KnE Life Sciences

ICHT 2019
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Volume 2019

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Conference Paper

The Risk Factor of Recurrence Stroke Among Stroke and Transient Ischemic Attack Patients in Indonesia

Listian Prisilia Rahayu[1], Serlina[1], Diwa Agus Sudrajat[1], Gina Nurdina[1], Elis Nurhayati Agustina[2], and Putri Tri Antika[1]

[1]STIKep PPNI Jawa Barat, West Java-Indonesia
[2]National Brain Center Hospital, Jakarta-Indonesia

Abstract

Background: Stroke described as a disruption of blood flow in the brain which can lead to brain malfunction, neurological deficits, and even death. Although with good management in acute period, the incidence of recurrent stroke still increasing every year. **Objectives:** This study aimed to determine the dominant risk factor of stroke recurrence. Methods: This study was a cross sectional descriptive study with 274 strokes patients as samples. The samples were recruited from one of general hospital specialize in neurology disorders in Jakarta, Indonesia. **Results:** The result indicated a significant correlation between cardiovascular disorders, cholesterol, and activity with incidence of stroke recurrent ($p<0.05$). The dominant risk factor in this study was obesity event (OR = 0.616). **Conclusion:** Besides the dominant factor, there were 3 factors that significantly affect stroke recurrence; cardiovascular disorders, hypercholesterolemia, and physical activity. Nurses should be more aware that some patients may still have risk factors of stroke recurrence even they have discharged from hospital. With some efforts like health education and controlling the factors can help to reduce the risk of stroke recurrence.

Keywords: Stroke, recurrence stroke

Corresponding Author:
Listian Prisilia Rahayu
prisilialistian97@gmail.com

Received: 22 September 2019
Accepted: 4 October 2019
Published: 10 October 2019

Publishing services provided by Knowledge E

Selection and Peer-review under the responsibility of the ICHT 2019 Conference Committee.

1. Introduction

Stroke defined as a clinical syndrome caused by sudden brain blood vessel disorder which can occur in patients aged 45-80 years. Stroke also described as a neurological change caused by the disruption of blood supply to the part of the brain [1]. Stroke divided into two types; ischemic stroke (non-hemorrhagic) and hemorrhagic stroke. Ischemic stroke occurred because of an arteriosclerotic or blood clot in blood vessel leading to decreasing the blood flow. While the hemorrhagic stroke happened when blood vessels ruptured and make abnormal blood flow into the brain and cause damage to it [2]. It concluded that stroke is an interruption of blood flow to the brain which can cause brain malfunction.

According to [3], stroke is the second leading cause of death in the world, whereas, in big country like USA, stroke became one of the highest cause of death after cardiovascular disease and cancer with 795.000 people in the USA suffer a stroke every each year and 185.000 of which are recurrent stroke. While in Indonesia there are 500.000 people suffering from stroke each year and 2.5% of them suffered disabilities both mild and moderate or even death [4]. Based on Indonesian Health Research in 2018 the stroke prevalence nationally has increased compared to 2013 (7.0%). It is aligned with the stroke prevalence in Jakarta-Indonesia in 2018 showed an increase (9.7%).

The data shows the incidence of stroke is increasing every year, especially in developing countries like Indonesia. Strokes can cause various symptoms and effects such as facial or limbs paralysis, slurred speech, altered consciousness, impaired vision, and any other neurological deficits symptom [5]. In severe case, strokes can cause death or in better condition As for the impact in severe cases can result in death, while in the better scenario dementia, depression, or even recurrent stroke can occur as a result.

Stroke Recurrence is one of the most happened complications after hospital discharge [6]. According to [7], 25% of stroke patients had at least one episode of recurrent strokes which 2-22% occurred in the first year and 10-53% at 5 years after the primary stroke [8]. Stroke patients with risk factors can have a period of recurrent stroke in the same or different place on the brain [9]. After primary stroke, the recurrence stroke can occur with more fatal effects than the primary with extent damage of the brain [10]. It's also happened in patients with lack of self-control which can trigger period of stroke recurrence if bleeding or the problems wider than the primary attack. The problems because of stroke can affect the physical condition like disability or pshycological defect in the productive age or older which can lead to socio-economic problems [11].

