

RESEARCH ARTICLE

RELATIONSHIP RISK FACTORS AND HEMIPARESIS PREVALENCE IN
ISCHEMIC STROKE AT MEDICAL REHABILITATION FATMAWATI
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ABSTRACT

Background: A stroke is a brain dysfunction in the form of nerve insufficiency caused by a disruption of blood flow to part of the brain. Stroke is divided into two types, namely ischemic and hemorrhagic type. Ischemic stroke or non-hemorrhagic stroke is an acute disease whose time of onset of symptoms determines the patient's survival prognosis. It will often cause cerebral infarction. The government of the Republic of Indonesia found that stroke patients, especially ischemic strokes in Indonesia, were still predominantly male, with a rate of 50.1%. This problem could be due to a more carefree lifestyle and a heavier workload. The stroke rate is very high and has increased dramatically, especially in patients >50 years of age.

Methodology: This study is a cross-sectional observational study. The study sample was obtained by a consecutive

sampling of up to 105 study data samples taken from the medical record data. Data analysis was performed using univariate and bivariate analyses with Chi-Square tests.

Result: Based on a sample of 105 patients, with an age range between 60-70 years old the following results Relationship of Prevalence of Hemiparesis in Ischemic Stroke Patients by Gender to Blood Pressure (P=0.312), Age (P=0.591) and Nutritional Status (P=0.760).

Conclusion: No statistically significant relationship was found between stroke risk factors in blood pressure, age, and nutritional status with hemiparesis rates in geriatric ischemic stroke patients at the Medical Rehabilitation Clinic in Fatmawati Central General Hospital, Jakarta.

Keywords: Ischemic stroke, hemiparesis, risk factors, geriatrics.

INTRODUCTION

Stroke disease is a brain disfunction in the form of paralysis of the nerve (neural insufficiency) due to interruption of blood flow to a part of the brain^{1,2}. Stroke is divided into two types, namely, ischemic and hemorrhagic types. Ischemic stroke is when the patient's blood vessels experience a blockage, while hemorrhagic-type stroke is when the patient's blood vessels rupture. The two types of stroke are located in the blood vessels of the brain³⁻⁵. Based on the results of Basic Health Research made by the Ministry of Health in 2018, it was found that stroke cases were dominated by urban communities⁶.

A study was also found in 2021, which stated that ischemic stroke still dominates stroke cases with a percentage of 85% of cases, and the rest are hemorrhagic type strokes⁶.

Ischemic stroke or non hemorrhagic stroke is an acute disease; symptoms determine the patient's prognosis. If this is not known, then the reference will be the last time the patient was known to have a normal neurological condition³. Ischemic stroke often leads to cerebral infarction. Infarction occurs when blood flow to the brain is obstructed or blocked, causing the brain will lack oxygen^{7,8}. Cerebral infarction will cause clinical manifestations, one of them hemiparesis, when one part of the body experiences weakness, making it difficult to move, and the extremities dominate weakness in the extremities. This hemiparesis condition is also usually followed by sensory loss in the face, dysarthria, and aphasia³. In Jakarta, in 2017, it was found that 85% of ischemic stroke patients had hemiparesis^{6,9}.

The prevalence of stroke is very high and has increased dramatically, especially in patients aged 50 years and over, especially in Jakarta. This is in line with the results of the

2018 Basic Health Research study, which showed data that more than 50% of stroke cases were experienced by patients aged >50 years⁶. In 2018, the Indonesian Ministry of Health found that stroke patients, especially ischemic stroke patients in Jakarta, were still predominantly male, with a rate of 50.1%⁶. This condition may be due to a less protected lifestyle and a heavier workload⁶. In the world community, ischemic stroke is also dominated by men, and women dominate hemorrhagic stroke. However, in the ischemic stroke halo, women have an average onset of 4 years later than men¹⁰.

