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FACTORS ASSOCIATED WITH RECURRENT STROKE AT DR. M. HATTA BRAIN HOSPITAL, BUKITTINGGI, 2024

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ABSTRACT

Background: Stroke is a cerebrovascular disease that causes disability and death. Recurrent stroke occurs after the first stroke, due to the patient's lack of self-control and low level of awareness of stroke risk factors. Based on the 2023 Indonesian Health Survey (IHS), the prevalence of stroke in Indonesia is 8.3% cases per mile of population. Low knowledge, understanding, and awareness of risk factors for stroke are problems that arise in stroke services. Objective: To determine the factors associated with the incidence of recurrent stroke in stroke patients at Rumah Sakit Otak Dr. Drs. M. Hatta Bukittinggi. Methods: Using Analytic-Descriptive, purposive sampling technique totaling 99 people. Hypothesis analysis test using Chi-square test. Results: Based on age 47-52 as many as 20 people (27%), 45 men (60.8%), 51 people (68.9%), and have a family history of 48 people (64.9%). There is a significant relationship between recurrent stroke and age p-value= 0,001, gender p-value =0,031, ethnicity p-value= 0,044, family history p-value= 0,029, physical activity p-value= 0,000, smoking p-value= 0,000, diet p-value= 0,000, and control compliance p-value= 0,000 at Dr. Drs. M. Hatta Bukittinggi Brain Hospital. Conclusion: There is a significant relationship between age, gender, ethnicity, family history, physical activity, smoking, diet and control compliance with recurrent stroke.

Keywords: Recurrent stroke, risk factors, patient compliance

ABSTRAK

Stroke adalah penyakit serebrovaskuler yang menyebabkan kecacatan dan kematian. Stroke berulang terjadi setelah stroke pertama, disebabkan penderita kurang kontrol diri dan tingkat kesadaran yang rendah akan faktor risiko stroke. Berdasarkan Survei Kesehatan Indonesia (SKI) 2023, prevalensi stroke di Indonesia sebanyak 8,3% kasus per mil penduduk. Rendahnya pengetahuan, pemahaman, dan kesadaran faktor risiko munculnya stroke merupakan permasalahan yang muncul pada pelayanan stroke. Tujuan: Mengetahui faktor-faktor yang berhubungan dengan kejadian stroke berulang pada pasien stroke di Rumah Sakit Otak Dr. Drs. M. Hatta Bukittinggi. Metode: Menggunakan Analitik-Deskriptif, teknik purposive sampling berjumlah 99 orang. Uji analisis hipotesa menggunakan uji Chi-Square. Hasil: Berdasarkan usia 47-52 sebanyak 20 orang (27%), laki-laki 45 orang (60,8%), bersuku minang 51 orang (68,9%), dan memiliki riwayat keluarga 48 orang (64,9%). Terdapat hubungan yang signifikan antara stroke berulang dengan usia p-value= 0,001, jenis kelamin p-value= 0,031, suku p-value= 0,044, riwayat keluarga p-value= 0,029, aktivitas fisik p-value= 0,000, merokok p-value= 0,000, pola makan p-value= 0,000, dan kepatuhan kontrol p-value= 0,000 di Rumah Sakit Otak Dr. Drs. M. Hatta Bukittinggi. Kesimpulan: Terdapat hubungan yang signifikan antara usia, jenis kelamin, suku, riwayat keluarga, aktivitas fisik, merokok, pola makan dan kepatuhan kontrol dengan stroke berulang.

Kata Kunci: *Stroke berulang, faktor risiko, kepatuhan pasien*

INTRODUCTION

Stroke is recognized as the most common cerebrovascular disease, leading to disability and death. Stroke occurs when a blood clot forms or a hemorrhage blocks a blood vessel, preventing oxygen and nutrients from reaching the brain. When this happens, the affected area of the brain is deprived of oxygen and nutrients, leading to brain cell death (Yuniarti et al., 2020). A stroke is not necessarily a one-time event; it can recur. Recurrent stroke, also known as secondary stroke or a second and subsequent stroke, occurs suddenly due to cerebrovascular disorders, causing more severe brain damage than the primary stroke (Firuza et al., 2022).