According to the theories, a lot of recurrent stroke risk factors are well known. Therefore, further analysis is needed to identify the dominant risk factors of recurrent strokes in Indonesian Population. The purpose of this study was to determine the dominant risk factor of recurrent strokes among Indonesia stroke and transient ischemic stroke patients.

2. Methods

2.1. Study design

This study was a cross-sectional descriptive study with 274 stroke patients at National Brain Hospital as respondents.

2.2. Sample

This study conducted at National Barin Center hospital with 274 strokes patients as samples. The inclusion criteria in this study were 1) stroke patients 2) didn't have cognitive disorder. Independent variables included age, sex, contraception, diagnosis, hypertension, cardiovascular disorders, arrhythmia, hypercholesterolemia, obesity, smoking, alcohol consumption, diabetes mellitus, physical activity, self-efficacy, NIHSS, and recurrent stroke as dependent variable.

2.3. Instrument

This study used questionnaires and checklist form to described the variables. The questionnaires are Bharthel Index, NIHSS (National Institutes of Health Stroke Scale) score sheet, the stroke self-efficacy scale, and another form to describe the characteristics of respondents. This study starts with making doing paperwork for permission and ethical clearance STIkep PPNI Jabar and National Brain Hospital. All of the variables got analyzed independently, bivariate analysis used Chi Square, and multifactorial analysis used binary regression test.

2.4. Data collection procedure

This study conducted in May-June 2019 at National Brain Center Hospital Jakarta-Indonesia.

2.5. Data analysis

Data in this study analyzed for univariate, bivariate, and multivariate. The most dominant factor in this study found by multi variance analysis using binomial regression.

3. Result

Table.1 showed the result of univariate analysis for all the variables in this research. The results from univariate analysis based on the incidence of recurrent stroke showed 109 (39.8%) patients suffered a recurrence stroke, 227 (82.8%) patients have above 45 years old, 233 (85.0%) respondents did not have enough education, 123 (44.9%) still working independently like being an employee at private agencies or businessman.

Around 56.9% of respondents are male and more than a half respondents came from Java tribe. The diagnosis of stroke, more than a half samples diagnosed with ischemic stroke.

Table. 2 showed the result of bivariate analysis. The results indicated that there is no significant correlation between age, gender, contraception, family history of stroke, hypertension, alcohol consumption, physical activity, self-efficacy, NIHSS score, and education level with recurrence stroke (p value>0.005). While there was significant correlation between cardiovascular disorders, arrhythmia, smoking history, diabetes mellitus, and hypercholesterolemia with recurrence stroke (p value>0.005).

The multifactorial analysis was conducted to determine the dominant risk factors independent. The results showed that the dominant risk factor on strokes recurrence stroke was obesity (p = 0.015; OR 0.616).

4. Discussion

The prevalence of stroke in Indonesia is still increasing every year which get along with increasing the risk factors of stroke recurrence. Recurrent stroke can occur if the risk factors are not controlled both in the same and different part of the brain with the primary attack. Sometimes, patients with recurrent stroke can have more dangerous condition than the primary stroke. It is because the extent of brain damage that occurs as a result of a previous and current stroke [10]. Age is one of risk factor of stroke that can not be changed, while someone gets older, the risk of recurrent stroke is increasing. That age is one of undeniable risk on stroke patient, due to bad elasticity of blood vessels in older peoples. [3] also mentioned that the risk factors of stroke doubled each decade of age after 55 y.o. Prevalence of stroke in Indonesia highest obtained at the age of 75 years [5].

