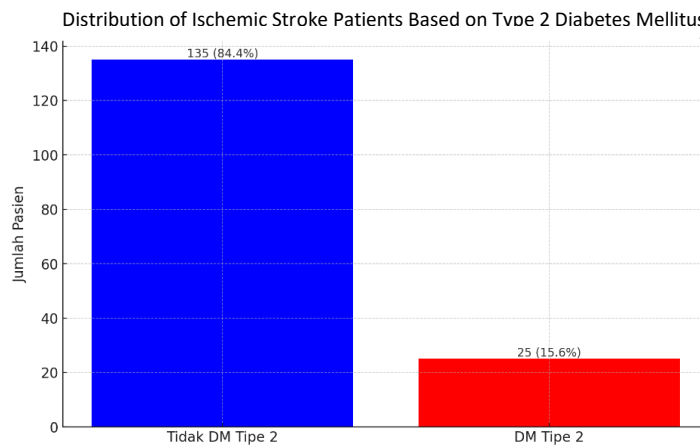


Figure 4. Distribution of Ischemic Stroke Patients Based on Type 2 Diabetes Mellitus

History of Heart Disease

Heart disease is a significant risk factor in the pathogenesis of ischemic stroke, primarily through cardiocerebral embolism, hemodynamic disturbances, and arrhythmic complications such as atrial fibrillation. Analysis of the history of heart disease in stroke patients provides insight into the role of cardiogenic factors in stroke occurrence.

Table 5. Distribution of Ischemic Stroke Patients Based on History of Heart Disease

No	Heart Disease Status	Number (n)	Percentage (%)
1	No heart disease	105	65.60
2	There is heart disease	55	34.40
	Total	160	100.00

The majority of ischemic stroke patients (65.6%) had no history of heart disease, while 34.4% had a history of heart disease. The significant proportion of patients with heart disease suggests that cardiogenic factors continue to play a significant role in stroke etiology, particularly in conditions such as atrial fibrillation, congestive heart failure, and valvular heart disease, which increase the risk of cerebral embolism. These findings highlight the importance of optimal cardiovascular management and rhythm screening in at-risk populations to reduce the incidence of ischemic stroke originating from a primary cardiac source.

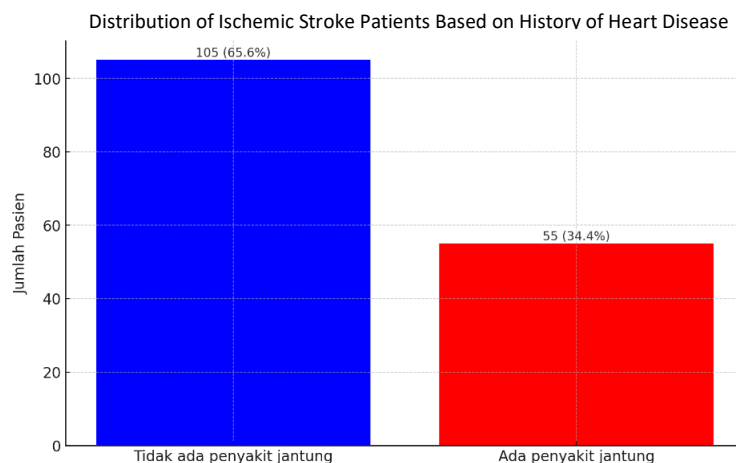


Figure 5. Distribution of Ischemic Stroke Patients Based on History of Heart Disease

Onset of Arrival to the ER < 4.5 Hours

The time a patient arrives at the emergency department (ED) after the onset of stroke symptoms is a crucial factor in the success of reperfusion therapy, including intravenous thrombolysis. The sooner a patient receives treatment, the greater the likelihood of a better neurological outcome. These data show the distribution of patients based on the speed of access to medical attention from the onset of stroke symptoms.

Table 6. Distribution of Ischemic Stroke Patients Based on Onset of Arrival to the Emergency Room < 4.5 Hours

No	Onset to ER < 4.5 hours	Number (n)	Percentage (%)
1	> 4.5 hours	131	81.90
2	< 4.5 hours	29	18.10
	Total	160	100.00

The majority of ischemic stroke patients were recorded arriving at the emergency department with a delay of more than 4.5 hours from stroke onset (81.9%), while only 18.1% arrived within a timeframe of <4.5 hours, which still allowed for thrombolytic intervention according to therapy guidelines. This pattern indicates obstacles to early stroke detection, delayed response from family or surrounding communities, and a possible lack of public knowledge regarding the urgency of the golden period in stroke. These findings emphasize the need for public education regarding the early signs of stroke (FAST: Face Arm Speech Time), as well as the importance of expediting medical transportation to increase the chances of successful reperfusion therapy and minimize permanent neurological disability.