According to the Global Stroke Fact Sheet released by the World Stroke Organization (WSO) in 2022, the incidence of stroke increased by 70%, and stroke-related deaths rose by 102% between 1990 and 2019 (Feigin et al., 2022). Based on findings from the Indonesian Health Survey (IHS) 2023, the prevalence of stroke in Indonesia is 8.3% per thousand people (RI, 2023). In West Sumatra, stroke cases increased from 7% per thousand (2013) to 10.8% per thousand (2018). Stroke generally affects individuals over 45 years old, with prevalence rates of 14.2% in the 45–54 age group, 32.4% in the 55–64 age group, 45.3% in the 65–74 age group, and 50.2% in individuals aged 75 and older (RI, 2023). Dr. Drs. M. Hatta Brain Hospital in Bukittinggi, a referral center for stroke cases in West Sumatra, reported that approximately 75% of stroke inpatients experienced first-time ischemic stroke (RSOMH, 2021).

Recurrent stroke usually occurs in individuals who lack self-control or believe they have fully recovered from the initial stroke, leading them to neglect preventive measures (Tunik, 2022). Low knowledge, understanding, and awareness of stroke risk factors remain critical challenges in stroke care in Indonesia. To address this issue, it is essential to consider the factors that contribute significantly to recurrent or secondary stroke. One of the statistical analysis methods that can be used to examine these factors is factor analysis.

A study conducted at Stella Maris Hospital in Makassar found that 19 (35.8%) respondents over the age of 55 experienced recurrent strokes, while 11 (20.8%) respondents under 55 did not

experience recurrent strokes. Non-compliance with medical check-ups increases the risk of recurrent stroke, with a 1.122 times higher risk for those who do not adhere to follow-up care. The study results showed that among those who were non-compliant with medical check-ups, 11 (20.8%) experienced recurrent strokes, whereas among those who were compliant, only 8 (15.1%) did not experience recurrence (Kanda & Tanggo, 2022).

Another meta-analysis study indicated that a family history of stroke increases the risk of stroke by 30% (Aninditha, 2023). Additionally, it was found that 18 individuals had unhealthy lifestyles, while 10 individuals maintained a healthy lifestyle. A larger proportion of those with poor lifestyles engaged in smoking, consuming high-salt and high-fat foods, lack of exercise, and insufficient vegetable intake. This theory suggests that a healthy lifestyle and regular health monitoring can prevent up to 80% of strokes (Wulandari & Herlina, 2021).

RESEARCH METHODS

This study employs a cross-sectional research design and a descriptive-analytic approach, meaning that measurements of both the dependent and independent variables are conducted simultaneously. The study was carried out at Dr. Drs. M. Hatta Brain Hospital in Bukittinggi, West Sumatra. The population in this study consists of stroke patients within the hospital's coverage area who meet the eligibility criteria. The sample consists of patients who have experienced recurrent strokes.

The sampling method used in this study is purposive sampling, selecting participants who meet the predefined inclusion criteria. The inclusion criteria include patients who have experienced recurrent stroke and are willing to participate as respondents. The exclusion criteria include patients who failed to complete the questionnaire, had incomplete medical records, or were in a coma/unconscious state. The dependent variable in this study is recurrent stroke, while the independent variables include age, gender, family history, physical activity, smoking, dietary patterns, and adherence to medical check-ups. The instrument used in this study is a questionnaire containing several questions aimed at determining whether respondents possess risk factors for recurrent stroke. The data for this study were collected from

primary sources through questionnaire responses. This study has received approval from the Health Research Ethics Committee of FK UISU (NO.067/EC/KEPK.UISU/VIII/2024).

RESULTS AND DISCUSSION

From the results of the univariate test, it can be seen the frequency distribution of risk factors that cannot be modified in the occurrence of recurrent stroke such as age, gender, ethnicity, and family history. The largest age category is (47-52 years) with 20 respondents (27%). Based on gender, the largest respondents who faced recurrent stroke were male respondents with 45 (60.8%). From their ethnic origin, it can be seen that respondents who experienced recurrent stroke were mostly Minang, namely 51 respondents (68.9%). Based on family history, respondents with a family history of stroke dominated, namely 48 (64.9%).