According to research in 2020, it was found that the cure rate in post-ischemic stroke patients accompanied by hemiparesis will be higher if pharmacological therapy is carried out through drugs and supported by non-pharmacological therapies such as physiotherapy and psychological assistance so that patients can get up back to work^{11,12}. The therapy will certainly be very time-consuming, laborious, and costly. Therefore, through this research, researchers hope to provide education to the public so that they are more aware and aware of the impact that will be caused by an ischemic stroke, which is likely to be followed by complaints of hemiparesis. Some of the theories mentioned above have made researchers interested in seeing whether stroke risk factors affect the prevalence of hemiparesis in ischemic stroke patients based on gender because there is much news that appears in society that stroke, especially ischemic stroke, is a disease that has a high chance of being suffered by a certain gender only.

METHODS

This research is an observational analytic study by design cross-sectional. The research was conducted at the Medical Rehabilitation Polyclinic, Fatmawati General Central Hospital, Jakarta. The time of study was conducted from May 2022 to January 2023. The accessible population in this study were all patients aged 60 to 70 years with hypertension and ischemic stroke accompanied by hemiparesis. This study uses a sampling technique by consecutive sampling method; all observed subjects that satisfy the sampling criteria are included in the study until the required number of subjects is reached. The data used is secondary data from the patient's medical record in the medical rehabilitation polyclinic at Fatmawati Jakarta General Central Hospital. The data taken were patient data that met the requirements, namely patients at the medical rehabilitation polyclinic who suffered from ischemic stroke accompanied by accompanying complaints in the form of hemiparesis from January 2019 to March 2022, aged 60 to 70 years and had complete medical record data. The estimated sample size will be determined based on the unpaired categorical analytical formula, ie:^{13,14}

$$n1 = n2 = \left[\frac{z\alpha\sqrt{2PQ} + \sqrt{P1Q1+P2Q2}}{P1-P2} \right]^2$$

Description:

- n = Number of samples
- Zα = Z value at 95% degree of significance (CI) with α = 0.05 namely 1.96
- Zβ = Z value on the power test (power) 1- = 20%, namely 0.84
- P2 = Proportion in the group whose value is known = 0.4
- P1 = Proportion in group two clinical judgment researcher = 0.6
- Q2 = 1 - P2 = 1 - 0.4 = 0
- Q1 = 1 - P1 = 1 - 0.6 = 0.4
- P = Total proportion = $\frac{(P1+P2)}{2} = 0.5$
- Q = 1 - P = 1 - 0.5 = 0.5

So that the number of samples can be calculated:

$$n1=n2 = \left[\frac{1.96\sqrt{2(0.5)(0.5)} + 0.84\sqrt{(0.6)(0.4)(0.6)}}{0.6 - 0.4} \right]^2$$

$$n1=n2 = \left[\frac{1.956}{0.2} \right]^2 = (9.758)^2$$

$$n1=n2 = 95.2 \sim 95$$

To anticipate the possibility that there is drop out, then the sample size is enlarged by the following formula:

$$N = \frac{h}{(1-f)} = \frac{95}{(1-10\%)} = \frac{95}{(1-0.1)} = \frac{95}{0.9} = 105.5 = 105$$

Description:

- N = number of correction samples
- n = Initial sample size
- f = Estimated Proportion of dropout 10%

Based on this formula, the minimum number of samples to be studied is 105

Data is processed using Excel and SPSS software. Then the data is categorized based on blood pressure (from ministry of health of Indonesia classification), age (using range of geriatric ages), gender, and nutritional status. The nutritional status will be seen through the value of body weight and height, and then it will be calculated using the formula from the WHO Body Mass Index. Then univariate analysis was carried out to determine the distribution or frequency of each data, namely blood pressure, age, gender, and nutritional status. In addition, a two-variable analysis was performed to determine the relationship between the stroke risk factors (blood pressure, age, nutritional status)

and the prevalence of hemiparesis in ischemic stroke patients by gender using the chi-square test.