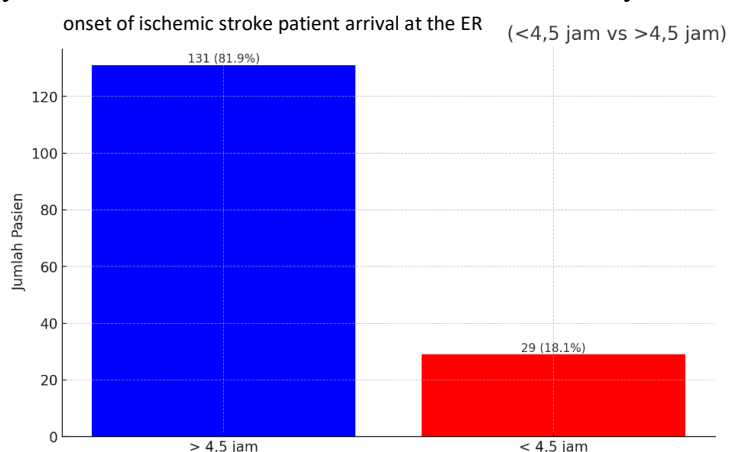


Figure 6. Distribution of Ischemic Stroke Patients Based on Onset of Arrival to the Emergency Room < 4.5 Hours

Total Cholesterol

Total cholesterol is one of the key lipid parameters associated with the risk of vascular disease and ischemic stroke. Elevated cholesterol levels can lead to the formation of atherosclerotic plaques in cerebral blood vessels, potentially impairing cerebral blood flow. Evaluation of cholesterol distribution in patients helps understand the lipid profile of stroke populations and the potential contribution of hypercholesterolemia to its pathogenesis.

Table 7. Distribution of Ischemic Stroke Patients Based on Total Cholesterol Category

No	Total Cholesterol Category	Number (n)	Percentage (%)
1	Normal (< 200 mg/dL)	111	69.38
2	High threshold (200–239 mg/dL)	39	24.38
3	High (\geq 240 mg/dL)	10	6.25
	Total	160	100.00

Average (Mean)	181.88
Minimum	94
Maximum	288
Standard deviation	38.09

The majority of ischemic stroke patients (69.38%) were in the normal cholesterol category, indicating that stroke incidence in this population was not solely related to hypercholesterolemia. On the other hand, 24.38% had borderline high cholesterol and 6.25% were in the high category (≥ 240 mg/dL), both of which are at increased risk for atherosclerosis and thrombogenic processes associated with ischemic stroke. The mean value of 181.88 mg/dL with a standard deviation of 38.09 indicates considerable lipid variation between individuals, with the minimum cholesterol level recorded at 94 mg/dL and the maximum reaching 288 mg/dL. These results indicate that although most patients do not have severe hypercholesterolemia, lipid profile control remains important as part of primary and secondary stroke prevention efforts.

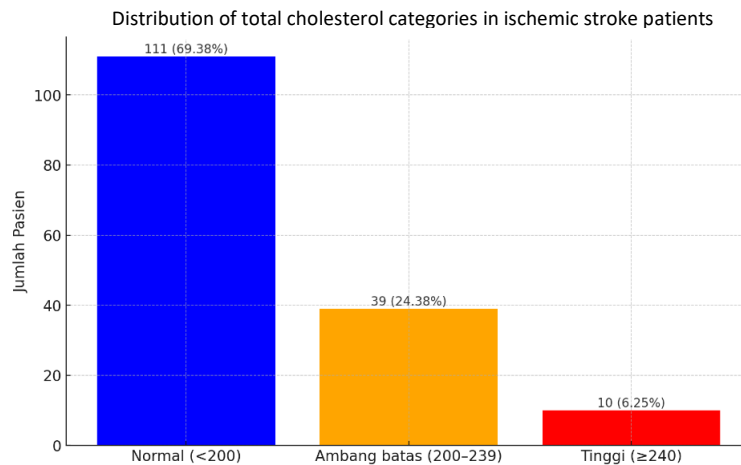


Figure 7. Distribution of Ischemic Stroke Patients Based on Total Cholesterol Category

HDL in Male Patients

HDL has a protective function in the cardiovascular system, and the HDL category limits differ in men than in women. Low HDL levels in men are associated with an increased risk of atherosclerosis and ischemic stroke, so evaluating HDL distribution in this group is important for understanding lipid factors related to stroke incidence.

Table 8. Distribution of HDL Categories in Male Patients

No	HDL Category (Men)	Number (n)	Percentage (%)
1	Low (<40 mg/dL)	43	41.75
2	Normal (≥ 40 mg/dL)	48	46.60
3	Ideal/High (≥ 60 mg/dL)	12	11.65
	Total Men	103	100.00

Most male patients had normal HDL levels or above 40 mg/dL (46.6%), indicating a moderate level of vascular protection, although the proportion of patients with low HDL was still quite high (41.75%), thus remaining a risk factor for atherosclerosis. The group with ideal HDL (> 60 mg/dL) accounted for 11.65%, representing a subpopulation with stronger lipid protection against ischemic stroke.

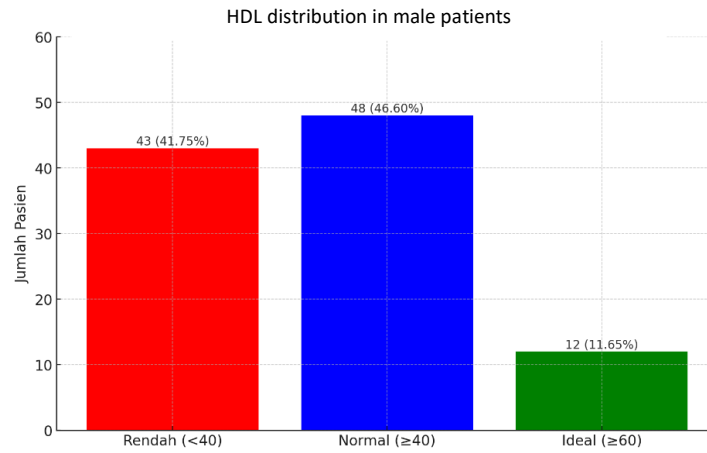


Figure 8. Distribution of HDL Categories in Male Patients

HDL in Female Patients

In women, the normal HDL level is higher than in men due to hormonal factors and physiological lipid profiles. Low HDL in women has significant clinical implications, particularly after menopause when decreased estrogen levels can impact the cardiometabolic profile.