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Table 1. Characteristics of Research Samples Based on Non-Modifiable Risk Factors

Respondent Characteristics	Frequency (people)	Percentage (%)
Age		
41-46 years	2	2
47-52 years	34	34.3
53-58 years	24	24.2
59-64 years	16	16.2
65-70 years	11	11.2
71-76 years	9	9.1
77-82 years	1	1
≥83 years	2	2
Gender		
Female	45	45.5
Male	54	54.5
Ethnicity		
Minangkabau	75	75.8
Javanese	9	9.1
Malay	9	9.1
Batak	6	6.1
Family History		
Present	58	58.6
Absent	41	41.4

Table 2 shows that out of 99 respondents, 72 people (72.7%) had insufficient physical activity, while 27

people (27.3%) had sufficient activity. Based on smoking history, 49 people (49.5%) were smokers, while 50 people (50.5%) were non-smokers. Regarding dietary patterns, 68 people (68.7%) had poor dietary habits, while the remaining 31 people (31.3%) had good dietary habits. In terms of compliance with medical check-ups, 61 people (61.6%) were non-compliant, while 38 people (38.4%) were compliant.

Table 3. Analysis of Non-Modifiable Risk Factors for Recurrent Stroke Incidents

Variable	Group						OR (CI 95%)	*p*	*r*
	Recurrent Stroke		Non-Recurrent Stroke		Total				
	f	%	f	%	f	%			
Age									
41-46 years	1	1,4	1	4	2	2			
47-52 years	20	27	14	56	34	34,3			
53-58 years	19	25,7	5	20	24	24,2			
59-64 years	11	14,9	5	20	16	16,2	-	0,001*	-0,328
65-70 years	11	14,9	0	0	11	11,2			
71-76 years	9	12,2	0	0	9	9,1			
77-82 years	1	1,4	0	0	1	1			
≥83 years	2	2,7	0	0	2	2			
Total	74	100	25	100	99	100			
Gender									
Female	29	39,2	16	64	45	45,5	0,363 (0,142-0,929)	0,031*	-
Male	45	60,8	9	36	54	54,5			
Total	74	100	25	100	99	100			
Ethnicity									
Minang	51	68,9	24	96	75	75,8			
Javanese	9	12,2	0	0	9	9,1	-	0,044*	0,275
Malay	9	12,2	0	0	9	9,1			
Batak	5	6,8	1	4	6	6,1			
Total	74	100	25	100	99	100			
Family History									
Yes	48	64,9	10	40	58	58,6	2,763 (1,091-7,030)	0,029*	-
No	26	35,1	15	60	41	41,4			
Total	74	100	25	100	99	100			

*) Significant effect (p<0.05)

Table 3 presents the Chi-Square analysis for the 2x2 tables (gender and family history variables), the Spearman test for the age variable, and the Pearson test for the ethnicity variable. All non-modifiable risk factors have a significant relationship with recurrent stroke incidence (p<0.05).

Age and recurrent stroke have a p-value of 0.001 with r= -0.328, meaning that as age increases, the number of recurrent stroke cases decreases. Gender is significantly associated with recurrent stroke, with a p-value of 0.031 (OR= 0.363,

CI 95%= 0.142-0.929). This indicates that gender is not a risk factor but rather a protective factor, as the OR is less than 1.

Ethnicity is significantly associated with recurrent stroke, with a p-value of 0.044 and a weak correlation (r= 0.275). The more Minang ethnicity cases, the higher the occurrence of recurrent stroke. Family history is significantly associated with recurrent stroke, with a p-value of 0.029 (OR= 2.763, CI 95%= 1.091-7.030). This means that individuals with a family history of stroke have a 2.76 times higher risk of experiencing recurrent stroke.

Table 4: Frequency Distribution Based on Age

Variable	Group						OR (CI 95%)	*p*
	Recurrent Stroke		Non-Recurrent Stroke		Total			
	f	%	f	%	f	f		
Physical Activity								
Insufficient	63	85,1	9	36	72	72,7	10,182 (3,607-	0,000*
Sufficient	11	14,9	16	64	27	27,3	28,745)	
Total	74	100	25	100	99	100		
Smoking History								
Smoker	46	62,2	3	12	49	49,5	12,048 (3,301-	0,000*
Non-smoker	28	37,8	22	88	50	50,5	43,965)	
Total	74	100	25	100	99	100		
Dietary Pattern								
Poor	61	82,4	7	28	68	68,7	12,066 (4,186-	0,000*
Good	13	17,6	18	72	31	31,3	34,779)	
Total	74	100	25	100	99	100		
Control Compliance								
Non-compliant	56	75,7	5	20	61	61,6	12,444 (4,082-	0,000*
Compliant	18	24,3	20	80	38	38,4	37,936)	
Total	74	100	25	100	99	100		

*) Significant effect (p<0.05)

