

## ANALYSIS OF THE RECURRENCE OF STROKE: A CROSS-SECTIONAL STUDY IN THE UNIVERSITY OF MUHAMMADIYAH MALANG HOSPITAL

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### Abstract

**Background:** a recurrence of stroke, is a matter of concern because it can worsen the situation, increase the treatment costs, and increase death risk. Stroke recurrence caused by multifactorial cases. The objective of this study is to analyze the factors associated with stroke recurrence in the university of muhammadiyah malang hospital.

**Methods:** This study used a cross-sectional observation analytic study. A total sample of 64 people was collected using the purposive sampling technique. The dependent variable in this study was stroke recurrence. The independent variables were the factors that cause stroke recurrence (family history of the disease, comorbidities, physical activity, stress, and knowledge). This study used the Global Physical Activity Questionnaire(GPAQ), the International Stress Management Association(ISMA), and socio-demographic questionnaire to collect the data. The data were analyzed using the Chi-Square test.

**Results:** a total of 47 patients (73.43%) had stroke recurrence, the majority of the second recurrence. Most types of stroke were ischemic stroke (81.25%). The risk factor significantly associated with stroke recurrence was hypertension (sig 0.026 <0.05). **Conclusion:** Uncontrolled hypertension increases the process of atherosclerosis that can lead to bleeding and brain infarction.

**Keywords:** Stroke recurrence, Physical activity, Stress, Comorbidities, Family illness, Knowledge

## INTRODUCTION

Lack of public awareness of the dangers of recurrent stroke is a cause for concern. The impact of a stroke recurrence is experiencing paralysis/disability in some or all limbs, senility, communication disorders, movement disorders, and depression [1]. According to [2], recurrence of stroke can be fatal, and worsen the sufferer's condition can even lead to death and cause of disability. WHO [3] defines stroke as a condition caused by a disruption in the brain's blood supply due to a ruptured or blocked blood vessel due to a clot in the flow. The same factors that influence stroke recurrence are debated; the clarity has not been found with certainty the leading cause of recurrence [4]. Risk factors associated with irreversible and potentially modifiable stroke are lifestyle, habits including smoking, hypertension, diabetes mellitus, asymptomatic carotid stenosis, and obesity, use of oral contraceptives, physical activity, and sickle cells. Simultaneously, the factors that cannot be modified include gender, age, race, and descent. Ischemic strokes are mostly caused by thrombotic or embolic obstruction, while hemorrhagic strokes are caused by bleeding resulting from ruptured blood vessels in the brain area [5].

The incidence of death due to stroke in developing countries reaches 87% [3]. [6] recurrent stroke cases account for 20%. Data in RSUP Dr. Kariadi Semarang, throughout 2010, 229 patients (22.6%) had recurrent strokes out of 1009 stroke patients. Research data obtained at Margono Soekardjo Hospital Purwokerto, 73 patients experienced a recurrence of stroke ([7]. Research conducted at Dr. Soetomo Surabaya, 38 patients out of 180 stroke patients experienced recurrence (21.11%). Meta-analysis of recurrence in stroke patients is around 1.15% to 15% in the first 1 month, in 1 year 7.0% to 20.6%, and in 5 years it reaches 16.2% to 35.3%, around 10 years 14% to 51.3% stroke recurrence [7].

The occurrence of recurrence after stroke is most likely due to several

accompanying factors. Previous research has shown that risk factors for recurrent stroke include both modifiable and irreversible factors. Irreversible factors include age, gender, race, and genetics. In comparison, risk factors that can be changed include hypertension, smoking, obesity, diabetes mellitus, not carrying out a healthy lifestyle, not doing routine medical check-ups, and consuming foods that contain lots of salt [5], [8], [4], [9]. The previous study show that smoking is not proven to have a relationship with recurrent stroke but is influenced by hypertension, heart disease, and diabetes mellitus [9]. From several previous studies, the factors that cause recurrence in stroke patients are still uncertain. Therefore, this study aim to analyze the factors that influence the occurrence of recurrence in stroke patients.