Table 9. Distribution of HDL Categories in Female Patients

No	HDL Category (Women)	Number (n)	Percentage (%)
1	Low (<50 mg/dL)	40	70.18
2	Normal (≥50 mg/dL)	10	17.54
3	Ideal/High (≥60 mg/dL)	7	12.28
	Total Women	57	100.00

HDL levels in women were predominantly low (<50 mg/dL), reaching 70.18%, indicating a higher atherogenic vulnerability compared to men. This condition may be associated with reduced estrogen protection, particularly in postmenopausal women, which plays an important role in lipid metabolism and vascular protection. The group with ideal HDL levels only reached 12.28%, and only 17.54% were in the normal category, reflecting the HDL profile of the female population with a relatively more significant vascular risk in the context of ischemic stroke. Low HDL levels in women can contribute to impaired reverse cholesterol transport and increased endothelial dysfunction, thereby enhancing susceptibility to atherosclerotic plaque formation and ischemic cerebrovascular events.

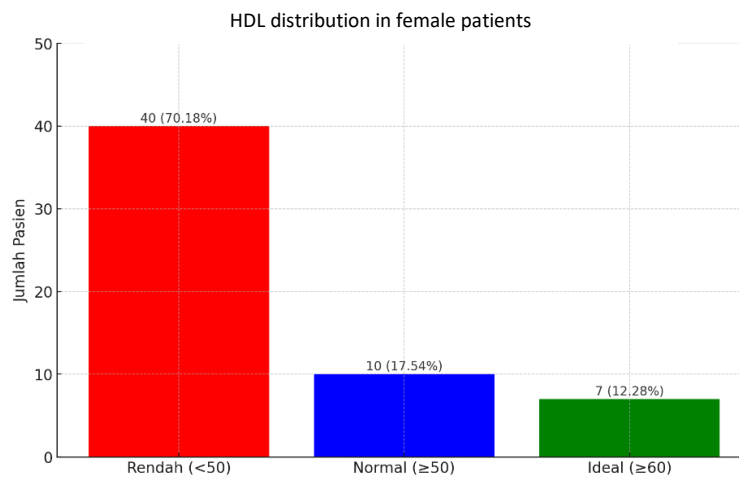


Figure 9. Distribution of HDL Categories in Female Patients

Low Density Lipoprotein (LDL)

LDL is a cholesterol fraction that plays a role in the formation of atherosclerotic plaque in blood vessels, thus being known as "bad" cholesterol. High LDL levels increase the risk of narrowing of the cerebral artery lumen and thrombus formation, which can lead to ischemic stroke. Evaluation of the distribution of LDL levels in patients provides insight into the atherogenic risk level of the analyzed population.

Table 10. Distribution of Ischemic Stroke Patients Based on LDL Category

No	LDL Category	Number (n)	Percentage (%)
1	Optimal (<100 mg/dL)	42	26.25
2	Near optimal (100–129 mg/dL)	72	45.00
3	High threshold (130–159 mg/dL)	35	21.88
4	High (160–189 mg/dL)	7	4.38
5	Very high (\geq 190 mg/dL)	4	2.50
	Total	160	100.00
	Average (Mean)	116.69	
	Minimum	34	
	Maximum	231	
	Standard deviation	32.10	

The LDL distribution results showed that most patients were in the optimal and near-optimal categories with a combined percentage of 71.25%, indicating that the LDL profile of this population was not a dominant risk factor for primary atherosclerosis, although 21.88% of patients were in the high threshold category and 6.88% in the high and very high categories, indicating the presence of a patient group with an increased risk of lipid plaque formation in cerebral blood vessels. The mean LDL value of 116.69 mg/dL confirmed the population's status tending to be in the borderline range, with significant individual variation as seen from the standard deviation of 32.10 mg/dL. The range of LDL values from 34 to 231 mg/dL indicates that there is a subpopulation with very high LDL levels, which deserves clinical focus for preventive intervention through statin therapy and ongoing lipid management education.

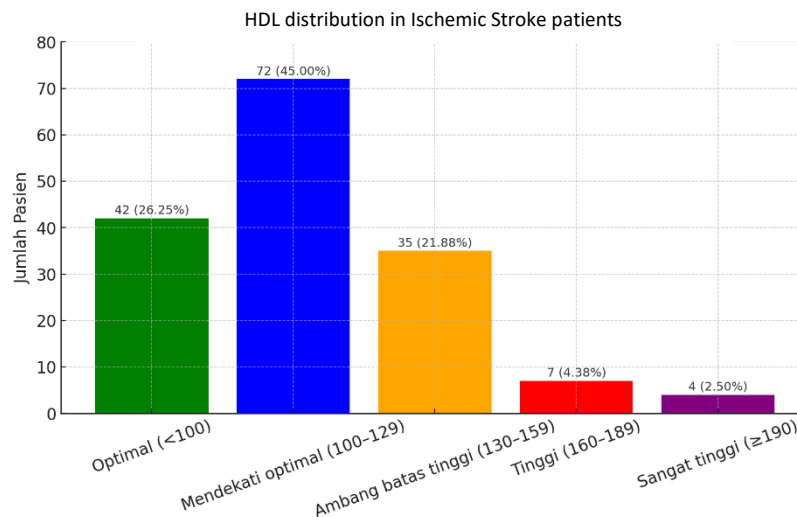


Figure 1.0 Distribution of Ischemic Stroke Patients Based on LDL Category

Triglycerides

Triglyceride levels are an important indicator of blood lipid profiles and are closely linked to the risk of atherosclerosis and ischemic stroke. Elevated triglycerides are associated with lipid metabolism abnormalities that can trigger the formation of fatty plaques in blood vessels.