Table 4 shows the analysis of modifiable risk factors for recurrent stroke using the Chi-Square test. All modifiable risk factors have a significant relationship with recurrent stroke (p<0.05). Physical activity with recurrent stroke has a p value = 0.000 with a value (OR = 10.182, 95% CI = 3.607-28.745). Insufficient physical activity is 10.18 times more at risk for recurrent stroke. Smoking with stroke is significantly associated with a p value = 0.000 with a value (OR = 12.048, 95% CI = 3.301-43.965). Smokers are 12.04 times more at risk for recurrent stroke. The relationship between diet and recurrent stroke has significant results with a p value = 0.000 (OR = 12.066, 95% CI = 4.186-34.779). People with poor diet are 12 times more at risk of recurrent stroke. Compliance with control and stroke incidence is significantly associated with a p value of 0.000 (OR = 12.444, CI95% = 4.082-37.936).

People who are not compliant with control will be 12.44 times more at risk of recurrent stroke.

DISCUSSION

The age categories in this study were divided into eight groups, with the highest number of recurrent stroke cases found in the second age category (47-52 years), comprising 20 respondents (27%). This study's findings differ from Prabawati's research, where the most common age group was 56-65 years, with 39 respondents (41.5%), followed by the 46-55 years group with 20 respondents (21.8%) (Prabawati & Pitaloka, 2021). Respondents aged >55 years are more likely to experience recurrent strokes because aging is directly related to cellular aging. As age increases, overall bodily functions decline, especially vascular elasticity, making individuals over 50 years old more susceptible to recurrent strokes (Nurlan, 2020).

Regarding gender, most respondents experiencing recurrent strokes were male, with 45 individuals (60.8%), while the remaining 29 respondents (39.2%) were female. Rosanti's study found similar results, where the majority of respondents were male (21 respondents, 52.5%) and female (19 respondents, 47.5%) (Rosanti et al., 2024). This can be attributed to testosterone, a hormone in men that increases LDL levels. High LDL levels also elevate blood cholesterol, which is a significant risk factor for stroke and other degenerative diseases. Additionally, men's lifestyles tend to be less healthy, including smoking and alcohol consumption, which further increase stroke risk compared to women (Rosanti et al., 2024).

Based on ethnicity, most respondents with recurrent strokes were Minangkabau, with 51 respondents (68.9%). The remaining 23 respondents were from other ethnicities, including Javanese (12.2%) and Malay (12.2%)—each comprising nine individuals—and Batak (6.8%), with five individuals. Mayestika's study, conducted in West Sumatra, found that the majority of respondents were Minangkabau (57 respondents, 91.5%), while five others (8.5%) were from different ethnic backgrounds (Mayestika & Hasmira, 2021). Sangaji and Nurhayati's research highlights the strong relationship between culture, ethnicity, and lifestyle changes. Compared to other ethnic groups in

Indonesia, such as Sundanese, Javanese, Batak, and Bugis, the Minangkabau have a higher incidence of hypertension due to their diet, which is high in fat and low in vegetables. The Minangkabau are also known for their spicy and coconut milk-rich dishes. Hypertension is a significant risk factor for stroke, as high blood pressure disrupts blood flow, reducing the diameter of blood vessels supplying the brain. Consequently, brain tissue receives less oxygen and glucose, increasing the likelihood of recurrent strokes (Rina et al., 2016).

In terms of family history, respondents with a family history of stroke dominated, with 48 respondents (64.9%), compared to 26 respondents (35.1%) without a family history. Cahyaningtyas' study found that 32 respondents (53.3%) had a family history of stroke, while 28 (46.7%) did not (Marselia Dwiyanti Cahyaningtyas et al., 2024). Elmukhsinur's study states that individuals with a family history of stroke are 4.148 times more likely to experience a stroke than those without such a history (Elmukhsinur & Kusumarini, 2021). Individuals with a family history of stroke are more prone to developing diabetes and hypertension, which are also stroke risk factors.

The relationship between age and recurrent stroke events showed a p-value of 0.001 with an r-value of -0.328. This result aligns with Xu's study, which also found a relationship between age and recurrent stroke incidence, with a p-value of 0.001 (Xu et al., 2022). However, the dominant age group differed, as Xu's study found that respondents over 54 years old were 1.24 times more likely to experience recurrent strokes. In a literature review by Nurwidya Ade, it was found that elderly stroke patients experiencing recurrent strokes could be influenced by post-hospitalization stress (Ade Putri & Herlina, 2021). Depression after a stroke can lead to decreased functional recovery and reduced motivation for rehabilitation, negatively impacting patients and triggering recurrent strokes in older individuals (Ade Putri & Herlina, 2021).

