

# Analysis of the Characteristics of Inpatient Stroke Patients at the Regional Special Hospital (RSKD) Dadi, South Sulawesi Province

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## Abstract

**Aims:** Stroke is a leading cause of death and disability worldwide. In South Sulawesi, the number of stroke cases has reached 21,490, ranking it as the sixth highest province in Indonesia.

**Methods:** This study employed a quantitative approach with a cross-sectional design. Data collection was conducted using a total sampling technique with 165 patients, combining secondary data from medical records and primary data from family interviews. The study was conducted between January 15 and February 7, 2025.

**Results:** The findings showed that ischemic stroke was the most common type (84.4%), predominantly affecting the elderly (57%). Females exhibited a higher prevalence (53.3%) than males (46.7%). The most common comorbidity was hypertension (67.9%), followed by dyslipidemia (55.2%) and diabetes mellitus (18.2%). Regarding lifestyle factors, 23.6% of the patients were smokers, and 4.2% reported alcohol consumption. There is no significant correlation between sex ( $p = 0.06$ ), age ( $p = 0.77$ ), comorbidities, including hypertension ( $p = 0.63$ ), dyslipidemia ( $p = 0.09$ ), and diabetes mellitus ( $p = 0.15$ ) and lifestyle factors such as smoking ( $p = 0.95$ ) and alcohol consumption ( $p = 0.96$ ) with the type of stroke.

**Conclusion:** Inpatients with stroke at RSKD Dadi were predominantly female, elderly, and diagnosed with ischemic stroke, and most commonly presented with hypertension as a comorbidity. Besides, there is no correlation between sex, age, comorbidities, and lifestyle factors with the type of stroke.

*Keywords: Comorbidity; Hypertension; Lifestyle; Patient Characteristics; Stroke*

## Introduction

According to the World Health Organization (WHO), stroke is defined as a sudden disturbance of brain function caused by an interruption of blood flow to the brain, either due to vessel occlusion or rupture of the vessel. Globally, approximately 12.2 million new stroke cases are reported annually [1]. Stroke is the second leading cause of death and disability worldwide [2]. Indonesia ranks as the country with the highest number of stroke cases in Asia. Based on the 2023 Indonesian Health Survey, 638,178 individuals were recorded as having suffered from stroke, with South Sulawesi ranking sixth in the country, with 21,490 cases [3].

Several factors contribute to the increased risk of developing stroke. Among the productive age group (25–34 years), stroke incidence is the highest, with 133,887 cases reported [3]. Dewi and Asman (2021) explained that this is associated with unhealthy lifestyle patterns commonly found in this age group, such as sedentary behavior and irregular dietary habits due to occupational demands [4]. Based on sex, the number of male stroke patients was higher (321,060 cases) than that of female patients (312,118 cases) [3]. This finding aligns with that of Nirmalasari et al. (2020), who reported that men are at a greater risk of stroke [5]. In addition to age and sex, comorbidities also play a significant role in increasing the risk of stroke. Abdu et al. (2022) emphasized that hypertension is the most common comorbidity among patients with stroke [6]. The combination of age, sex, and comorbidities, such as hypertension, indicates that stroke is a complex health issue requiring a multidimensional approach to management.

Secondary data from RSKD Dadi, South Sulawesi, recorded 270 hospitalized stroke patients between August and October 2024 were used. Although data on stroke patient characteristics have been documented, further analysis is necessary to understand the contributing factors of the high stroke incidence at this hospital. This study provides updated insights by exploring the characteristics of hospitalized stroke patients at RSKD Dadi, South Sulawesi Province, using the most recent data, and analyzing intervariable relationships to provide a more comprehensive overview.

This study aimed to identify the characteristics of inpatients with stroke, including age, sex, comorbidities, and lifestyle factors. This study is expected to provide a deeper understanding of stroke patient profiles at RSKD Dadi, South Sulawesi Province, which may contribute to the development of more effective stroke prevention and management strategies. Furthermore, this study may serve as a valuable reference for healthcare professionals, particularly physiotherapists, in improving the quality of care for stroke patients in hospitals.