Therefore, interpreting triglyceride distribution in patients is crucial for understanding the cardiometabolic risk factors underlying stroke.

Table 11. Distribution of Ischemic Stroke Patients Based on Triglyceride Category

No	Triglyceride Category	Number (n)	Percentage (%)
1	Normal (<150 mg/dL)	123	76.88
2	Borderline high (150–199 mg/dL)	19	11.88
3	High (200–499 mg/dL)	17	10.63
4	Very high (≥500 mg/dL)	1	0.63
	Total	160	100.00
	Average (Mean)	123.35	
	Minimum	39	
	Maximum	582	
	Standard deviation	71.53	

The majority of ischemic stroke patients in this study had normal triglyceride levels (76.88%), indicating that triglycerides were not the dominant lipid factor in the majority of patients. However, there were approximately 22.5% of patients with triglyceride levels in the borderline high to very high category, indicating the presence of a risk group with a more atherogenic metabolic profile. The mean triglyceride value was 123.35 mg/dL with a fairly wide variation (SD 71.53 mg/dL), indicated by a range of values from 39 to 582 mg/dL, emphasizing the existence of a subpopulation with extreme triglycerides that potentially increase the risk of lipid plaque formation and vascular complications associated with ischemic stroke.

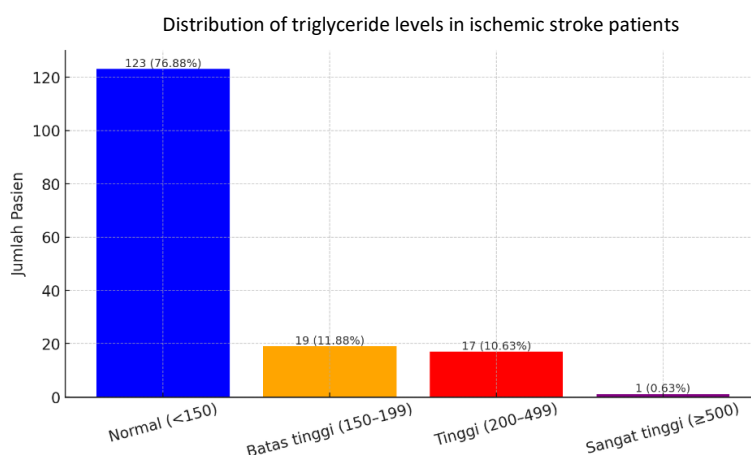


Figure 11. Distribution of Ischemic Stroke Patients Based on Triglyceride Category

Gout

Gout in Male Patients

Uric acid levels in men have a normal range of 3.4–7.0 mg/dL, with levels above 7.0 mg/dL indicating hyperuricemia, which can increase the risk of vascular inflammation and accelerate atherosclerosis. Evaluating the distribution of uric acid levels in male patients helps identify potential metabolic risk factors associated with stroke.

Table 12. Distribution of Uric Acid Categories in Male Patients

No	Gout Category (Men)	Number (n)	Percentage (%)
1	Hypouricemia (<3.4 mg/dL)	4	3.88
2	Normal (3.4–7.0 mg/dL)	70	67.96
3	Hyperuricemia (>7.0 mg/dL)	29	28.16
	Total Men	103	100.00

Most male patients (67.96%) had uric acid levels within the normal range, indicating that purine metabolism and urate excretion are within the physiological limits of the majority of the population. However, 28.16% of patients experienced hyperuricemia, indicating a high-risk group for chronic inflammation and vascular endothelial dysfunction. This condition is clinically relevant because it can exacerbate cerebral circulatory disorders that contribute to ischemic stroke.

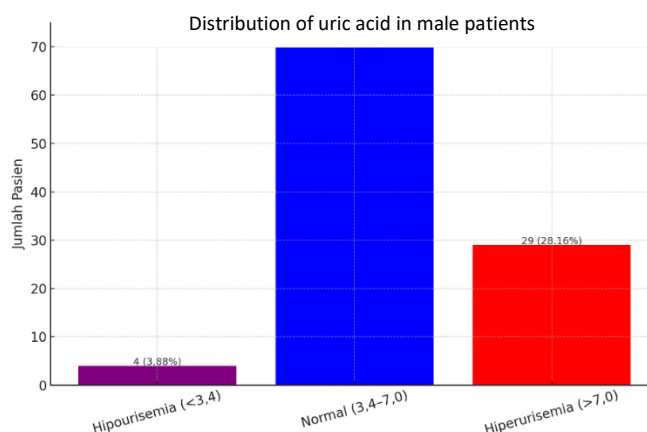


Figure 12. Distribution of Uric Acid Categories in Male Patients

Gout in Female Patients

Uric acid levels in women have a lower normal range, 2.4–6.0 mg/dL, due to the influence of the hormone estrogen, which plays a role in increasing urate excretion. Levels above 6.0 mg/dL are categorized as hyperuricemia, which potentially increases the risk of atherogenic and vascular inflammation.