This study showed that some have maintained a large proportion of respondents aged over 45 years have 227 (82.8%) (Table.1). According to the research of [7] involved 140 stroke patients in Thailand obtained an average age of stroke patients was 65.5 years. The research by [12] in Panti Wilasa Citarum Semarang revealed that most respondents age >45 y.o. The study by [13] showed that the frequency distribution that the highest age of respondents is 46-50 years (27.5%). While in this study found that there was no significant correlation between age and the risk of stroke recurrence (Table 2). This is in line with research conducted by [14] said that age does not significantly associate with the occurrence of recurrent stroke (p = 0.059, 95% CI).

Table 1: Risk Factors of Recurrence Stroke.

Variables		Frequency	Percentage (%)
Stroke	Primary	165	60.9
	Recurrent	109	39.8
Education	High	41	15.0
	Low	233	85.0
Work	Government Employee	15	5.5
	Private Employee	185	67.5
	Does not work	74	27.0
Medical diagnosis	Hemorrhagic stroke	79	28.8
	Ischemic stroke	195	71.2
Age	<15	47	17.2
	> 15	227	82.8
Gender	Woman	156	56.9
	Man	118	43.1
Family History	No	156	56.9
	Yes	118	43.1
Hypertension History	No	140	51.1
	Yes	133	48.5
Cardiovascular disorders	No	235	85.8
	Yes	39	14.2
Arrythmia	No	242	81.8
	Yes	50	18.2
Hypercholesterolemia	No	161	58.8
	Yes	113	41.2
Obesity	No	224	81.8
	Yes	50	18.2
Smoking history	No	224	81.8
	Yes	50	18.2
Alcohol history	No	270	98.5
	Yes	4	1.5
Diabetes mellitus	No	148	54.0
	Yes	126	46.0
Activity	No	217	79.2
	Yes	57	20.8
Self-efficacy	Low	186	67.9
	Moderate	69	25.2
	High	19	6.90
NIHSS	<15	256	93.4
	> 15	18	6.60

In Table 1 obtained more than half of the respondents are male 156 (56.9%). According to Chih, Ying and Wu in March 2007 - August 2008 in Taiwan, found the incidence of

Table 2: Results of the Bivariate analysis Stroke incidence recurring factors.

Variables	OR	95% CI	P-Value
Diagnosis	.715	.421 to 1.213	.213
Age	1.345	.696 to 2.598	.377
Gender	1.456	.893 to 2.373	.131
Contraception	1.267	.756 to 2.124	.369
Family history	.943	.578 to 1.538	.814
Hypertension	.981	.605 to 1.592	.940
Cardiovascular Disorders	.233	.940 to.577	.001
Arrythmia	1.042	.491 to 2.205	.917
Hypercholesterolemia	.402	.240 to 0.674	.000
Obesity	1.510	.815 to 2.789	.189
Smoking	.739	.389 to 1.406	.356
Alcohol	.500	.051 to 4.970	.543
Diabetes Mellitus	1.525	.937 to 2.481	.089
Physical Activity	.290	.143 to.591	.000
Self Efficacy	.871	.520 to 1.458	.598
Education Level	1.509	.744 to 3.063	.252
NIHSS	2.543	.950 to 6.754	.056

Table 3: Multivariate Analysis on Strokes Recurrence Among Strokes and Transient Ischemic Stroke.

Variable	Step 1	Step 2	Step3	Step4	F (Z^{-e})
Gender	1.075 *				
Type of Stroke	.878	.881 *			
NIHSS	2.416	2.448	2.436 *		
Cardiovascuar Disorder	.211	.205	.202	.207	.148
Hypercholesterolemia	.533	.531	.542	.512	.302
Obesity	1.917	1.951	1.968	1.899	.616
Physical Activity	.392	.392	.383	.377	.242
Diabetes mellitus	1.746	1.376	1.676	1.675	.586
* Excluded from modeling					

stroke in men more than in women with the percentage of each 63.4% male and 36.6% female. The study by [13] showed that the respondent distribution dominated by male than women. According to, male patient tends to be higher because of the smoking incidence higher in male dan women which can lead to blood vessel damage and lead to stroke incidence. Female has the estrogen as a hormone which can increase the HDL levels in the blood, thus preventing atherosclerosis in women. However, when estrogen production is reduced or even not been established yet, a woman's risk of stroke would be greater than men. The pattern of this attack is related to the protection of the female sex hormones, so it will changed when female patients come into menopause period.

