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Research Article

**Analysis of Predictor Factors for
Recurrent Stroke at RSI Siti Aisyah
Madiun Neurology Outpatient
Department: Cross-Sectional Study**

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Abstract

Introduction: Stroke is a serious and life-threatening neurological disease worldwide that has long been a major concern in the world health sector. Stroke has become a global health challenge and is a major cause of disability and death in many countries. Many studies highlight the risk factors that contribute to the occurrence of a first stroke attack, but there is a limited study that focuses on the factors that influence someone to experience a recurrence of stroke.

Objective: To identify the factors that contribute and are the most dominant in the incidence of recurrence stroke.

Method: This study is a descriptive quantitative study that employs observation methods and a cross-sectional approach, with data analysis conducted using univariate, bivariate, and multivariate techniques.

Results: There are 152 recurrent stroke patients participated in this study. The accidental sampling technique was used to obtain potential respondents. Researchers found that out of the 10 factors that affect the chance of having a recurrence stroke, three are the most important. These are self-rehabilitation (P value = 0.000; OR = 58.843, CI = 7.0497–491.165), family support (P value = 0.027; OR = 0.931, CI = 0.8734–0.992), and taking medications as prescribed (P value = 0.031; OR = 0.670, CI = 0.4666–0.963).

Conclusion: There are 3 factors that most dominantly influence the incidence of recurrent stroke, namely early rehabilitation, family support, and patient compliance in taking medication. Furthermore, enhancing patients' adherence to self-management poststroke requires social support from family, peers, and healthcare providers.

Keywords: most dominant factor, recurrent stroke events, risk factors

Introduction

Stroke is a syndrome that occurs due to focal or global disruption of brain function, occurring suddenly due to cerebrovascular disorders.¹ According to data from the American Heart Association (AHA) in 2015, every year 15 million people worldwide suffer from stroke, 5 million of them die, and 5 million people experience permanent disability. The prevalence of stroke in Indonesia continues to increase from year to year. According to data from Basic Health Research in 2018, the prevalence of stroke increased by 10.9 per mile from the previous 7.0 per mile, or in other words, there was an increase of around 3.9 per mile in the prevalence of stroke in Indonesia within 5 years. East Java Province ranks 7th (12.4%) of 34 provinces in Indonesia.² Indonesia is the country with the most stroke sufferers in Asia, where the prevalence of stroke reaches 8.3 per 1000 population. The incidence of stroke is around 750,000 per year in Indonesia and 200,000 of them are recurrent strokes.³ In epidemiological research conducted by the University of Indonesia, it was found that 19.9% of strokes were recurrent strokes.⁴ Stroke is a serious and life-threatening neurological disease throughout the world and has long been a major concern in the world of health. Stroke has become a global health challenge and is a major cause of disability and death in many countries. Many studies highlight the risk factors that contribute to the occurrence of a first stroke, but there is little research that focuses on the factors that influence someone to experience a repeat stroke.⁵ Recurrent strokes can occur during the period and after recovery of neurological function, where recovery of neurological function takes 3-18 months after a stroke.⁴

Recurrent stroke attacks occur in sufferers who lack self-control, apart from that it can occur because the sufferer feels cured after the first attack, so they do not do things that can prevent repeated attacks, such as going to a health service for a check-up, or following a proper diet. Appropriate, or adopting a lifestyle that risks recurrent stroke.⁶ According to Pujiarto's research results (2017), recurrent stroke is a disease that has many causes (multifactorial causes). The more risk factors a stroke patient has, the higher the chance of having a repeat stroke. The risk factors that the patient already has, especially risk factors that can be modified, must be able to be controlled properly because by controlling risk factors that can be modified/changed appropriately, recurrent strokes can be prevented. With the above considerations in mind, it is necessary to research the predictor factors for recurrent stroke.⁷ Low knowledge regarding stroke risk factors, both in terms of recognizing stroke symptoms, suboptimal stroke services, and low individual adherence to therapy programs to prevent recurrent strokes, are weak points in stroke management in Indonesia.¹ Seeing the above phenomenon, researchers are interested in researching "What are the factors that influence and are the most dominant in the incidence of recurrent stroke". This research aims to determine the factors that contribute to and are most dominant in the incidence of stroke recurrence.