Table 13. Distribution of Uric Acid Categories in Female Patients

No	Gout Category (Women)	Number (n)	Percentage (%)
1	Hypouricemia (<2.4 mg/dL)	1	1.75
2	Normal (2.4–6.0 mg/dL)	42	73.68
3	Hyperuricemia (>6.0 mg/dL)	14	24.56
	Total Women	57	100.00

The majority of female patients (73.68%) showed uric acid levels within the normal range, although 24.56% had hyperuricemia, a condition that can increase the risk of inflammation and urate crystal deposition, which affect vascular integrity. The presence of hyperuricemia in these women requires clinical attention, especially in the postmenopausal age group when the protective effect of estrogen decreases, making the potential for lipid and purine metabolic disorders more significant in the risk of ischemic stroke.

Hypertension was found to be a major risk factor in ischemic stroke patients at Bangli Regional Hospital, experienced by 67.5% of patients, illustrating the significance of hypertension as the most powerful vascular determinant in triggering stroke events. Laily (2017) showed that hypertension is closely related to the occurrence of ischemic stroke through the mechanism of increased arterial wall stress and accelerated atherosclerosis, in line with the analysis of Putri (2015), who linked hypertension to the dominant cause of stroke in the Indonesian adult population. The study by Amaliah et al. (2020) also showed a tendency for abnormal lipid profiles in ischemic stroke patients with hypertension as the dominant clinical characteristic, followed by the findings of Firmansyah et al. (2016) who proved that patients with hypertension have a greater burden of stroke care costs. These findings are reinforced by the Clinical report of Patricia et al. (2015), which showed the highest prevalence of ischemic stroke in patients with a long-standing history of hypertension, consistent with the findings of

Sihombing (2023), who confirmed hypertension as a primary factor in the stroke population in a multi-year study. Given these findings, hypertension is not only a direct causative factor, but also often interacts with other metabolic factors such as dyslipidemia, uric acid levels, and diabetes, strengthening the understanding that ischemic stroke is a multifactorial clinical condition.

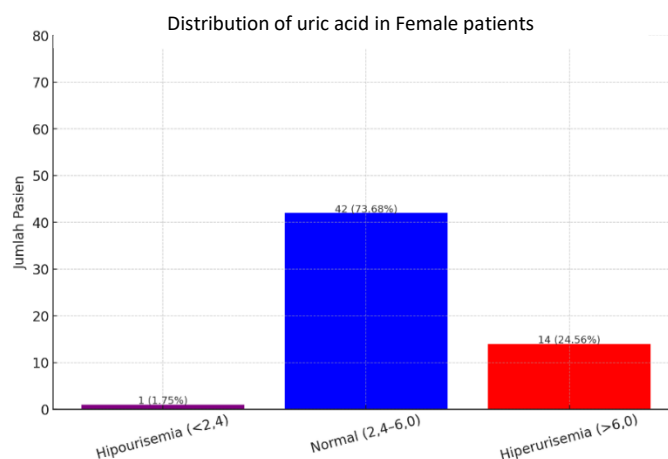


Figure 13. Distribution of Uric Acid Categories in Female Patients

The age profile in this study shows a predominance of older age, followed by dementia and the elderly, reflecting the demographic pattern of degenerative vascular disease. Mahendrakrisna et al. (2019) found that stroke incidence in young adults persists but is not as dominant as stroke in the elderly group, due to decreased blood vessel elasticity and the accumulation of metabolic risk factors. This finding is also consistent with Bariroh et al. (2016), who noted that post-stroke quality of life is significantly lower in elderly patients compared to those of productive age, implying broader clinical implications, including long-term care. Hermawan (2021) added that neurological outcomes in ischemic stroke patients are also worse in the elderly based on the NIHSS, emphasizing the relationship between age and stroke severity. In a national epidemiological context, Putri et al. (2017) linked older age to decreased cognitive function after stroke, while Yunara et al. (2025) emphasized the importance of nursing interventions for the elderly based on early detection of cardiometabolic risk factors in the elderly population. The overall data supports the interpretation that advanced age is not only a demographic variable but also a biological indicator of decreased vascular homeostasis that increases stroke vulnerability.

Lipid profiles showed that most patients had LDL in the optimal–near-optimal category and normal HDL, but there were significant clinical subpopulations with high LDL and low HDL, which increased atherogenic potential. Amaliah et al. (2020) clearly stated the presence of abnormal lipid profile patterns in ischemic stroke patients, with LDL and total cholesterol as key indicators, while Hairani (2022) emphasized that differences in lipid profile patterns between ischemic and hemorrhagic stroke can be used as clinical diagnostic indicators. Akbari's (2024) study highlighted the chronopharmacological effect of atorvastatin on total cholesterol levels and demonstrated that pharmacotherapeutic intervention has the potential to reduce the risk of atherosclerosis. The relationship between LDL and vascular stenosis was further clarified by Antaresta Naisa (2022), who demonstrated the association of renal insufficiency with the degree of vascular stenosis in coronary heart disease, which is pathogenetically consistent with the process of narrowing of the vascular lumen in stroke. These results are in line with the findings of Dewi et al. (2014), which identified triglycerides and LDL as key components of metabolic syndrome that increase the risk of vascular infarction. The literature collectively suggests that lipid profiles continue to play a central role in modulating the risk of ischemic stroke.