ETHICAL APPROVAL

This research has received ethical approval after passing an ethical review at the Committee of Health Research Ethics Faculty of Medicine, Syarif Hidayatullah State Islamic University Jakarta, with registration number B-058/F12/KEPK/TL.00/10/2022 and the Research Ethics Committee at Fatmawati General Central Hospital Jakarta with registration number UM.01.05/VIII.5/602/2022.

RESULTS

Based on the data found, there were 68 out of 105 samples (64.8%) of ischemic stroke patients accompanied by hemiparesis complaints at the medical rehabilitation

polyclinic at Fatmawati General Central Hospital, Jakarta, who also suffered from high blood pressure or hypertension, and there were 37 people who had non-hypertensive blood pressure (35.2%).

Furthermore, for the age range, from the total data of 105 patients, dominated by patients with an age range of 60-62 years, as many as 31 people (29.5%), followed by an age range of 68-70 years as many as 30 people (28.6%). Then in third place, there are 16 people (15.2%) aged 66-68 years, and finally, the age range of 62-64 years and 66-68 years both have 14 people (13.3%). Also obtained, the average value of the patient's age was 64,8 years, and the median was 64 years.

Table 1. Sample distribution based on Blood Pressure, Age, Gender, and Nutritional Status.

Variable	Category	Total (n=105)			
		N	Percentage (%)	Mean	Median
Blood Pressure	Hypertension	68	64.8		
	Not Hypertension	37	35.2		
Age	60-62	31	29.5		
	62-64	14	13.3		
	64-66	14	13.3		
	66-68	16	15.2		
	68-70	30	28.6		
				64.8	64
Gender	Man	65	61.9		
	Women	40	38.1		
Nutritional Status	Obesity	40	38.1		
	Normal	65	61.9		

Then, regarding gender, out of a total sample of 105 ischemic stroke patients accompanied by hemiparesis, 65 people (61.9%) were dominated men, and only 40 (38.1%) were women. For nutritional status, out of 105 patients, 40 had obesity (38.1%), and 65 had normal nutritional status (61.9%). (Table 1)

The analysis for this study uses a chi-square test to determine the relationship between the prevalence of hemiparesis in ischemic stroke patients based on gender, blood pressure, age, and nutritional status. The relationship between variables is considered significant if the results of the p-value <0.05.

The data from the 105 patients in table 2 shows that 45 male patients (66.2%) suffer from hypertension. Meanwhile, 23 female patients (33.8%) suffered from hypertension.

Analysis Chi Square conducted between the prevalence of hemiparesis in ischemic stroke patients based on sex with blood pressure to get P results Value >0.05, with a P value of 0.312 which indicates that there is no significant relationship between the prevalence of hemiparesis in geriatric ischemic stroke patients based on gender and blood pressure at the Medical Rehabilitation Polyclinic at Fatmawati General Central Hospital, Jakarta in 2022. (Table 2)

Table 2. Relationship of Prevalence of Hemiparesis in Ischemic Stroke Patients by Gender and Blood Pressure.

Ischemic stroke accompanied by hemiparesis	Blood Pressure		Total	P value
	Hypertension	Not Hypertension		
	N	n	n	
Male Patient	45	20	65	0.312
Female Patient	23	17	40	
Total	68	37	105	

Based on data obtained from 105 patients, table 3 shows that male patients dominate the prevalence of cases in all age categories. The highest age group is male patients 68-70 years old, accounting for 18 people (27.7%).

Analysis of Chi Square conducted between the prevalence of hemiparesis in ischemic stroke patients based

on sex and age to get the result P Value >0.05, with a P value of 0.591 which indicates that there is no significant relationship between the prevalence of hemiparesis in geriatric ischemic stroke patients based on gender and age at the Medical Rehabilitation Polyclinic at Fatmawati General Central Hospital Jakarta in 2022. (Table 3)

Table 3. Relationship of Prevalence of Hemiparesis in Ischemic Stroke Patients by Gender and Age.