## Methods

This was a quantitative descriptive study employing a cross-sectional design aimed at identifying the characteristics of inpatients with stroke at RSKD Dadi, South Sulawesi Province. Data analysis was performed using secondary data from patient medical records at RSKD Dadi and primary data obtained through interviews with family members. A total sampling technique was applied, resulting in the inclusion of 165 patients in the study. The study was conducted between January 15 and February 7, 2025.

This study was approved by the Research Ethics Committee of the Faculty of Nursing, Universitas Hasanuddin (No. 017/UN4.18.3/TP.01.02/2025; Protocol No. UH2412321).

## Results

Data were collected from secondary sources (patient medical records) and primary sources (family interviews) covering variables such as age, sex, stroke type, medical history, and lifestyle. A total of 165 respondents participated in the study.

**Table 1. Distribution of Stroke Patients by Stroke Type**

Stroke Type	Frequency	Percentage
Ischemic	140	84.4%
Haemorrhagic	25	15.2%

Source: Medical Records, RSKD Dadi, South Sulawesi Province (2025)

The majority of hospitalized stroke cases were ischemic stroke (84.4%), whereas hemorrhagic stroke was considerably lower (15.2%).

**Table 2. Distribution of Stroke Patients by Age Group**

Age Group	Frequency	Percentage
Infants (<5)	0	0%
Children (5–9)	0	0%
Adolescents (10-18)	1	0.6%
Adults (19-59)	70	42.4%
Elderly (>60)	94	57%

Source: Medical Records, RSKD Dadi, South Sulawesi Province (2025)

The majority of stroke cases occurred among the elderly (>60 years, 57%), followed by adults (42.4%), with minimal cases among adolescents (0.6%). No cases were found in children or infants.

**Table 3. Distribution of Stroke Patients by Sex**

Sex	Frequency	Percentage
Male	77	46.7%
Female	88	53.3%

Source: Medical Records, RSKD Dadi, South Sulawesi Province (2025)

Female patients accounted for a higher proportion of hospitalized stroke cases (53.3%) than male patients (46.7%).

**Table 4. Distribution of Stroke Patients by Medical History (Comorbidities)**

Comorbidity	History	Frequency	Percentage
<b>Hypertension</b>	Yes	112	67.9%
	No	53	32.1%
<b>Diabetes Mellitus</b>	Yes	30	18.2%
	No	135	81.8%
<b>Dyslipidemia</b>	Yes	91	55.2%
	No	74	44.8%

Source: Medical Records, RSKD Dadi, South Sulawesi Province (2025)

Hypertension was the most prevalent comorbidity (67.9%), followed by dyslipidemia (55.2%), and diabetes mellitus was less common (18.2%).

**Table 5. Distribution of Stroke Patients by Lifestyle Factors**

Life Style	Category	Frequency	Percentage
<b>Smoking</b>	Smoker	39	23.6%
	Non-smoker	126	76.4%
<b>Alcohol</b>	Consumer	7	4.2%
	Non-consumer	158	95.8%

Source: Primary Data (2025)

Smoking was reported by 23.6% of patients, whereas alcohol consumption was relatively rare (4.2%). The majority of patients were non-smokers (76.4%) and non-alcohol consumers (95.8%).

Table 5 presents the distribution of patient characteristics based on the type of stroke. Most ischemic stroke cases occurred in patients aged >60 years, followed by those aged 19–59 years. A similar pattern was observed in haemorrhagic stroke cases, although with smaller frequencies. No significant association was found between age group and stroke type ( $p = 0.06$ ). Sex was also not significantly associated with stroke type ( $p = 0.77$ ), with both ischemic and haemorrhagic strokes occurring more frequently in males than females.