Another important clinical parameter is the use of drug therapy, particularly antiplatelet and antihypertensive drugs. Anggraini et al. (2016) observed the pattern of stroke medication use in ischemic stroke patients at Abdul Wahab Sjahranie Regional Hospital in Samarinda, demonstrating the dominance of antiplatelets as standard therapy. Megawati et al. (2021) further added that antiplatelet use is significantly effective in reducing platelet aggregation and preventing recurrent strokes. Fitriani (2019) found the effectiveness of antihypertensive use in ischemic stroke patients as a control strategy in both the acute and chronic phases, reaffirming the importance of pharmacotherapy interventions in high-risk patients. Relevant figures also appear in the study by Rasyid et al. (2025), which illustrates the pattern of stroke medication prescriptions at Bone Regional Hospital, illustrating the compatibility of pharmacological practices at regional health care facilities with national clinical standards. This pharmacotherapy collaboration demonstrates that ischemic stroke management focuses not only on controlling comorbidities but also on short- and long-term therapy profiles according to clinical protocols.

Uric acid levels also made a relevant contribution to the analysis of ischemic stroke risk factors at Bangli Regional Hospital, where hyperuricemia was found in a significant proportion of patients, both male and female. Mahendrakrisna & Soedomo (2020) found a correlation between blood uric acid levels and clinical outcomes of acute ischemic stroke, where hyperuricemia was associated with worse clinical outcomes. Antaresta Naisa (2022) added that impaired kidney function leading to uric acid accumulation worsens vascular conditions through inflammation. Sofian et al. (year unspecified) also described that impaired peripheral circulation in peripheral vascular disease has a similar risk factor pattern to stroke, including hyperuricemia, atherosclerosis, and lipid metabolism disorders. When these research findings are reviewed alongside the literature, it becomes clear that uric acid is not simply a metabolic byproduct, but rather part of a complex vascular pathophysiology.

The overall results of this study reinforce the position of ischemic stroke as a multifactorial medical condition involving interactions between demographic, metabolic, vascular, and pharmacological factors. Firmansyah et al. (2016) showed that stroke is a disease with a high healthcare cost burden, making its prevention strategies increasingly important in public health policy. Bariroh et al. (2016) emphasized that the quality of life of post-stroke patients is significantly influenced by the patient's initial clinical characteristics. Mahendrakrisna et al. (2019) and Putri et al. (2017) strengthened the relationship between demographic factors and clinical outcomes within the framework of stroke prognosis. All these references reinforce that the research at Bangli Regional Hospital not only provides a local clinical picture but also reflects national epidemiological patterns that have been reported in various Indonesian medical journals.

Conclusion

This study shows that the majority of ischemic stroke patients at Bangli Regional Hospital in 2024 were dominated by old age (60–75 years) at 38.75% and middle age at 32.5%, with the proportion of male patients at 64.4% higher than female patients at 35.6%, and the most prominent clinical risk factor was hypertension found in 67.5% of patients, followed by type 2 diabetes mellitus in 15.6% of patients and a history of heart disease in 34.4% of patients. Lipid profiles showed an average LDL of 116.69 mg/dL and an average triglyceride of 123.35 mg/dL with 76.88% of patients in the normal triglyceride category, while hyperuricemia was detected in 28.16% of men and 24.56% of women. The distribution of these clinical parameters indicates that ischemic stroke in this population is not only related to hypertension but is also influenced by multi-factorial metabolic patterns such as high LDL, low HDL, and increased uric acid in some patients.

Efforts to prevent and control ischemic stroke need to be directed at routine blood pressure screening, glycemic control, lipid profile monitoring, and uric acid level examinations, especially in the elderly and patients with a history of metabolic disease, accompanied by public education on early detection of stroke symptoms so that arrivals to the emergency room are within the golden period of <4.5 hours; in addition, the implementation of risk factor management protocols in primary health care facilities and hospitals needs to be strengthened through clinical coordination, evidence-based pharmacological therapy, and continuous monitoring of high-risk patients.