## MATERIALS AND METHODS

### *Research design and data collection*

Observational analytic research with cross-sectional design was conducted in this study. The research has received approval from the Ethics Commission of the Faculty of Health, University of Muhammadiyah Malang (No. E.5.a / 038 / KEPK-UMM / II / 2020). The research was conducted in February - April 2020 at the University of Muhammadiyah Malang Hospital (RS UMM). We recruited 64 participants and purposive sampling technique was used. The inclusion criteria were conscious patients and no aphasia. In contrast, the exclusion criteria was patients in critical condition. Before we collected the data, all respondents had received an explanation about the study and signed the informed consent.

The dependent variable in this study was stroke recurrence. The instruments used in this study consisted of 1). The sociodemographic questionnaire, 2). Questionnaire on factors that cause stroke recurrence (family history of illness, comorbidities, physical activity, stress, and

knowledge). Additionally, we used the Global Physical Activity Questionnaire(GPAQ) as our instrument. The total value of physical activity > 3000 = heavy intensity physical activity, 600-3000 = moderate-intensity physical activity, and ≤ 600 = light-intensity physical activity [10]. The GPAQ questionnaire validity test based on research has a moderate level of validity . As for the reliability value in the research of Bull, Maslin, & Armstrong (2009), GPAQ has a strong reliability value (Kappa 0.67 to 0.73).

The International Stress Management Association (ISMA)stress questionnaire was consists of 25 items with dichotomous response options, which are YES and No. A score of 1 is assigned for YES response, while 0 is assigned for NO response. If the points are 4 points or less, it indicates least likely to suffer from stress-related illness. Points from 5 to 13 indicates the likeliness of experiencing physical or mental stress-related problems in the future, and points above 14 indicates greater vulnerability to suffering from stress-related complications. The interpretation, scores 1-4 are considered

low levels of stress; scores in the range 5 - 13 are moderate levels of stress, and scores above 14 are considered high-stress levels. The questionnaire had a good internal consistency,  $\alpha = 0.859$  [11], [12], [13].

### Data analysis

The Chi-Square analysis was used to determine the correlation between factors and stroke recurrence. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to describe the sociodemographic characteristics, physical activity, level of stress, and knowledge. A p-value <0.05 was considered significant. All data were analyzed using SPSS software version 25.

## RESULTS

Table 1. shows the data about the characteristics of stroke patients at UMM Hospital. The mean patient age was 61.72 years with male gender (51.56%). Based on the type of stroke, the majority were ischemic strokes (81.25%).

**Table 1. Demographic Characteristics of Stroke Patients**

Characteristics	n	%
Age (years)	min: 30, max: 93, mean: 61.72 SD: 12.60	
Gender		
Male	33	51.56
Female	31	48.44
Stroke type		
Ischemic	52	81.25
Hemorrhagic	12	18.75
Stroke Recurrence		
No Relapse	17	26.57
Relapse	47	73.43
Recurrence		
2	24	51.06
3	17	36.18
4	5	10.64
5	1	2.12

The bivariate analysis results showed that the analysis of the relationship between recurrence and the causes of recurrence could be seen in Table 2. Patients' recurrence rate was still high (73.43%), and the majority of second recurrences (51.06%). The risk factor associated with stroke recurrence is hypertension (p-value = 0.026).

**Table 2. Statistical Test Results of Factors Affecting Stroke Recurrence**

No.	Data	n	%	p-value
1	Family History of Stroke			
	Yes	21	32.81	1.00
	No	43	67.19	
2	Comorbidities			
	Hypertension			<b>0.026</b>
	Yes	52	81.25	
	No	12	18.75	
	Diabetes mellitus			0.113
	Yes	18	28.12	
	Not	46	71.88	
	Hypercholesterolemia			0.533
	Yes	22	34.37	
	No	42	65.63	
	Heart disease			0.712
	Yes	13	20.31	
No	51	79.69		
Obesity			1.00	
Yes	26	40.62		
No	38	59.38		
3	Physical Activity			0.429
	Low	15	23.44	
	Moderate	33	51.56	
	High	16	25	
4	Stress			0.466
	Low	9	14.06	
	Moderate	45	70.31	
	High	10	15.63	
5	Knowledge			1.00
	Low	2	3.12	
	Moderate	13	20.31	
	High	49	76.57	