Regarding comorbidities, hypertension, dyslipidemia, and diabetes mellitus showed no significant relationship with the type of stroke ( $p = 0.63$ ,  $p = 0.09$ , and  $p = 0.15$ , respectively). Hypertension and dyslipidemia were more prevalent among ischemic stroke patients.

Lifestyle factors, including smoking and alcohol consumption, demonstrated no significant association with stroke type ( $p = 0.95$  and  $p = 0.96$ ). The vast majority of cases in both categories occurred among non-smokers and non-alcohol users.

**Table 5. Association Between Patient Characteristics and Stroke Type Based on Chi-Square Analysis**

Variables		Type of Stroke (n)		P-Value
		Ischemic	Haemorrhagic	
Age	10 - 18 y.o		1	0.06
	19 - 59 y.o	59	11	
	>60 y.o	81	13	
Sex	Male	66	11	0.77
	Female	74	14	
<b>Comorbidities</b>				
Hypertension	Yes	94	18	0.63
	No	46	7	
Dyslipidemia	Yes	81	10	0.09
	No	59	15	
Diabetes Mellitus	Yes	28	2	0.15
	No	112	23	
<b>Life Style</b>				
Smoking	Yes	6	1	0.95
	No	134	24	
Alcoholic	Yes	33	6	0.96
	No	107	19	

Source: Primary Data (2025)

## Discussion

### Analysis of Stroke Patient Characteristics Based on Stroke Type

The findings of this study indicate that ischemic stroke was the most prevalent type, accounting for 84.4% of cases, predominantly occurring among the elderly (49.1%), with the majority being female (53.3%). This is consistent with the study by Widyasari et al. (2023), who reported that ischemic stroke accounted for 70% of stroke cases [7]. The high prevalence of ischemic stroke can be attributed to common risk factors in the community, such as hypertension, diabetes mellitus, dyslipidemia, and lifestyle.

Hypertension is a major risk factor for stroke, as sustained elevations in blood pressure damage the vascular walls, accelerate atherosclerosis, and increase the likelihood of clot formation that may obstruct cerebral blood flow [8]. Dyslipidemia further contributes to vascular risk by elevating LDL cholesterol, which facilitates the development of atherosclerotic plaques, leading to arterial narrowing and increased thrombotic potential [9]. Diabetes mellitus also accelerates atherosclerosis by impairing endothelial function, promoting inflammation, and disrupting lipid metabolism and blood pressure regulation [10]. The coexistence of these comorbidities intensifies vascular deterioration and substantially increases the probability of ischemic obstruction. Therefore, optimal control of blood pressure, lipid levels, and blood

glucose is essential in preventing ischemic stroke. Aging additionally plays a crucial role in stroke pathogenesis.

Aging contributes to an increased risk of ischemic stroke due to degenerative processes, including vascular stiffening (atherosclerosis), elevated blood pressure, and metabolic disturbances, such as diabetes and dyslipidemia. Older adults are more prone to chronic hypertension, which serves as the principal driver of ischemic stroke through progressive vascular narrowing and occlusion [11].

The higher prevalence of ischemic stroke among women in this study may be explained by hormonal factors such as estrogen levels. Postmenopausal women experience a sharp decline in estrogen levels, a hormone known for its protective effects on vascular health, as it maintains vessel elasticity, reduces inflammation, and regulates cholesterol. Thus, the reduction in estrogen contributes to an increased risk of hypertension and dyslipidemia, ultimately raising the likelihood of ischemic stroke [12].