Methods

This research uses descriptive quantitative methods with a cross-sectional approach. This research was conducted at the RSI Siti Aisyah Madiun Neurology Outpatient Departement from April – July 2024. The samples in this study were recurrent stroke sufferers, who were selected using a convenience sampling/accidental sampling technique where all subjects who met the inclusion criteria were included in the study until the number of subjects selected that requirement was fulfilled. The inclusion criteria in this study were individuals who had experienced a stroke before and individuals who were willing to participate in this study. The instruments in this research were questionnaires filled out by respondents in the form of respondent characteristics data, medication adherence questionnaires, family support questionnaires, and patient motivation questionnaires to recover. Data analysis tests used univariate tests, bivariate tests, and multivariate tests. Univariate analysis in this study used Descriptive Statistics

tests, explaining the distribution of frequencies and percentages of all variables including age, gender, education, occupation, type of stroke, early rehabilitation, length of first stroke, compliance with taking medication, family support, and The patient's motivation to recover is an independent variable and the dependent variable is the incidence of recurrent stroke. Bivariate analysis in this study was used to determine the existence of a relationship or influence between two variables. Bivariate analysis in this study uses the Chi-Square test to determine the relationship between independent variables and dependent variables, while multivariate analysis uses the Logistic Regression test to determine the relationship between independent and dependent variables and determine the most dominant variable. This research has passed the ethical review carried out by the Health Research Ethics Committee (KEPK) of the Siti Aisyah Madiun Islamic Hospital with ethical permit number 02/RSISA-KEPK/III/2024.

Results

A total of 152 respondents participated in this research. The results of the research showed that the majority of respondents were female, namely 101 people (66.4%), with the highest level of education, namely at the junior high school level, 110 people (72.4%), the majority of respondents did not work 106 (69.7%). The most common type of stroke in this study was ischemic stroke, namely 124 people (81.6%), and participation in early rehabilitation was evenly divided, with 50% of respondents participating and 50% not participating in rehabilitation. In addition, almost all respondents experienced a stroke in less than 30 days (98.7%) and more than half of respondents experienced recurrent strokes more than twice (54.6%). More details can be seen in [Table 1](#). The results of the study show that the average family support received by respondents was 81.7 (SD = 16.45), indicating variations in support from a minimum value of 55 to a maximum of 100. The average of respondents' motivation to recover was 80.4 (SD = 6.46), with the lowest value of 60 and the highest of 90, indicating relatively high and consistent motivation among respondents. Adherence to treatment or medical recommendations averaged 19.1 (SD = 2.80), and scores ranged from 15 to 25, indicating fairly high adherence. The mean age of respondents was 57.6 years (SD = 9.02), and the ages ranged from 44 to 83 years, illustrating a study population that was dominated by adults to the elderly. More details can be seen in [Table 2](#).

Table 1. Distribution of Respondent Characteristics (N=152)

Variable	Frequency (n = 152)	Percentage (%)
Gender		
Man	51	33.6
Women	101	66.4
Education		
Elementary school	24	15.8
Middle School/Equivalent	110	72.4
High School/Equivalent	16	10.5
PT (Diploma and Bachelor)	2	1.3
Jobs		
Doesn't work	106	69.7
PNS/TNI/POLRI	0	0
Private sector employee	2	1.3
Self-employed	14	9.2
Others (Farmers, Fishermen, Traders, etc)	30	19.7
Types of Strokes		
Ischemic	124	81.6
Hemorrhagic	28	18.4

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Early rehabilitation		
Attend rehabilitation	76	50
Not attending rehabilitation	76	50
Length of the first stroke		
Less than 30 days	150	98,7
More than 30 days	2	1,3
Recurrent stroke events		
More than 2 times	83	54,6
Less than 2 times	69	45

Table 2. Distribution of Respondents Based on Age, Compliance with Taking Medication, Family Support, and Patient Motivation to Recover

Variable	N	Mean	Standard Deviation	Minimum	Maximum
Family Support	152	81.7	16.45	55	100
Motivation to recover	152	80.4	6.46	60	90
Compliance with taking medication	152	19.1	2.80	15	25
Age	152	57.6	9.02	44	83

In summary based on [Table 2](#), the 10 factors analyzed showed that type of stroke, gender, education, participation in early rehabilitation, age, family support, patient motivation to recover, and adherence to taking medication had a significant relationship with the frequency of recurrent strokes, while employment and duration of stroke did not show a significant relationship.

Table 3. Final Modeling Analysis of Predictor Factors for the Incidence of Recurrent Stroke at the RSI Siti Aisyah Madiun Neurology Outpatient Departement (N=152)

Variable	Estimate	SE	Z	P value	OR (95%CI)
Early rehabilitation	4.0749	1.0826	3.76390	0.000	58.843(7.0497-491.165)
Family support	-0.0718	0.0324	-2.21327	0.027	0.931 (0.8734-0.992)
Compliance in taking medication	-0.3998	0.1850	-2.16129	0.031	0.670 (0.4666-0.963)
Types of Stroke	2.3836	1.3355	1.78473	0.074	10.844(0.7913-148.588)
Gender	-1.5489	0.8861	-1.74802	0.080	0.212 (0.0374-1.207)
Age	0.0804	0.0558	1.44158	0.149	1.084 (0.9715-1.209)
Motivation to recover	-0.0988	0.0797	-1.24068	0.215	0.906(0.7750-1.059)
Education					
High School - Junior High School	0.5534	1.3887	0.39852	0.690	1.739 (0.1144-26.451)
Elementary School - Junior High School	-0.9375	1.4258	-0.65753	0.511	0.392 (0.0239-6.404)
College/University - Junior High School	13.1830	2723.8496	0.00484	0.996	531237.012(0.0000-Inf)

