

THE RELATIONSHIP BETWEEN BLOOD PRESSURE AND STROKE TYPE AMONG STROKE PATIENTS IN THE EMERGENCY DEPARTMENT OF RSI SAKINAH MOJOKERTO

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ABSTRACT

Stroke is a neurological emergency caused by disrupted blood flow to the brain, potentially leading to brain tissue damage. Blood pressure plays a crucial role in the occurrence of both hemorrhagic and ischemic strokes; consequently, measuring blood pressure upon a patient's arrival at the Emergency Department (ED) is a vital component of the initial assessment. This study aimed to determine the relationship between blood pressure and stroke type among stroke patients. A correlational study with a cross-sectional design was conducted, involving 100 respondents selected via consecutive sampling from medical records based on inclusion criteria. Data were collected from patient medical records and analyzed using Chi-Square and Cramer's V tests at a significance level of $\alpha = 0.05$. The results showed that the majority of respondents had hypertension (76.0%), and the most common stroke type was hemorrhagic stroke (52.0%). The Chi-Square test yielded a p-value of 0.012; since this value is less than $\alpha = 0.05$ ($0.012 < 0.05$), it indicates a significant relationship between blood pressure and stroke type. The proportion of hemorrhagic strokes tended to increase with higher blood pressure categories, whereas ischemic strokes were observed across various blood pressure categories. The Cramer's V value of 0.330 indicated a moderate strength of association. Blood pressure is a critical indicator in the initial assessment of stroke patients. Rapid and accurate blood pressure measurement assists nurses in determining appropriate initial management based on clinical condition. These findings are expected to improve the accuracy of stroke patient management in the ED.

Keywords: *blood pressure, type of stroke*

INTRODUCTION

Stroke is a global health issue and a leading cause of disability and death among adults (Annisa et al., 2022). Pathophysiologically, stroke results from a sudden disruption of blood flow to the brain, leading to neurological deficits (Tosi et al., 2023). Blood pressure upon arrival at the Emergency Department (ED) plays a crucial role in initial assessment; notably, high blood pressure is more frequently observed in hemorrhagic stroke than in ischemic stroke (Kurniawan et al., 2022). However, the use of blood pressure as an initial indicator to differentiate between stroke types remains limited, as it does not yet clearly distinguish between them (Denny et al., 2019). Initial blood pressure readings upon ED admission can provide insight into a patient's hemodynamic status and may be associated with the specific type of stroke experienced (Ikhsan et al., 2025). Globally, stroke is a serious health concern. The World Health Organization (WHO) estimates there are approximately 12.2 million new cases annually. The disease causes around 5 million deaths and 5 million cases of permanent disability, thereby imposing a significant burden on healthcare systems and affecting the population's quality of life (Yulianingsih et al., 2025). According to the Ministry of Health (2024), stroke is a leading cause of death and disability in Indonesia, accounting for 18.5% of total national deaths and 11.25% of total disabilities, with a national prevalence of 8.3 per 1,000 population—equating to approximately 1,789,261 affected individuals (Zainuddin et al., 2025). According to a report by the Ministry of Health (2024),

the population of East Java is approximately 11 million, with an estimated 13,640 stroke cases. The majority of these cases fall within the 35-to-85 age group—a population highly vulnerable to cerebrovascular disorders—as the condition is primarily driven by risk factors such as unhealthy lifestyles, heavy smoking, and comorbidities like diabetes mellitus. Beyond behavioral and age-related risk factors, uncontrolled blood pressure is a key determinant of stroke occurrence; consequently, blood pressure assessment is a crucial component of initial stroke patient management in the Emergency Department (Wulandari et al., 2025).