Conversely, hemorrhagic stroke was observed at a lower prevalence (15.2%); however, it is often associated with higher severity and mortality rates than ischemic stroke. This is attributed to the rapid and extensive brain injury caused by sudden intracerebral hemorrhage, which elevates intracranial pressure (ICP), impairs perfusion to the surrounding brain tissue, and increases the risk of brain herniation and vital function failure. Unlike ischemic stroke, which can be managed with thrombolytic therapy, treatment options for hemorrhagic stroke remain limited, with surgical interventions being high-risk and not always effective in improving outcomes. Systemic complications, such as respiratory distress, electrolyte imbalance, and organ failure, further worsen the prognosis [13]. Hemorrhagic stroke often results from chronic hypertension, aneurysm rupture, and arteriovenous malformations (AVM). Once vessel rupture occurs, extravasated blood compresses the surrounding brain tissue, exacerbating ICP elevation, impairing cerebral perfusion, and potentially triggering secondary ischemia. Toxic blood components aggravate neuronal injury and cerebral edema, thereby worsening the patient's outcome. Without timely intervention, elevated ICP may lead to fatal brain herniation, affecting vital centers such as respiration and cardiac rhythm [14]. Thus, early detection and rapid management are critical for improving survival in patients with hemorrhagic stroke.

### **Analysis of Stroke Patient Characteristics Based on Age**

The data demonstrated that stroke predominantly occurred among the elderly (>60 years) at 57%, followed by adults (19–59 years) at 42.4%, and was rarely observed in adolescents (10–18 years) at 0.6%. No cases were identified in children aged < 9 years. These findings align with those of Mkoba et al. (2021), who reported that older adults (281 patients) were more likely to experience stroke than younger groups (83 patients) [15]. Similarly, Lutski et al. (2017) reported 3,243 stroke cases among patients aged 51–84 years compared to 336 cases among those aged < 50 years [16]. Furthermore, Xia et al. (2019) found that nearly 80% of stroke patients aged  $\geq 70$  years were classified as high-risk [17]. However, the Chi-square analysis in this study showed no significant association between age group and stroke type ( $p = 0.06$ ).

The elevated prevalence among older adults can be attributed to degenerative cardiovascular changes, including arterial stiffening, reduced vascular elasticity, and a higher prevalence of comorbidities such as hypertension, diabetes mellitus, and dyslipidemia [11]. Adults aged 19–59 years also demonstrated a high proportion (42.4%), largely associated with modifiable lifestyle risk factors such as smoking, alcohol consumption and uncontrolled hypertension. Although lower than that in the elderly, this suggests that stroke is increasingly affecting the working-age population.

Although rare, adolescent stroke may result from congenital heart disease, coagulopathy, severe infections, or traumatic brain injury [18]. The absence of cases in children under 9 years of age may be explained by their minimal exposure to conventional stroke risk factors

and more elastic vasculature. However, rare pediatric stroke cases are often linked to congenital or infectious etiologies [19].

Collectively, these findings highlight that stroke is predominantly an age-related disease but is increasingly a concern for younger populations than previously thought. Therefore, preventive measures should target early risk factor modification through healthy lifestyle promotion, blood pressure control, and reduction of smoking and alcohol consumption.

### **Analysis of Stroke Patient Characteristics Based on Sex**

This study revealed a higher stroke prevalence in women (53.3%) than in men (46.7%). This is consistent with the findings of Kim et al. (2020), who reported a higher age-adjusted incidence among women than among men in China (309 vs. 280 per 100,000 population). Postmenopausal estrogen decline contributes significantly to cardiovascular disease, as estrogen provides cardiovascular protection by maintaining vascular elasticity and reducing atherosclerosis. Its absence increases the risk of hypertension, dyslipidemia, and insulin resistance [12]. Nevertheless, Chi-square analysis demonstrated no significant association between sex and stroke type ( $p = 0.77$ ).

Women are also more susceptible to stroke due to conditions such as atrial fibrillation and differential responses to drugs. Anticoagulant use increases the risk of hemorrhage, whereas antiplatelet therapy is less effective because of aspirin resistance [20].