High prevalence of strokes in communities with low educational but there was no significant correlation between education level and the risk of recurrent stroke (Table 2). Hypertension is one of the factors that not properly controlled which contribute to the incidence of recurrent strokes. The higher the blood pressure also make the risk of recurrent strokes increasing. [15] said that based on data analysis using Chi Square test showed p <0.05 means there is a significant correlation between hypertension with recurrent strokes. Controlling the blood pressure on stroke patients will reduce the risk of recurrence stroke.

Hypercholesterolemia has a very close relation to recurrent stroke, this case put forward by the theory show that hypercholesterolemia can lead to atherosclerosis event in the blood vessels of the brain and the formation of fat so that blood flow is slow. Besides, hypercholesterolemia can cause coronary heart disease too. In these studies showed that hypercholesterolemia has a significant relationship with the incidence of recurrent stroke (p = 0.000). The research in China conducted by [16] showed p-value <0.05 which means that there was a significant correlation between dyslipidemia with an incidence of recurrent strokes.

Respondents who suffer from cardiovascular disorders in this study were 39 peoples or 14.2%. The results of the bivariate analysis using chi square indicated that there was a significant correlation between history of heart problems with the incidence of recurrent stroke (p = 0.001) (Table 2). said that heart disease is the most powerful factors which can lead to ischemic stroke. According to [that smoking is a risk factor for cardiovascular disease and stroke. National Stroke Association (2014) described that The content of cigarette such carbon monoxide can cause a lack of oxygen bound to hemoglobin in the blood. It make the heart will work harder in order to fulfill the cardiac output for the whole body parts. In addition, cigarettes substances will make it easier to blood vessel formed a blood clot or thrombus which can block blood flow. The disturbance in blood flow to the part of the brain will cause a stroke. However, the risk of stroke can be reduced by quitting smoking. According to [17] cigarette contains 4000 different chemical compounds who need to be absorbed into the bloodstream and distributed throughout the body via the vascular system. Many of these compounds can work as free radicals which initiate unwanted chemical reactions, some of these chemicals are known to be directly toxic to the endothelium of blood vessels. Smoking will increase the risk of stroke by 50% also subarachnoid hemorrhage by 100%.

This study found that there was no significant association between smoking history and recurrent stroke with p-value of 0.356. [15] stated that there is no significant relationship between smoking and the incidence of recurrent stroke with a p-value

1.000 (p>α). the same result in getting from research found no significant correlation between smoking and the incidence of stroke with p-value 0.527 (p> α). In this study, smoking does not affect the possibility of recurrent stroke events as it relates to the number of cigarettes smoked per day and is also related to how long the respondent started smoking.

In addition to smoking, alcohol is also one factor that can contribute to the incidence of recurrent stroke. Alcoholic consumption will affect the incidence of recurrent stroke which totals 80 cc or 560 cc per day of the week [18]. Theoretically alcohol can induce the increase of blood pressure which is the risk factor of stroke, but the levels of alcohol consumed also affects the incidence of recurrent strokes. In this study, the proportion of respondents with a history of alcohol less than respondents who did not have a history of alcohol. Research conducted Japan was found in respondents recurrent stroke by 40% had the habit of drinking alcohol. According to the research of [19] on the characteristics and the risk of recurrent stroke in China obtained that alcohol is a risk factor for stroke in the West, but for the population in Indonesia has not been proven as one of the different cultural. Specifically reported that alcohol consumption of more than 60 grams per day of 1.69 times risk of stroke when compared with respondents who did not consume alcohol.