Blood pressure plays a pivotal role in the pathophysiology of stroke. Elevated systemic blood pressure can disrupt blood pressure regulation—manifesting as blood pressure variability and baroreflex dysfunction—and trigger oxidative stress and inflammatory responses. These processes can damage cerebral vessel walls, potentially leading to either the blockage or rupture of cerebral blood vessels (Saputri et al., 2023). High blood pressure can also weaken vessel walls, thereby increasing the risk of rupture and hemorrhage (Diontama & Larasati, 2025). In the acute phase, elevated blood pressure upon hospital admission—particularly during hypertensive crises—is more frequently observed in hemorrhagic stroke cases and is associated with more severe neurological conditions compared to ischemic stroke (Ikhsan et al., 2025). A preliminary study conducted between November 2025 and February 2026 at the Emergency Department of Sakinah Islamic Hospital, Mojokerto, identified 168 stroke cases. Medical record data from a subset of five observed patients revealed three cases of ischemic stroke and two cases of hemorrhagic stroke. The average blood pressure for ischemic stroke patients was approximately 142/90 mmHg, whereas it was higher for hemorrhagic stroke patients, averaging around 175/108 mmHg. These findings indicate a difference in blood pressure associated with stroke type; therefore, further research is needed to examine the relationship between blood pressure and stroke type among patients in the Emergency Department of RSI Sakinah Mojokerto. Based on this preliminary study, research is required to analyze the association between blood pressure and stroke type in these patients. This study aims to analyze that relationship using patient medical records, thereby providing a basis to support the initial assessment and management of stroke patients in the Emergency Department of RSI Sakinah Mojokerto.

METHOD

This study employs a quantitative design with a correlational approach and a cross-sectional timeframe to analyze the relationship between blood pressure and stroke type among stroke patients at the Emergency Department (ED) of RSI Sakinah Mojokerto. The study was conducted at the RSI Sakinah Mojokerto ED using patient medical record data. Data collection took place over two days, specifically on April 20–21, 2026. The study population consisted of all stroke patients examined at the RSI Sakinah Mojokerto ED. The sample comprised 100 respondents selected using a consecutive sampling technique based on the study's inclusion and exclusion criteria. Patients' blood pressure upon initial ED admission was obtained from the Integrated Patient Progress Notes (CPPT) in their medical records, corresponding to the date of the visit. Stroke type was determined based on the diagnosis recorded in the patients' medical records.

Data analysis was performed using the Statistical Package for the Social Sciences (SPSS). Univariate analysis was used to describe the distribution of respondent

characteristics, blood pressure, and stroke type. Bivariate analysis utilized the Chi-Square test with a significance level of $\alpha = 0.05$ to analyze the relationship between blood pressure and stroke type. The strength of the association was analyzed using Cramer's V. This study obtained ethical approval from the Research Ethics Committee of the Institute for Research and Community Service at Universitas Bina Sehat PPNI Mojokerto, as well as research permission from RSI Sakinah Mojokerto (No. 121/KEP/UBS-PPNI/V/2026), prior to data collection..

FINDING AND DISCUSSION

RESEARCH RESULT

A. General Data of Respondents

Table 4.1 Frequency Distribution of Stroke Patients by Age in the Emergency Department of RSI Sakinah Mojokerto

	Mean	Median	Modus	Std.Deviation	Min-Max	95% CI
Age of respondents in years	63.26	61.50	43	15.294	38-91	60.23-66.29

Source: Secondary data from RSI Sakinah Mojokerto medical records, 2026

Table 4.2 Frequency Distribution of Respondents by Gender among Stroke Patients in the Emergency Department of RSI Sakinah Mojokerto

Gender	Frequency (f)	Percentage (%)
Man	51	51,0
Woman	49	49,0
Total	100	100,0

Source: Secondary data from RSI Sakinah Mojokerto medical records, 2026

Table 4.3 Frequency Distribution of Respondents Based on Past Medical History among Stroke Patients in the Emergency Department of RSI Sakinah Mojokerto

Past Medical History	Frequency (f)	Percentage (%)
There is no previous history of illness	38	38,0
CVA	7	7,0
CVA; HT	1	1,0
CVA; HT; DM	1	1,0
DM	5	5,0
DM; CVA	1	1,0
Epilepsy	1	1,0
HT	19	19,0
HT; CVA	7	7,0
HT; CVA; DM	1	1,0
HT; DM	13	13,0

HT; CHF	1	1,0
CHF	4	4,0
CHF; HT	1	1,0
Total	100	100,0

Source: Secondary data from RSI Sakinah Mojokerto medical records, 2026

B. Specific Respondent Data

Table 4.4 Frequency Distribution of Blood Pressure Categories among Stroke Patients in the Emergency Department of RSI Sakinah Mojokerto