## DISCUSSION

The mean stroke prevalence was in patients at 61.72 years, according to the study [14] that stroke patients are predominantly aged 55-64 years, with 198 people (31.1%). The risk of stroke increases with age. An increase of 20% at 45-55 years, 32% at 55-64 years, and 83% at 65-74 [15]. The results also showed that stroke patients'

proportion was higher in men with ischemic (non-hemorrhagic) stroke. This research is in line with research by [14]. The prevalence of male patients was 287 (55.2%) and non-hemorrhagic stroke 81.6%. A total of 3/4 of the stroke patients were aged  $\geq 65$ , with 87% ischemic stroke type [16].

the prevalence of stroke increases with age [17]. Occurs because it is related to aging factors. Due to aging factors, micro

and macrocirculation changes will cause structural and functional changes in the brain. Microcirculation changes due to aging are mediated by endothelial dysfunction and changes in autoregulation and neurovascular coupling. Furthermore, endothelial dysfunction will trigger neuroinflammation and autoregulation disorders that lead to microvascular injury and neurovascular disorders [16]. This study suggests that hypertension is a significant factor that causes stroke recurrence. Blood pressure is a determinant of the recurrence of ischemic and hemorrhagic strokes [18]. Uncontrolled hypertension increases the process of atherosclerosis, which can lead to bleeding and brain infarction. Besides, uncontrolled hypertension causes disorders of the autoregulation of brain blood vessels. Blood pressure should be controlled at levels <150/90 mmHg and perfusion pressure at 61–80 mmHg to reduce stroke risk. A randomized clinical trial showed good functional recovery in hemorrhagic stroke patients who recovered, although there was no apparent benefit in clinical prognosis. A risk ratio of more than 1 means that this factor (blood pressure) is a high-risk factor [19].

To prevent the recurrence of stroke from recurring, controlling blood pressure is very important. Research evidence suggests that 24-hour ABPM (ambulatory blood pressure monitoring) is necessary for patients treated with stroke [20]. Meanwhile, hypertension causes recurrent stroke recurrence, especially in patients with small-artery occlusion (SAO), and not in other types of ischemic stroke (IS). IS patients are classified under large-artery atherosclerosis (LAA), small-artery occlusion (SAO), and cardioembolism (CE) [21]. SAO patients have clinical symptoms of lacunar syndromes (including pure motor stroke, pure sensorimotor stroke, pure sensory stroke, ataxic hemiparesis, or clumsy hand dysarthria), no cerebral cortical dysfunction, and an infarct area diameter <1.5 cm on CT or MRI.

Several research variables in this study, such as physical activity and stress, were not significantly associated with stroke recurrence. Gallanagh, Quinn, Alexander, & Walters (2011) physical activity can reduce the frequency of stroke recurrences. Thirty minutes of aerobic exercise with moderate intensity effectively lower blood pressure and blood fat levels than 60 minutes of aerobic exercise with low intensity or non-aerobic exercise. Stroke management guidelines recommend physical activity as a rehabilitation process because it has been shown to improve physical fitness, reduce stroke disability, and improve the overall quality of life. Patients with a history of mild ischemic stroke who have a low MVPA (moderate-to-vigorous physical activity) and a high VFL value (visceral fat level) are risk factors for stroke recurrence [22].

Stress will cause a stroke to rise if it occurs continuously for a long time and is not handled properly. A total of 40 respondents experienced recurrent strokes (44.4%) which included 6 respondents (15%) without stress, 11 respondents (27%) mild stress, 14 respondents (35%) moderate stress and 9 respondents (22.5%) severe stress. In conclusion, most patients with recurrent strokes have experienced prior stress [23]. Although the two variables (physical activity and stress) were not shown to be associated with stroke recurrence in this study, this contradicts several previous studies. Therefore it is necessary to do further research on this variable.

The strength of this study was researchers analyzed all the risk factors that can cause stroke recurrence. However, the limitation of the study was the researchers lacked detail in exploring the patient's physical activity. It is necessary to research this factor using other instruments that are more appropriate. The researchers did not analyze the patient's behavior in controlling their blood pressure, however, it was still limited to the level of knowledge of the patients about hypertension management.

## CONCLUSION

Hypertension is the main factor causing stroke recurrence. Therefore, it is necessary to control blood pressure routinely both pharmacologically and non-pharmacologically. The patient's blood pressure should be controlled at a level <150/90 mmHg to reduce the risk of stroke recurrence

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