Association Between Cigarette Smoking And Cognitive Function In Stroke Patients Of Siloam Lippo Karawaci Hospital.

Raissa Putri Raspati [1], Pricilla Yani Gunawan [2]

[1]Faculty of Medicine, Universitas Pelita Harapan
[2]Department of Neurology, Faculty of Medicine, Uninversitas Pelita Harapan

Abstract

Stroke is a cerebrovascular disease, causing deterioration of brain function as a result of cerebral blood flow disruption. Stroke is the third leading cause of death in the world and is considered an important cause of long-term disability and cognitive impairment. Risk factors of stroke are further divided into unmodifiable risk factors and modifiable risk factors, with one of the most common modifiable risk factors of stroke, is cigarette smoking. Besides being one of the risk factors that cause stroke, cigarette smoking is believed to have a role in cognitive impairment. This study aims to obtain information regarding the association between cigarette smoking and cognitive function in stroke patients of Siloam Lippo Karawaci Hospital. This research is an unpaired comparative analytical study with a cross-sectional design. Data sampling was taken by consecutive sampling on 56 stroke patients of Siloam Lippo Karawaci Hospital. Cognitive function was made based on the Montreal Cognitive Assessment version Indonesia (MoCA-INA). All data were analyzed by Chi-Square test using SPSS version 25 and the result is considered significant if the p-value < 0,05. From the result of this study. There is a significant association between cigarette smoking and cognitive function (p-value 0,004 and OR 5,343).

Introduction

According to the World Health Organization (WHO), an estimated 15 million people in the world suffer from strokes each year and about 5 million ends up dying with long-term disabilities.[1] WHO also states that there are 15 million people who suffer a stroke every 10 years between the ages of 55 and 85 years.[1] The increase in the things that happen to strokes. The incidence of stroke doubles every 10 years after age 45.[2] In Indonesia, data from the Basic Health Research (Riskesdas) by the Indonesian Ministry of Health (Kemenkes) states that the main cause of death for all ages is stroke (15.4%) followed by tuberculosis and hypertension.[2] WHO also classifies risk factors for stroke incidence, namely non-modifiable and modifiable risk factors. One of the most frequent and underserved risk factors for stroke is smoking. In Indonesia, according to data from the Global Adult Tobacco Survey (GATS), There are 58 million male active smokers and 3.8 million female active smokers with around 85.4% of the population has been exposed to cigarettes in 2015.[3] Data from GATS can be concluded in a period of 4 years, namely from 2011-2015 there is an increase in the number of smokers by 4 million people.[4,3] Smoking becomes main contributor to health problems in Indonesia, although 4 out of 5 people (86%) active smokers in Indonesia know that smoking can causeserious disease with the lowest knowledge of stroke incidence, namely; 40%.[4]

In most people, the incidence of stroke is closely related to smoking habits. Smoking is one of the many risk factors for stroke development with damage to blood vessels and contributing to the formation of atherosclerosis or hardening of the arteries.

In 2015, WHO states tobacco smokers have reached 1.3 billion worldwide with 6 million deaths due to cigarette use.[5]

According to several hypotheses, smoking has been linked as a risk factor for cognitive decline. Substances in cigarettes can impair cognitive function by several mechanisms such as the effects of oxidative stress in the brain cells.[6] However, the extent to which smoking increases the risk of declined cognitive function remains unclear.[7] Study by Dobson et al with the title *The Long Term of Smoking Contributes to Cognitive Decline* concludes that smokers over a long period of time contributes to cognitive decline over time aging, which occurs at the peak of the age of 60 years.[8] Research has been done on the relationship between smoking and cognitive function in stroke patients conducted by Ekamala Putri Almi with the title "The Relationship of Smoking Behavior With Impaired Cognitive Function In Ischemic Stroke Patients" found significant results between the two variables.

Materials And Methods

This study used an unpaired categorical analytic study type with a cross-sectional study design. Sampling was based on consecutive sampling, namely the selection of the sample was based on the inclusion and exclusion criteria of the study. The subjects were patients at Siloam Lippo Karawaci Hospital who had previously diagnosed with a stroke by a neurologist. The diagnosis of stroke that are included in this study are both ischemic and hemorrhagic stroke. The inclusion criteria were patients who had been diagnosed with a stroke by a neurologist and were over 45 years old. Exclusion criteria were patients who had a history of dementia and were illiterate. The ethical approval of this study was obtained from The faculty of medicine of Universitas Pelita Harapan with license number (rev)125/K LKJ/ETIK/IV/2019.