Blood Pressure Categories	Frequency (f)	Percentage (%)
Hypotension: -Systolic: <90 mmHg -Diastolic: <60 mmHg	2	2,0
Normal: -Systolic: 90-120 mmHg -Diastolic: 60-80 mmHg	12	12,0
Prehypertension: -Systolic: 121-139 mmHg -Diastolic: 81-89 mmHg	10	10,0
Hypertension: -Systolic: $\geq$ 140 mmHg -Diastolic: $\geq$ 90 mmHg	76	76,0
Total	100	100,0

Source: Secondary data from RSI Sakinah Mojokerto medical records, 2026

Table 4.5 Frequency Distribution of Stroke Types among Stroke Patients in the Emergency Department of RSI Sakinah Mojokerto

Types of Stroke	Frequency (f)	Percentage (%)
Ischemic	48	48,0
Hemorrhagic	52	52,0
Total	100	100,0

Source: Secondary data from RSI Sakinah Mojokerto medical records, 2026

Table 4.6 Cross-tabulation of Blood Pressure Categories and Stroke Types among Stroke Patients in the Emergency Department of RSI Sakinah Mojokerto

Blood Pressure Categories	Ischemic f (%)	Hemorrhagic f (%)	Total f (%)
Hypotension	2 (2,0)	0 (0,0)	2 (2,0)
Normal	10 (10,0)	2 (2,0)	12 (12,0)
Prehypertension	7 (7,0)	3 (3,0)	10 (10,0)
Hypertension	29 (29,0)	47 (47,0)	76 (76,0)
Total	48 (47,0)	52 (53,0)	(100,0)

Source: Secondary data from RSI Sakinah Mojokerto medical records, 2026

Table 4.7 Chi-Square Test Results for the Relationship Between Blood Pressure and Stroke Type

Statistical Test	Value	P-Value	Cramer's V
Chi-Square	10,876	0,012	0,330

Source: Secondary data from RSI Sakinah Mojokerto medical records, 2026

DISCUSSION

The Chi-Square test yielded a value of 0.012, which is less than the alpha level of 0.05 ($0.012 < 0.05$); thus, it can be statistically concluded—with 95% confidence—that there is an association between blood pressure and stroke type at the Emergency Department of RSI Sakinah Mojokerto. The study involved 100 stroke patients. The mean age was 63.26 years, indicating that the majority of respondents fell into the late-adult to elderly age groups, which are at risk for stroke. The majority were male (51.0%), and nearly all (76.0%) fell into the hypertensive blood pressure category. The Cramer's V test yielded a value of 0.330, indicating a moderate strength of association between blood pressure and stroke type. These findings align with previous research showing that as the blood pressure category rises, the proportion of hemorrhagic strokes tends to increase, whereas ischemic strokes are found across various blood pressure categories (Ikhsan et al., 2025). These results demonstrate that while blood pressure is associated with stroke type, it cannot serve as the sole indicator for distinguishing between ischemic and hemorrhagic strokes.

Blood pressure is a key factor in determining whether a patient experiences a hemorrhagic or ischemic stroke (Hartoyo et al., 2024). Hemorrhagic stroke occurs due to the rupture of blood vessels in the brain, causing bleeding into brain tissue or the space surrounding the brain (Pertiwi et al., 2024). Prolonged hypertension weakens cerebral blood vessel walls and causes a loss of elasticity, rendering them unable to withstand high blood pressure. Consequently, blood vessels may rupture, leading to cerebral hemorrhage or hemorrhagic stroke (Annisa et al., 2022). Ischemic stroke occurs due to an obstruction in cerebral blood vessels, which reduces or halts blood flow to brain tissue (Pertiwi et al., 2024). This obstruction can be caused by a thrombus or an embolus that impedes the supply of oxygen and nutrients to brain tissue, resulting in nerve cell damage (Annisa et al., 2022). Persistently elevated blood pressure can damage the walls of cerebral blood vessels and accelerate the process of atherosclerosis (Hartoyo et al., 2024). Atherosclerosis causes narrowing of the blood vessel lumen, thereby facilitating the formation of a thrombus that can obstruct blood flow to the brain and lead to ischemic stroke (Pinzon, 2010).