Ischemic Stroke Accompanied by Hemiparesis	Age					Total	P Value
	60-62	62-64	64-66	66-68	68-70		
	n	n	n	n	n	n	
Male Patient	17	11	8	11	18	65	0.591
Female Patient	14	3	6	5	12	40	
Total	31	14	14	16	30	105	

Data from 105 patients in table 4 shows that the nutritional status that dominates cases in male and female patients is normal, with a body mass index range of 18-25 based on standards of the World Health Organization. 39 (60%) male patients and 26 (40%) female patients had normal nutritional status. Then there were 26 male patients (65%) and 14 female patients (35%) who had obesity nutritional status.

Chi-Square analysis conducted between the prevalence of hemiparesis in ischemic stroke patients based on gender and nutritional status to get the result P Value >0.05 with a P value of 0.760, which indicates that there is no significant relationship between the prevalence of hemiparesis in geriatric ischemic stroke patients based on gender and nutritional status at the Medical Rehabilitation Polyclinic at Fatmawati General Central Hospital, Jakarta in 2022. (Table 4)

Table 4. Relationship of Prevalence of Hemiparesis in Ischemic Stroke Patients by Gender and Nutritional Status.

Ischemic Stroke Accompanied by Hemiparesis	Nutritional Status		Total	P value
	Obesity	Normal		
	n	n	n	
Male Patient	26	39	65	0.760
Female Patient	14	26	40	
Total	40	65	105	

DISCUSSION

This study used data from the medical records of elderly patients with ischemic stroke with hemiparesis at the Medical Rehabilitation Polyclinic at Fatmawati General Central Hospital, Jakarta. It was found that data that could be used were 105 patients with the period for data collection from January 2019 to March 2022. This study was analyzed using the SPSS 25 application. A significant relationship was indicated by a P value <0.05 .

Based on the results of data analysis on the relationship between hemiparesis rate in ischemic stroke patients by gender and blood pressure, no statistically significant relationship was found between the two variables ($P=0.222$). The same result also happened in a study at the Saiful Anwar Regional General Hospital in Malang, East Java, where there was no significant relationship between the number of ischemic stroke cases and blood pressure, while the P value in this study was 0.136^{15} . In Jakarta in 2020, there was a study conducted at the National Brain Center Hospital which stated that although it was stated that blood pressure has a relationship with the rate of ischemic stroke, the strength of the correlation is weak¹⁶. This result indicates that the relationship to the research variables is weak and tends not to be linear^{14,16}. A study at Dhaka Medical College states that blood pressure and the prevalence of hemiparesis in ischemic stroke patients are unrelated, so blood pressure is considered an indirect risk factor¹⁷. In geriatric patients, a study in India stated that uncontrolled blood pressure or hypertension lasting less than five years did not correlate with the occurrence of ischemic stroke, which could lead to hemiparesis. This result is caused by many other external factors, which are the main triggers of ischemic strokes, such as smoking, drinking alcohol, and so on¹⁸. In addition, several reasons underlying this could happen; namely, there is a possibility that the patient has been given blood pressure-lowering drugs when he enters the emergency room so that there is a difference in blood pressure in acute and post-acute patients¹⁹. In the management of acute ischemic stroke patients, it is targeted that their blood pressure can drop a maximum of 4 hours after the attack to prevent rupture of blood vessels and further expansion of infarcted brain tissue²⁰. Further research is needed to ensure that there is no significant effect between the prevalence of hemiparesis in ischemic stroke patients on blood pressure specifically examining post-acute ischemic stroke patients at the Medical Rehabilitation Polyclinic.