Data collection was carried out by direct interviews with patients using the Indonesian version of the Montreal Cognitive Assessment (MoCA-INA) questionnaire after the subjects filled out the consent form to participate in the study. Smoking is obtained based on the patient's history. The MoCA examination includes orientation, short-term memory, executive function, language, abstraction, animal naming, attention, and clock-drawing test. The maximum score of the MoCA-INA is 30, with a total score of 26 to 30 considered normal cognitive function, below 26 are considered poor cognitive, and with the score of below 19 are considered dementia.[9]

Result

The sample obtained in this research are 56 patients that were previously diagnosed with stroke by neurologist in Siloam Hospitals Lippo Village Karawaci. The distribution of respondents for the results of cognitive function with the use of MoCA-INA, from a total of 56 respondents obtained from the interviews in this study, there were 23 (41.1%) respondents who had more than 12 years of education, and 33 respondents (58.9%) who have less than 12 years of proper education. In terms of occupation of the respondents, there were 31 (55,4%) who were unemployed, includes housewives, 7 respondents who are an employee, 14 respondents are an entrepreneur, and 4 respondents with different types of occupations. 27 respondents (48.2%) who got poor MoCA-INA results and 29 respondents (51.8%) who got good MoCA-INA results. The distribution of respondents based on demographic characteristics can be seen in Table 1.

Table 1. Demographic Characteristics

Characteristics	Population N	Percentage (%)
Gender		
Male	31	55,4
Female	25	44,6
Age (year)		
45-64	44	78,6
> 65	12	21,4
Stroke Type		
Ischemic	39	69,6
Hemorrhagic	17	30,4
Hypertension		
Yes	39	69,6
No	17	30,4
Diabetes Mellitus		
Yes	26	46,4
No	30	53,6
Cholesterol		
Yes	23	41,1
No	33	58,9
Metabolic Syndrome		
Yes	5	8,9
No	51	91,1

Based on the results of the cross-tabulation that have been carried out in Table 2, overall there are 24 samples (42.9%) who have a history of smoking with 17 samples (70.8%) getting poor MoCA-INA results and 7 samples (29.2%) get good MoCA-INA results. There were also 32 samples (57.1%) who did not have a history of smoking, with 10 samples (31.3%) getting poor MoCA-INA results and 22 (68.8%) getting good MoCA-INA results.

Table 2. Cross-tabulation and Chi-Square Test Results Relationship Between Cigarette Smoking and Cognitive Function

	MoCA-INA		Total N (%)	P Value	OR (95% CI)
	Bad n (%)	**Good n (%)**			
Cigarette Smoker	17 (70,8)	7 (29,2)	24 (42,9)		
Non Smoker	10 (31,3)	22 (68,8)	32 (57,1)	p = 0,004	5,343(1,684– 16,955)
Total	34 (60,7)	22 (39,3)	56 (100)		

The results of data analysis using the Chi-Square test found the p-value is 0.004. The relationship obtained is also supported by an Odds Ratio of 5.343 and 95% CI = 1.684 - 16,955.

Bivariate Analysis Results

Bivariate analysis was carried out on other variables in this study to see if there was a relationship with cognitive function or the results of the MoCA-INA. Data analysis was performed statistically with the Chi-Square test to obtain the p-value through the SPSS program. From the results obtained (Table 3), several significant variables have a relationship with cognitive function. These variables include gender (p-value = 0.027), smoking (p-value = 0.004), type of stroke (p-value = 0.027). Through this analysis, it was found that there was no significant relationship between age and cognitive function using the MoCA-INA, which was found to be p-value = 0.573.

Table 3. Bivariate Analysis of Variables Associated with Cognitive Function

Variables	MoCA-INA Poor n (%)	Good n (%)	P value	OR
Gender				
Male	19 (61,3)	12 (38,7)	0,027	0,297
Female	8 (32,0)	17 (68,0)		
Education				
> 12 years	9 (60,9)	14 (39,1)	0,194	1.867
< 12 years	18 (54,5)	15 (45,5)		
Age (years)				
45-64	21 (47,7)	23 (52,3)	0,573	1.095
> 65	6 (50,0)	6 (50,0)		
Hypertension				
Yes	19 (48,7)	20 (51,3)	0,570	1.069
No	8 (47,1)	9 (52,9)		
Diabetes Mellitus				
Yes	9 (34,6)	17 (65,4)	0,240	0,59
No	18 (60,0)	12 (40,0)		
Metabolic Syndrome				
Yes	2 (40,0)	3(60,0)	0,535	0,693
No	25 (49,0)	26 (51,0)		
Dyslipidemia				
Yes	13 (56,5)	10 (43,5)	0,222	1,764
No	14 (42,5)	19 (57,6)		
Cigarette Smoking				
Yes	17 (70,8)	7 (29,2)	0,004	5,343
No	10 (31,3)	22 (68,8)		
Stroke Types				
Ischemic	15 (38,5)	24 (61,5)	0,027	3.840
Hemorrhagic	12 (70,6)	5 (29,4)		

The results of the bivariate analysis above will be carried out in the multivariate analysis, namely, variables that meet the requirements of the multivariate analysis p-value = <0.25 will be continued for multivariate logistic regression analysis.