Respondents with a history of diabetes mellitus in this study were 126 respondents (46.0%) and there is no significant relationship between diabetes mellitus with an incidence of recurrent stroke with a p-value of 0.089 (p> α). Research there wasn't a significant relationship with the occurrence of diabetes mellitus and recurrent stroke with the results of the statistical test Chi-Square p-value = 0.409 (p> α). However this is not in line with research of [20] about diabetes as an independent factor for recurrence stroke who obtained OR 1.45 (p-value <0.05) means that the risk of recurrent stroke with diabetes was 1.45 times higher than those without diabetes. Lambert mentioned that although diabetes is a risk factor for the occurrence of stroke for the first time, not a lot of data showing that diabetes has a significant effect on the incidence of recurrent stroke. Diabetes is estimated to affect only 9% in the incidence of recurrent stroke lead [21].

Physical activities in this study viewed from everyday activities which include activities in their daily activities. The results of this study noted that was a significant relationship between physical activity with incidence of recurrent stroke (p<0.005). The research by Saengsuwan and Suangpho (2018) in Thailand stated that stroke patients with a Barthel Index score ≤60 have a higher risk for recurrent stroke than patients who can do the physical activity independently. In this study, patients with stroke usually bear

disabilities as a result of a neurological disorder and make them need assistance to do their activity daily living. Stroke also has an impact on a person's activity cause it can make paralysis, disability, communication disorders, emotional disorders, pain, sleep disorders, depression, and dysphagia. NIHSS score can also affect the occurrence of recurrent stroke, in this study, the majority of respondents NIHSS score less than 15, the lower the value NIHSS then also increase the risk of recurrent stroke events.

Dysfunction in stroke patients may impact psychologically and socially to the patient, such as low self-esteem, hopelessness, sorrow, anxiety, and despair which it was the signs of low self-efficacy [22]. Someone with low self-efficacy tends to not have confidence and doubt their own abilities. Meanwhile patients with high self-efficacy have healthy behaviors that can increase the independence to fulfill their daily activity so it can reduce depression, lowering concerns, increasing self-esteem, and improve quality of life [23].

After controlling other variables on multifactorial analysis using binomial regression found that cardiovascular disease, hypercholesterolemia, obesity, physical activity, and diabetes mellitus affect the recurrence stroke with obesity as dominant factor (OR = 0.616) (Table.3). Obesity contributes to the occurrence of stroke. described that obesity did not show a positive relationship with the incident of the stroke but it's associated with high blood pressure and blood sugar levels so the heart works harder to pump blood throughout the body and lead to increase of blood pressure. [24] said that obesity is a major risk factor for heart disease, type 2 diabetes mellitus, increased cholesterol levels, and blood pressure which triggers the process of atherosclerosis.

5. Conclusion

The dominant risk factors for stroke recurrence in Indonesia is cardiovascular disease, hypercholesterolemia, obesity, physical activity, and diabetes mellitus. Because of the great impact of recurrence stroke, nurse practitioner and another health provider can focus not only on acute treatment but also to control the risk factors of recurrence stroke.

Acknowledgments

We would like to thank the STIKep PPNI Jawa Barat that has supported us to this scientific journal publication.

Conflict of Interest

The authors have no conflict of interest to declare.

References

[1] Black, JM, & Hawks, JH (2014). *Medical Surgical Nursing: Clinical Management of Expected Results*

[2] Bararah, T and Jauhar, M.. (2013). *Nursing Care Complete Guide Becoming a Professional Nurse*. Jakarta: Achievements Pustakaraya.

[3] Larry, GB (2011). Left atrial enlargement: A cause of stroke? *CMAJ*. https://doi.org/10.1503/cmaj.110617

[4] Laily, SR (2017). Relationship characteristics and Hypertension Patients with Ischemic Stroke Genesis. Periodic *Journal of Epidemiology*. https://doi.org/10.20473/jbe.v5i1.

[5] Riskesdas. (2018). Main results Riskesdas 2018. The Ministry of Health of the Republic of Indonesia. https://doi.org/1 December 2013

[6] Sinaga, J., & Sembiring, E. (2013). Recurrent Stroke Prevention Through, 143-150.