The relationship between gender and recurrent stroke events had a p-value of 0.031 with a prevalence ratio (PR) of 0.363 (CI95% 0.142-0.929). This result is consistent with Chung's study, which found a relationship between gender and recurrent stroke incidence, with a p-value

of 0.038. The risk of recurrent stroke in male respondents was 1.45 times higher than in females (Chung et al., 2023). Men are at a higher risk of recurrent strokes due to their unhealthy habits, such as smoking and alcohol consumption. Additionally, hormonal factors and the menstrual cycle in women of reproductive age contribute to better circulation and cardiovascular health compared to men (Nurlan, 2020).

The relationship between ethnicity and recurrent stroke events had a p-value of 0.044 with an r-value of 0.275. Mayestika's study found that 91.5% of respondents were Minangkabau, while 8.5% belonged to other ethnic groups (Mayestika & Hasmira, 2021). Javanese people tend to consume sweet foods and drinks, which are considered an unhealthy diet and can increase stroke risk (Utama & Nainggolan, 2022). Malay cuisine includes dishes like mie sagu, nasi lemak, asam pedas, mie tarempa, and luti gendang, which can contribute to diseases such as obesity, hypertension, and diabetes due to their high coconut milk and flour content (Nasution et al., 2023).

Batak people's dietary habits are characterized by high salt, soy sauce, thick coconut milk, and fatty foods, along with processed foods like salted fish. They also consume various sweet foods such as tauge, kipang, alame, and wajit. Additionally, their diet includes high-gas foods like sweet potato leaves, jackfruit, cabbage, and durian. Smoking is also prevalent, whether for daily use, traditional ceremonies, celebrations, or even mourning rituals. Batak and Minangkabau ethnic groups are more prone to strokes than other ethnic groups (Noradina et al., 2022). The most significant risk factor for stroke among Batak individuals compared to non-Batak individuals is their high alcohol consumption (Tambunan et al., 2019).

The researcher notes that other ethnic groups, such as Javanese, Malay, and Batak, have distinctive dietary habits involving coconut milk, salt, flour, and sweet foods and drinks, which may increase the likelihood of strokes. However, no research has confirmed that recurrent strokes are more dominant among Javanese, Malay, and Batak Mandailing individuals, similar to the findings in this study.

Family history and recurrent stroke events have a significant relationship, with a p-value of 0.029 and PR= 2.769 (CI95%

1.091-7.030). This result is consistent with Aninditha's study, which found that respondents with a family history of stroke are at a higher risk of recurrent strokes. The Framingham study also indicates that having a parent who suffered a stroke before age 65 increases the risk threefold for their offspring (Aninditha, 2023).

Physical activity is significantly related to recurrent stroke events, with a p-value of 0.000 and PR=10.182 (CI95% 3.607-28.745). This finding is similar to Trismiyana's study, which reported a p-value of 0.019, indicating that respondents with insufficient physical activity are 4.038 times more likely to experience recurrent strokes than those who engage in adequate physical activity (Trismiyana & Sari, 2021).

CONCLUSION

Based on the research findings and discussion, the majority of respondents experiencing recurrent strokes were in the age category of 47-52 years, with 20 respondents (27%). Among them, 45 respondents (60.8%) were male, while 29 respondents (39.2%) were female. A total of 50 respondents (67.6%) were of Minangkabau ethnicity, while the remaining 24 respondents belonged to other ethnic groups, including Javanese (12.2%) and Malay (12.2%), with 9 respondents each, and Batak, with 5 respondents (6.8%). Additionally, 48 respondents (64.9%) had a family history of stroke, while 26 respondents (35.1%) did not.

There was a significant relationship between recurrent stroke and age (p-value = 0.001, p-value < 0.05), gender (p-value = 0.031, p-value < 0.05), ethnicity (p-value = 0.044, p-value < 0.05), and family history (p-value = 0.029, p-value < 0.05). Furthermore, there was a significant relationship between recurrent stroke and physical activity (p-value = 0.000, p-value < 0.05), smoking (p-value = 0.000, p-value < 0.05), dietary patterns (p-value = 0.000, p-value < 0.05), and treatment adherence (p-value = 0.000, p-value < 0.05).

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