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References

- Adityasiwi, G. L., Budiono, I., Zainafree, I., & Cahyati, W. H. (2025). Stroke in Indonesia: An epidemiological overview. *Physical Therapy Journal of Indonesia*, 6(1), 70-73. <https://doi.org/10.51559/ptji.v6i1.274>
- Akbari, R. I. (2024). Pengaruh Kronofarmakologi Terhadap Kadar Kolesterol Total Pada Pasien Pengguna Obat Atorvastatin. *Jurnal Ilmiah Pharmacy*, 11(1), 119-132. <https://doi.org/10.52161/jiphar.v11i1.553>
- Amaliah, R., Mokhtar, S., Namirah, H. A., Rachman, M. E., & Syamsu, R. F. (2020). Karakteristik kadar profil lipid pada penderita stroke iskemik di Rumah Sakit Ibnu Sina Makassar tahun 2017. *Wal'afiat Hospital Journal*, 1(1). <https://doi.org/10.33096/whj.v1i1.8>
- Anggraini, R., Fitriani, V. Y., & Masruhim, M. A. (2016, April). Terapi Penggunaan Obat Stroke Pada Pasien Stroke Iskemik Di Rsud Abdul Wahab Sjahranie Samarinda. In *Proceeding of Mulawarman Pharmaceuticals Conferences* (Vol. 3, pp. 89-97). <https://doi.org/10.25026/mpc.v3i1.71>
- Antaresta Naisa, A. (2022). *Hubungan Insufisiensi Ginjal Dengan Derajat Stenosis Berdasarkan Vessels Disease Studi Observasional pada Pasien Penyakit Jantung Koroner di RSI Sultan Agung Semarang* (Doctoral dissertation, Universitas Islam Sultan Agung).
- Atun, R., Jaffar, S., Nishtar, S., Knaul, F. M., Barreto, M. L., Nyirenda, M., ... & Piot, P. (2013). Improving responsiveness of health systems to non-communicable diseases. *The Lancet*, 381(9867), 690-697. [https://doi.org/10.1016/s0140-6736\(13\)60063-x](https://doi.org/10.1016/s0140-6736(13)60063-x)
- Bariroh, U., Susanto, H. S., & Adi, M. S. (2016). Kualitas hidup berdasarkan karakteristik pasien pasca stroke (studi di RSUD Tugurejo Kota Semarang). *Jurnal Kesehatan Masyarakat*, 4(4), 486-495. <https://doi.org/10.14710/jkm.v4i4.14276>
- Barouki, R., Gluckman, P. D., Grandjean, P., Hanson, M., & Heindel, J. J. (2012). Developmental origins of non-communicable disease: implications for research and public health. *Environmental Health*, 11(1), 42. <https://doi.org/10.1186/1476-069x-11-42>
- Damluji, A. A., Forman, D. E., Wang, T. Y., Chikwe, J., Kunadian, V., Rich, M. W., ... & Alexander, K. P. (2023). Management of acute coronary syndrome in the older adult population: a scientific statement from the American Heart Association. *Circulation*, 147(3), e32-e62. <https://doi.org/10.1161/CIR.0000000000001112>

- Dewi, M. R., Haryati, D. S., & Sumardino, S. (2014). Faktor-Faktor Dominan Sindrom Metabolik Yang Berhubungan Dengan Kejadian Akut Miokard Infark (AMI) Di Ruang Intensive Kardiovaskuler Care Unit (ICVCU) RSUD DR. Moewardi Tahun 2014. *Jurnal Kesehatan Kusuma Husada*.
- Ding, R., Elmadhoun, O., Chen, R., & Ji, X. (2025). Comprehensive strategies for stroke prevention: A narrative review of population-level risk factor mitigation. *Brain Circulation*, 10-4103. https://doi.org/10.4103/bc.bc_15_25
- Familah, A., Arifin, A. F., Muchsin, A. H., & Rachman, M. E. (2024). Karakteristik Penderita Stroke Iskemik dan Stroke Hemoragik. *Fakumi Medical Journal: Jurnal Mahasiswa Kedokteran*, 4(6), 457-464. <https://doi.org/10.33096/fmj.v4i6.468>
- Feigin, V. L., Norrving, B., George, M. G., Foltz, J. L., Roth, G. A., & Mensah, G. A. (2016). Prevention of stroke: a strategic global imperative. *Nature Reviews Neurology*, 12(9), 501-512. <https://doi.org/10.1038/nrneurol.2016.107>
- Firmansyah, F., Andayani, T. M., & Pinzon, R. T. (2016). Analisis biaya penyakit stroke iskemik. *Jurnal Manajemen Dan Pelayanan Farmasi (Journal of Management and Pharmacy Practice)*, 6(1), 27-34. <https://doi.org/10.22146/jmpf.235>
- Fitriani, V. R. (2019). *Efektivitas Penggunaan Obat Antihipertensi Pada Pasien Stroke Iskemik Di Instalasi Rawat Inap RSAU Dr. Esnawan Antariksa Halim Perdana Kusuma Jakarta Periode 2018* (Doctoral dissertation, Institut Sains dan Teknologi Nasional).
- Guasti, L., Dilaveris, P., Mamas, M. A., Richter, D., Christodorescu, R., Lumens, J., ... & Cowie, M. R. (2022). Digital health in older adults for the prevention and management of cardiovascular diseases and frailty. A clinical consensus statement from the ESC Council for Cardiology Practice/Taskforce on Geriatric Cardiology, the ESC Digital Health Committee and the ESC Working Group on e-Cardiology. *ESC heart failure*, 9(5), 2808-2822. <https://doi.org/10.1002/ehf2.14022>
- Habib, S. H., & Saha, S. (2010). Burden of non-communicable disease: global overview. *Diabetes & Metabolic Syndrome: Clinical Research & Reviews*, 4(1), 41-47. <https://doi.org/10.1016/j.dsx.2008.04.005>
- Hairani, L. (2022). *Perbandingan Kadar Profil Lipid Pada Pasien Stroke Iskemik Dengan Stroke Hemoragik Di Rsud Budhi Asih Jakarta Timur* (Doctoral dissertation, Universitas Binawan).
- He, A. J., & Tang, V. F. (2021). Integration of health services for the elderly in Asia: A scoping review of Hong Kong, Singapore, Malaysia, Indonesia. *Health Policy*, 125(3), 351-362. <https://doi.org/10.1016/j.healthpol.2020.12.020>
- Hermawan, A. N. (2021). Karakteristik luaran klinis neurologis pasien stroke iskemik berdasarkan NIHSS. *Jurnal Kedokteran Syiah Kuala*, 21(3).
- Kalita, J., Bharadwaz, M. P., & Aditi, A. (2023). Prevalence, contributing factors, and economic implications of strokes among older adults: a study of North-East India. *Scientific Reports*, 13(1), 16880. <https://doi.org/10.1038/s41598-023-43977-z>
- Laily, S. R. (2017). Hubungan karakteristik penderita dan hipertensi dengan kejadian stroke iskemik. *Jurnal berkala epidemiologi*, 5(1), 48-59.
- Maharani, A. (2022). Participation in community-based healthcare interventions and non-communicable diseases early detection of general population in Indonesia. *SSM-Population Health*, 19, 101236. <https://doi.org/10.1016/j.ssmph.2022.101236>
- Mahendrakrisna, D., & Soedomo, A. C. G. T. (2020). Korelasi Kadar Asam Urat dalam Darah terhadap Luaran Klinis Stroke Iskemik Akut. *Majalah Kedokteran Neurosains*