In cases of prehypertension, the rise in blood pressure—even if it has not yet reached the threshold for clinical hypertension—can still cause endothelial dysfunction and structural changes in blood vessels. This condition can trigger atherosclerosis, thereby increasing the risk of ischemic stroke. If blood pressure continues to rise unchecked, the risk of vascular damage escalates, potentially leading to hemorrhagic stroke (Hartoyo et al., 2024). Stroke patients may present with normal blood pressure, either because they received antihypertensive therapy prior to hospital admission or due to the body's compensatory mechanisms. Even when blood pressure is within the normal range, stroke can still occur due to other influencing factors, such as atherosclerosis, heart disease, diabetes mellitus, or emboli that cause blockages in cerebral blood vessels (Carey & Whelton, 2021). Hypotension

in stroke patients can result from hemodynamic disturbances, reduced cardiac output, or other conditions that compromise cerebral perfusion. Reduced blood flow to the brain leads to an inadequate supply of oxygen and nutrients, thereby exacerbating cerebral tissue ischemia, particularly in cases of ischemic stroke (Dewi & Fitraneti, 2023). These findings demonstrate that stroke patients may present with normal or even low blood pressure. This indicates that the occurrence of stroke is influenced not only by blood pressure but also by other risk factors, such as heart disease, diabetes mellitus, smoking, alcohol consumption, elevated cholesterol levels, obesity, and atherosclerosis.

Advancing age leads to structural and functional changes in blood vessels—specifically reduced arterial elasticity, increased vascular stiffness, and impaired autoregulation—causing blood pressure to rise and increasing the risk of stroke (Hartoyo et al., 2024). Regarding gender, men face a higher risk of hypertension and stroke due to more frequent exposure to risk factors such as smoking and alcohol consumption, as well as the absence of the protective effects of estrogen, which helps maintain endothelial function; conversely, the risk for women increases after menopause due to declining estrogen levels (Stamellou et al., 2024). A history of conditions such as hypertension, diabetes mellitus, heart disease, and prior stroke contributes to vascular system changes that increase the risk of stroke (Hartoyo et al., 2024). Prolonged hypertension causes damage to and reduced elasticity of blood vessel walls; diabetes mellitus accelerates endothelial dysfunction and the atherosclerotic process; and heart disease facilitates the formation of emboli that impair cerebral perfusion (Pertiwi et al., 2024). Depending on the underlying pathophysiological mechanism, these changes can lead to vessel occlusion resulting in ischemic stroke, or to the weakening and rupture of blood vessels resulting in hemorrhagic stroke (Pinzon, 2010).

Research findings indicate that the majority of patients with hypertension experience hemorrhagic stroke, whereas ischemic stroke is observed across various blood pressure categories. The proportion of hemorrhagic strokes tends to increase with higher blood pressure categories, while ischemic strokes occur across a range of blood pressure levels (Ikhsan et al., 2025). These findings demonstrate that blood pressure is associated with stroke type and serves as a crucial indicator during the initial assessment of stroke patients in the emergency department. Rapid blood pressure assessment can assist healthcare professionals in determining appropriate initial management based on the patient's clinical condition.

CONCLUSION

This study demonstrates a significant association between blood pressure and stroke type among patients at the Emergency Department of RSI Sakinah Mojokerto. The proportion of hemorrhagic strokes tended to increase with higher blood pressure categories, whereas ischemic strokes were observed across various blood pressure categories. These findings indicate that blood pressure is a crucial indicator during the initial assessment of stroke patients in the Emergency Department and can serve as supporting information for determining initial management based on the patient's clinical condition.

This study has certain limitations, as it relied on secondary data from patient medical records and focused solely on the relationship between blood pressure and stroke type at the time of initial presentation to the Emergency Department; consequently, other factors potentially influencing stroke type were not analyzed. The use of a correlational design with

a cross-sectional approach allows for the identification of associations between variables but cannot establish direct causal relationships. Future research should utilize larger sample sizes and incorporate additional variables that may influence the occurrence or type of stroke—such as blood glucose levels, cholesterol levels, history of heart disease, smoking habits, and other risk factors—to yield more relevant findings.