Based on the analysis of [Table 3](#), it was found that the main predictor factors for the likelihood of recurrent stroke are early rehabilitation, followed by family support and medication adherence. Early rehabilitation contributes 4.0749 with an SE of 1.0826, a P-value of 0.000, and an odds ratio of 58.843. The second factor is family support, with an estimate value of -0.0718, an SE of 0.0324, a P-value of 0.027, and an odds ratio of 0.931. The third contributing factor is medication adherence, with an estimate value of 0.3998, an SE of 0.1850, a P-value of 0.031, and an odds ratio of 0.670.

Discussion

Respondents in this study were 152 people, with 83 (54.6%) people experiencing strokes more than 2 times and 69 people (45.4%) people experiencing recurrent strokes less than 2 times, where men were more likely to experience recurrent strokes more than twice as often as women.

Mechanism of Early Rehabilitation with Recurrent Stroke

Early rehabilitation mechanisms can be carried out in several ways, namely medical and diagnostic evaluations, the mechanisms used are clinical and diagnostic assessments by identifying brain damage and causes of recurrent strokes through physical, and neurological examinations, and imaging tests such as MRI or CT scans. This evaluation helps determine an appropriate rehabilitation plan.⁸ The next mechanism is treatment and risk management, the pharmacological treatment mechanism is the use of anticoagulants and anti-hypertensive drugs to prevent blood clots and control risk factors such as hypertension and diabetes and modification of risk factors in the form of strategies to manage long-term risk factors, including diet, exercise, and lifestyle changes.⁹

Apart from that, you can use physical rehabilitation, by using physical therapy in the form of exercises designed to restore strength, balance, and mobility. This involves structured exercises to improve motor skills and daily function and occupational therapy which can help patients restore the ability to perform daily activities with adaptive strategies and specific exercises.¹⁰ Cognitive rehabilitation can also be used in the early rehabilitation of stroke patients, with its mechanism, namely cognitive therapy to improve cognitive functions that may be impaired after a stroke, such as memory, attention, and thinking abilities, and by using an integrated approach, namely combining cognitive therapy with physical rehabilitation for optimal results.¹¹

Psychosocial support can also help in the early rehabilitation of stroke patients, emotional and psychological support can help to deal with the emotional and psychological aspects of stroke, such as anxiety and depression. In addition to psychosocial support, regular monitoring in observing patient progress and assessing the effectiveness of therapy through routine assessments is important.¹²

Adherence to Taking Medication and the Incidence of Recurrent Stroke

Medication taken regularly can prevent recurrent strokes because these drugs work to overcome or reduce risk factors that can cause stroke. By taking medication regularly according to the doctor's prescription, patients can manage the main risk factors that contribute to stroke. This not only reduces the chance of recurrent stroke but can also help improve overall quality of life.¹³ The first drug that can be used in stroke patients. Anticoagulants function to reduce the blood's ability to clot. Apart from that, you can use antiplatelets, which these drugs function to reduce the ability of platelets to form clots, blood pressure-lowering drugs can also be used, where their function is to control high blood pressure and Statin drugs can be used in stroke patients, which function to reduce blood cholesterol levels.¹⁴

Family Support for Recurrent Stroke

The role and function of the family are very important in supporting post-stroke patient care and preventing recurrent strokes. Family support not only influences patient compliance with treatment but can also improve the patient's overall quality of life.¹⁵ Families have an important role in supporting post-stroke patient care and preventing recurrent strokes through various means, including providing emotional support, monitoring treatment adherence, providing education, assisting with rehabilitation, and coordinating with the medical team. In addition, family involvement can significantly improve treatment outcomes and quality of life for stroke patients. Effective support and

involvement require good education, clear communication, and active involvement in the care and rehabilitation process for stroke patients so that recurrent strokes do not occur.¹⁶

Conclusion

There are 3 factors that most dominantly influence the incidence of recurrent stroke, namely early rehabilitation, family support, and patient compliance in taking medication. Furthermore, enhancing patients' adherence to self-management poststroke requires social support from family, peers, and healthcare providers.

Conflict of Interest Declaration

There are no conflicts of interest, either individually or on behalf of any organization.

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