From the results of the bivariate analysis, the results of p-value <0.25 were gender, diabetes mellitus, smoking, and type of stroke. The multivariate analysis are described in Table 3.

Variables	P Value	Odds Ratio	95% C.I	
			Lower	Upper
Gender	0.435	0.530	0,107	2.614
Cigarette Smoking	0.165	3.017	0.635	14.328
Stroke Type	0.440	1.772	0.415	7.565
Diabetes Mellitus	0.073	0.313	0.088	1.112

Table 4. Multivariate Regression Logistic Analysis

Discussion

From a total of 56 study respondents, 27 patients had decreased or poor cognitive function and 29 had a cognitive function that tended to be normal or good. The results of statistical tests using Chi-Square analysis show a significance value of p-value 0.004, which means that if the p-value is less than 0.05, it indicates that smoking has a significant relationship to cognitive function. The relationship obtained is also supported by an Odds Ratio of 5.343 and 95% CI = 1.684 - 16,955, which means that cognitive function deteriorates 5.343 times more in stroke patients who smoke compared to other stroke patients who do not smoke. This is by what was stated by Sabia (2012), namely the study involved a sample of 5099 respondents with male gender and 2137 others were women with significant results obtained with a p-value of 0.03, where the cognitive average tended to decrease in the male smoker.[10]Like the research above, this study also concluded that cognitive decline was supported by long-term smoking behavior for at least 10 years. This study found that male respondents who smoked for 10 years had a 10-year decline in cognitive function.

After analyzing the four variables from the bivariate model to the multivariate regression analysis, it was found that the four variables, namely gender, smoking, stroke type, and diabetes mellitus independently did not affect cognitive function. This is because the results of multivariate logistic regression analysis obtained a p value> 0.05, which means there is no significant relationship independently.

The results of this study are in accordance with previous studies that have been carried out by Ekamala Putri Almi where the results found indicate the presence of a significant relationship between smoking and cognitive function in patients stroke where the result is smoking decreases cognitive function. Research concluded that the free radicals contained in cigarettes can interfere with the transport of oxygen to the brain and also increasing the number of free radicals in the brain circulation can cause damage and death of brain nerve cells[.11]

One study that were conducted in China by Zhou in 2003 on the relationship between smoking and cognitive decline in the elderly, where in the study includes 3012 elderly,the p value found was 0.027. But this study cannot conclude whether the effect is the

frequency, history, and types of cigarettes used[7]

In contrast to a 10-year cohort study in Taiwan, which found that smokers tend to reduce the risk of cognitive decline compared to non-smokers and this is concluded because the nicotine in the smoking can improve cognitive function.[12] The results of this study are inversely proportional to the research conducted by Marchadinda Inggriani Suprapto with the title "The Relationship of Smoking History" With Cognitive Disorders in Stroke Patients" where no results were found which is significant between the two variables, namely the result of p value of 0.408. Whereas the conclusion of that study was that many of the samples had stopped smoking 5-10 years.

This study has several weaknesses, among others, the distribution of this study is not normal. Also, the research method used in this study unable to assess the causal relationship between the variables that exist with cognitive function.

This study also has a weakness in the sample included where the sample is only 56 respondents and only carried out at a certain time, where the results obtained not necessarily able to describe the same conditions with a different population and place. In addition, this study has respondents with a variable timing of stroke attacks and frequency. Therefore, it is expected that the effects of smoking such as frequency, type, and history or active smokers and also the timing of stroke can be measured by means or tools that are more specific and sensitive in the future research. Other factor related to cognitive decline not that is not being evaluated in this study such as diabetes also need a further research in terms of the correlation with smoking and cognitive function.

Because this study is limited in Siloam Hospitals Lippo Village, it is hoped that the results of this study can contribute to providing data of the correlation between cigarette smoking and cognitive function in stroke patients and as a motivation so this issue will become a concern in other hospitals in Indonesia. This study also hoped that it can help stroke patients to stop smoking, and for active smokers to stop cigarette smoking in terms of the occurrence of an increase number of individuals with cognitive decline.

Conclusion

Based on the results of research regarding the relationship between smoking and cognitive function in stroke patients at Siloam Lippo Karawaci Hospital, it can be concluded that there is a relationship between smoking and cognitive function in stroke patients at Siloam Lippo Karawaci Hospital which can be concluded from the p-value of 0.004. Of the 56 samples who participated in this study, there were 24 samples (42.9%) with a history of smoking and 27 samples (48.2%) with poor cognitive function. Then there is no relationship between gender, stroke type, age, education. Further study needed in terms of evaluating other factors related with stroke and cognitive function with a prospective cohort study to confirm the results.

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