In the data analysis regarding the relationship between the prevalence of hemiparesis in ischemic stroke patients based on gender and age, there was also no significant relationship between the two variables ($P=0.591$). The same thing was also found in research at Dr. Kariadi General Central Hospital Semarang, Central Java stated that age as an unmodifiable risk factor did not have a significant effect

($P=0.453$) on the prevalence of hemiparesis in ischemic stroke patients based on gender. However, clinical manifestations in improvement or recovery in male patients were better than in female patients, but the patient's age did not have a significant effect²¹. Research conducted in 2019 stated that age had no effect not only on the prevalence of hemiparesis in ischemic stroke patients but also on the mortality rate of the patients themselves²². In Jakarta in 2021, there was also a study that finds the fact that age does not affect the prevalence of hemiparesis in ischemic stroke patients with P value obtained is $0,186^{23}$. Another factor that can cause no effect on the two variables in this study is the uneven distribution of age in all research subjects. The same thing also happened in several other studies^{21,24}. Even so, in various studies, it was found that the number of cases tends to increase according to increasing age^{23,25}. According to anatomy and physiology, the older a person is, the lower the ability of the body, such as reduced elasticity of blood vessels which causes blood vessels to become stiff, so this is considered not to affect the occurrence of ischemic stroke accompanied by hemiparesis because these conditions do not cause an ischemic stroke to all people but become an indirect risk factor that must be watched out for^{26,27}. Because there has been a decrease in the function or ability of the body in geriatric patients, the rehabilitation of post-acute ischemic stroke patients is also carried out more quickly than in patients who are younger²⁸. However, further research is still needed specifically to able to ascertain whether age does not directly affect the prevalence of hemiparesis in post-acute ischemic stroke patients based on gender.

Data analysis on the relationship between the prevalence of hemiparesis in ischemic stroke patients based on gender and nutritional status also found no significant relationship between the two variables ($P=0.608$). The same fact was also found in a 2017 study which proved that nutritional status did not affect the prevalence of hemiparesis in ischemic stroke patients ($P=0.266$)²⁹. The same result was also conducted in India and Nigeria. Although the patients studied were of different races, the study's results were that obesity or nutritional status did not affect the prevalence of hemiparesis in ischemic stroke patients^{30,31}. Patients with obese nutritional status are rightly considered at risk for ischemic stroke, but this risk is indirect^{29,31}. In addition, the data in this study showed that as the older patients, weight loss occurred, so the data obtained showed that there were more patients with normal nutritional status than patients with obese nutritional status. The same result from the Northern Manhattan Stroke Study United States stated that the Body Mass Index or Body Mass Index might decrease with increasing age³². In geriatrics, in several studies, generally tend to experience weight loss³³. A decrease in muscle mass or atrophy causes this condition. Then hormonal changes occur in women in the form of a decrease in the hormones estrogen and testosterone in men, who can increase body weight due to reduced two hormones which

can make eating patterns irregular and reduce calorie burning³⁴. However, increasing age causes a decrease in the ability of the digestive organs and a decrease in the body's metabolism. Food that is digested will take longer in the stomach because the mechanical and chemical digestion processes experience a decrease in speed which impacts geriatric patients will feel full longer, so the body will use the fat that is stored. in the body to be processed into ATP so that geriatric patients can still move^{26,35,36}. The impact is the occurrence of significant weight loss in patients, and it will get worse if the patient suffers from ischemic stroke with hemiparesis, making it difficult for patients to consume food^{33,35}. Based on gender, the prevalence of hemiparesis in ischemic stroke patients, nutritional status is considered an indirect risk factor and has no direct effect. However, it is necessary to carry out further studies that must be carried out specifically in acute and post-acute ischemic stroke patients to be able to find out whether there are differences in the effect on patients with different onset.

CONCLUSION

There was no significant relationship between stroke risk factors in the form of blood pressure, age, and nutritional status with the incidence of hemiparesis in geriatric ischemic stroke patients at Fatmawati General Central Hospital, Jakarta, with the following results:

- Correlation between Prevalence of Hemiparesis in Ischemic Stroke Patients by Gender and Blood Pressure ($P=0.312$).
- Relationship between Hemiparesis Prevalence in Ischemic Stroke Patients by Gender and Age ($P=0,591$).
- Correlation between Hemiparesis Prevalence in Ischemic Stroke Patients by Gender and Nutritional Status ($P=0.760$).

CONFLICT OF INTEREST

The authors declares no conflicts of interest.

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