Conversely, Rajati et al. (2023) reported a higher prevalence of stroke among men, attributed to greater smoking and alcohol consumption, which elevates the risk of hypertension and cardiovascular disease [21]. While estrogen affords some protection to premenopausal women, the risk of stroke increases substantially postmenopause, explaining the higher prevalence in older women.

Thus, sex-specific prevention strategies are essential, with women requiring careful monitoring of hypertension, diabetes, and dyslipidemia after menopause, whereas men require greater emphasis on lifestyle modification.

### **Analysis of Stroke Patient Characteristics Based on Comorbidities**

The study identified Hypertension was the most common comorbidity (67.9%), followed by dyslipidemia (55.2%) and diabetes mellitus (18.2%). This aligns with Xia et al. (2019), who reported hypertension in 80% of stroke patients [17], and Geneva et al. (2023), who found hypertension in 50% of the cases [22]. However, the Chi-square test revealed no significant association between the presence of these comorbidities and stroke type; hypertension ( $p = 0.63$ ), dyslipidemia ( $p = 0.09$ ), and diabetes mellitus ( $p = 0.15$ ).

Hypertension contributes to stroke risk by damaging cerebral vessels, elevating intravascular pressure, and weakening arterial walls, predisposing patients to both ischemic and hemorrhagic strokes [8]. Dyslipidemia, particularly elevated LDL and reduced HDL levels, fosters atherosclerotic plaque formation, thereby increasing the risk of ischemic stroke [9]. Although less prevalent in this dataset, diabetes mellitus remains a critical factor, accelerating atherosclerosis, promoting hypercoagulability, and impairing post-stroke recovery [10].

These comorbidities, particularly in postmenopausal elderly women, collectively elevate the risk of stroke, emphasizing the importance of controlling blood pressure, cholesterol, and glucose levels.

### **Analysis of Stroke Patient Characteristics Based on Lifestyle**

Lifestyle data revealed that 23.6% of patients were smokers, predominantly adult males, whereas only 4.2% consumed alcohol. These findings are consistent with those of Hartaty & Haris (2020), who reported a significant association between smoking and stroke incidence [23]. Despite these known effects, Chi-square analysis showed no significant association between smoking ( $p = 0.95$ ) or alcohol consumption ( $p = 0.96$ ) and the type of stroke.

Smoking contributes to stroke risk through chronic inflammation, endothelial damage, hypertension, and accelerated atherosclerosis, predisposing individuals to ischemic stroke via thrombosis or embolism and hemorrhagic stroke via hypertensive vessel rupture [24,25]. Although less common, alcohol consumption remains a critical risk factor, being associated with hypertension, atrial fibrillation, thrombosis, endothelial damage, and intracerebral hemorrhage [26].

Despite their relatively low prevalence, smoking and alcohol consumption serve as catalysts for comorbid conditions, such as hypertension and dyslipidemia, indirectly amplifying the risk of stroke. Thus, health promotion campaigns targeting smoking cessation and alcohol consumption reduction remain vital.

### **Conclusion**

This study found that ischemic stroke was more prevalent than haemorrhagic stroke among inpatient cases at Rumah Sakit Khusus Daerah (RSKD) Dadi. Patient characteristics including age group, sex, comorbidities (hypertension, dyslipidemia, and diabetes mellitus), and lifestyle factors (smoking and alcohol consumption) showed no statistically significant association with the type of stroke based on Chi-square analysis. Although hypertension, dyslipidemia, and diabetes mellitus were more frequently observed among patients with ischemic stroke, these factors did not demonstrate a significant relationship with stroke subtype. Overall, the findings indicate that, within this inpatient population, common vascular risk factors and lifestyle behaviors did not significantly differentiate between ischemic and haemorrhagic stroke. Continued efforts in comprehensive risk factor management remain essential for reducing overall stroke burden.

### **Author Contribution**

All authors have accepted responsibility for the entire content of this manuscript and approved its submission.

### **Conflict of interest**

Authors state no conflict of interest.

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