[7] Saengsuwan, J., & Suangpho, P. (2019). Self-Perceived and Actual Risk of Further Recurrent Stroke in Patients with Recurrent Stroke or Transient Ischemic Attack in Thailand. *Journal of Stroke and Cerebrovascular Diseases*. https://doi.org/10.1016/j.jstrokecerebrovasdis.2018.11.001

[8] Zheng, S., & Yao, B. (2019). Impact of risk factors for recurrence after the first ischemic stroke in adults: A systematic review and meta-analysis. *Journal of Clinical Neuroscience*, 60, 24-30. https://doi.org/10.1016/j.jocn.2018.10.026

[9] Pandji, D. (2011). *Everything's Not The End Stroke*. Jakarta: PT Elex Media Gramedia Group Komputindo.

[10] Mulyatsih, E. (2010). *Stroke, Guidelines Post-Stroke Patient Care at Home*. Jakarta: FKUI.

[11] Siswanto, Y. (2006). Some risk factors that affect the incidence of recurrent stroke (Case Study at Dr Kariadi Semarang). Stroke.

[12] Kristiyawati, SP (2008). Analysis of Risk Factors Associated with Stroke incidence in Panti Wilasa Citarum Hospital Semarang.

[13] Koto, F. (2011). Risk Factors Stroke incidence in hospitals in 2011, (a risk factor for stroke), 1-24. *Jurnal Untad*.

[14] Wahyunah, MS (2016). Analysis of Factors Associated with Stroke incidence in hospitals Indramayu.

[15] Permatasari, I. (2015). factors related to the incidence of recurrent stroke in patients with post-stroke, 151, 10-17. https://doi.org/10.1145/3132847.3132886

[16] He, Q., Wu, C., Guo, W., Wang, ZY, Zhao, YF, Lu, J.,... He, J. (2017). Hospital-Based Study of the Frequency and Risk Factors of Stroke recurrence in Two Years in China. *Journal of Stroke and Cerebrovascular Diseases*, 26 (11), 2494-2500. https://doi.org/10.1016/j.jstrokecerebrovasdis.2017.05.026

[17] Alway, D & Cole, J. (2012). *Stroke essential for Primary Service*. (L. Jonathan & Indra, Ed.). Jakarta: EGC.

[18] Hillen, T.,... Wolfe, CDA (2003). Cause of stroke recurrence is multifactorial: patterns, risk factors, and outcomes of stroke recurrence in the South London Stroke Register. Stroke. https://doi.org/http://dx.doi.org/10.1161/01.STR.0000072985.24967.7F

[19] Li, F., Yang, L., Yang, R., Xu, W., Chen, FP, Li, N., & Zhang, JB (2017). Ischemic Stroke in Young Adults of Northern China: Characteristics and Risk Factors for recurrence. *European Neurology*, 77 (3-4), 115-122. https://doi.org/10.1159/000455093

[20] Shou, J., Zhou, L., Zhu, S., & Zhang, X. (2015). Diabetes is an Independent Risk Factor for Stroke recurrence in Stroke Patients: A Meta-analysis. *Journal of Stroke and Cerebrovascular Diseases*, 24 (9), 1961-1968. https://doi.org/10.1016/j.jstrokecerebrovasdis.2015.04.004

[21] Irdelia, RR, Tri Joko, A., & Bebasari, E. (2014). Profile Modifiable Risk Factors in Recurrent Stroke Cases at Arifin Achmad Hospital in Riau province. *Jom FK*.

[22] Wurtiningsih, B. (2012). Family Support in Patients with Stroke in Space Dr.Kariadi Neuroscience Hospital in Semarang, 1.

[23] Frost., D., R. (2015). Self-care self-efficacy correlates with independence in basic activities of daily living in individuals with chronic stroke. Journal of Stroke and Cerebrovascular Diseases.

[24] J. Mackay and Mensah G. (2008). *The Atlas of Heart Disease and Stroke*.