- Mahendrakrisna, D., Windriya, D. P., & GTS, A. C. (2019). Karakteristik Pasien Stroke Usia Muda di RSUD Kota Surakarta. *Cermin Dunia Kedokteran*, 46(3), 167-170. <https://doi.org/10.55175/cdk.v46i3.490>
- Maitri, W. S., & Lasmi, N. W. (2025). Health Education and Early Detection of Non-Communicable Diseases: A Participatory Approach to Raising Community Awareness. *ABDIKES Sunan Giri*, 2(1), 1-9.
- Megawati, S., Rahmawati, R., & Fhatonah, N. (2021). Evaluasi penggunaan obat antiplatelet pada pasien stroke iskemik di instalasi rawat inap rumah sakit umum kabupaten tangerang tahun 2019. *Jurnal Farmagazine*, 8(1), 39. <http://dx.doi.org/10.47653/farm.v8i1.531>
- O'Neill, D. E., & Forman, D. E. (2021). Cardiovascular care of older adults. *Bmj*, 374. <https://doi.org/10.1136/bmj.n1593>
- Patricia, H., Kembuan, M. A., & Tumboimbela, M. J. (2015). Karakteristik Penderita Stroke Iskemik Yang Di Rawat Inap Di Rsup Prof. Dr. RD Kandou Manado Tahun 2012-2013. *e-CliniC*, 3(1). <https://doi.org/10.35790/ecl.v3i1.7402>
- Pistoia, F., Sacco, S., Degan, D., Tiseo, C., Ornello, R., & Carolei, A. (2016). Hypertension and stroke: epidemiological aspects and clinical evaluation. *High Blood Pressure & Cardiovascular Prevention*, 23(1), 9-18. <https://doi.org/10.1007/s40292-015-0115-2>
- Putri, A. I. (2015). Frekuensi Dan Determinan Kejadian Stroke Pada Penderita Hipertensi Dewasa Di Wilayah Perdesaan Indonesia Tahun 2013 (Analisis Data Riskesdas 2013). *Universitas Indonesia*, 20, 1-17. <https://doi.org/10.13140/RG.2.2.23164.16003>
- Putri, M. N., Mutiawati, E., & Mahdani, W. (2017). Hubungan derajat stroke terhadap status kognitif pada pasien stroke iskemik di poliklinik saraf rumah sakit umum daerah dr. Zainoel Abidin Banda Aceh. *Jurnal Ilmiah Mahasiswa Kedokteran Medisia*, 2(1).
- Rasyid, A. U. M., Nurfadilah, N., Zulkifli, Z., Usman, F., Zulham, Z., & Aryulindah, A. (2025). Gambaran Pola Peresepan Obat Stroke Iskemik pada Pasien Rawat Inap di Salah Satu Rumah Sakit Umum Daerah Kabupaten Bone. *Pharmaceutical Science and Clinical Pharmacy*, 3(1), 21-27. <https://doi.org/10.61329/pscp.v3i1.39>
- Rayner, M., Wickramasinghe, K., Williams, J., McColl, K., & Mendis, S. (Eds.). (2017). *An introduction to population-level prevention of non-communicable diseases*. Oxford University Press.
- Rochmah, T. N., Rahmawati, I. T., Dahlui, M., Budiarto, W., & Bilqis, N. (2021). Economic burden of stroke disease: a systematic review. *International journal of environmental research and public health*, 18(14), 7552. <https://doi.org/10.3390/ijerph18147552>
- Sihombing, R. A. N. B. (2023). *Profil Faktor Risiko Pasien Stroke Iskemik di Rumah Sakit Universitas Kristen Indonesia pada Periode Januari 2018-Januari 2022* (Doctoral dissertation, Universitas Kristen Indonesia).
- Sofian, N., Prasetyo, G., & Wibisono, S. (2017). Peripheral Artery Disease Accompanied by Intermittent Claudication in Rural Areas of Sikka Regency—A Cross Sectional Study with Pulse Palpation Methods and Its Risk Factors. *Jurnal Penyakit Dalam Indonesia*, 4(3), 6. <https://doi.org/10.7454/jpdi.v4i3.133>
- Trisniawati, A. (2022). *Hubungan Tingkat Pengetahuan Dan Jarak Rumah Dengan Kecepatan Keluarga Membawa Penderita Stroke Ke Rumah Sakit Islam (RSI) Sultan Agung Semarang* (Doctoral dissertation, Universitas Islam Sultan Agung Semarang).

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