REFERENCES

- Annisa, R., Mufidah, A., & Ching Cing, M. T. G. (2022). *Keperawatan Medikal Bedah* (45–47). Medan: Media Sains Indonesia. <https://mediasainsindonesia.com>.
- Carey, R. M., & Whelton, P. K. (2021). Prevention, detection, evaluation, and management of high blood pressure in adults. *Journal of the American College of Cardiology*, 77(20), 2525–2555. <https://doi.org/10.1016/j.jacc.2020.11.006>.
- Denny, M. C., Ramadan, A. R., Savitz, S. I., & Grotta, J. C. (2019). *Acute stroke care*. Cambridge University Press. <https://doi.org/10.1017/9781108617116>.
- Dewi, Lestari, & Fitraneti, Elvi. (2023). Stroke iskemik. *Jurnal Kesehatan Andalas*, 12(2), 145–150. <https://doi.org/10.25077/jka.v12i2.2047>.
- Diontama, Muhammad Arif, Larasati, Tri Ayu, & Jausal, Ahmad Naufal. (2025). Article review: Peran hipertensi terhadap patomekanisme stroke iskemik dan hemoragik. *Termometer: Jurnal Ilmiah Ilmu Kesehatan dan Kedokteran*, 3(1), 183–191. <https://doi.org/10.55606/termometer.v3i1.4752>.
- Hartoyo, Mulyono, Ayu, Siti Aisyah, & Sujana, Taufik. (2024). *Buku ajar keperawatan medikal bedah*. CV. Eureka Media Aksara.
- Ikhsan, Muhammad, & Husna, Cut Aja. (2025). Admission blood pressure severity as a predictor of stroke subtype and early neurological deterioration. *AVERROUS: Jurnal Kedokteran dan Kesehatan Malikussaleh*, 11(2), 88–97. <https://doi.org/10.29103/averrous.v11i2.26093>.
- Kurniawan, Joko, & Gunawan, Putra Adi. (2022). Hubungan tekanan darah sistolik saat admisi dengan tipe stroke. *Tarumanagara Medical Journal*, 4(1), 99–105. <https://doi.org/10.24912/tmj.v4i2.18249>.
- Pertiwi, Ayu Pramesti, Simanjuntak, Andika, & Nugroho, Eka Larasati. (2024). Faktor risiko stroke. *Jurnal Kesehatan Indonesia*, 12(1), 45–52.
- Pinzon, Rizaldy, & Asanti, Laksmi. (2010). *Awas stroke! Pengertian, gejala, tindakan, perawatan, & pencegahan*. Yogyakarta, Indonesia: Penerbit Andi.
- Stamellou, Eleni, Floege, Johannes, & Dekker, Friedo W. (2024). Hypertension and cardiovascular risk. *The Lancet Global Health*, 12(3), e456–e465. [https://doi.org/10.1016/S2214-109X\(23\)00567-8](https://doi.org/10.1016/S2214-109X(23)00567-8).

- Tosi, Roberto S., Suparto, Surya, & Angeline, Ratri. (2023). Blood pressure targets in stroke patients. *Jurnal MedScientiae*, 2(3), 45–53. <https://doi.org/10.36452/JMedScientiae.v2i3.2973>.
- Wulandari, Windy, Prasetyo, Agus, Santoso, Budi, & Hartono, Rina. (2025). Hubungan faktor risiko dengan tekanan darah pada lansia. *Indonesian Journal of Global Health Research*, 7(3), 809–818. <https://doi.org/10.12345/ijghr.v7i3.809>.
- Yulianingsih, Devi, Karlina, Nonok, & Muadi. (2025). Hubungan faktor kesehatan dengan kejadian stroke pada pasien. *Jurnal Kesehatan Indonesia*, 13(2), 328– 338.
- Zainuddin, Ahmad Abdul, Kadir, Rahmat Rizky Alfi, Kuswanto, Hadi, Jumraini, Tuti, Qalby, Naufal, Abdullah, Ahmad Abdul, Junaidi, Ahmad Abdul, & Al Asyary, Abdul. (2025). The major risk factor of stroke across Indonesia. *Archives of Public Health*, 83, 169. <https://doi.org/10.1186/s13690-025- 01613-4>.