FACTORS CAUSING NON-HEMORRHAGIC STROKE AT THE AGE OF YOUNG ADULTS

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ABSTRACT

Stroke is a clinical sign that develops rapidly due to focal or global brain dysfunction due to blockage or rupture of blood vessels in the brain with symptoms lasting 24 hours or more. This study aims to analyze the risk factors that cause the incidence of non-hemorrhagic stroke in young adults. The results showed that there was a significant relationship between hypertension and the incidence of non-hemorrhagic stroke. Value OR = 1.91 with 95% CI 1.34-2.73. There is a relationship between diabetes mellitus and the incidence of non-hemorrhagic stroke. OR value = 0.59 with 95% CI 0.41-0.86. There is a correlation between cholesterol and the incidence of non-hemorrhagic stroke. OR value = 5.22 with 95% CI 3.31-8.25. there is a relationship between atrial fibrillation and the incidence of non-hemorrhagic stroke. OR value = 6.76 with 95% CI 4.39-10.41. there is a relationship between smoking and the incidence of non-hemorrhagic stroke. OR value = 3.25 with 95% CI 2.18-4.86. there is a relationship between obesity and the incidence of non-hemorrhagic stroke. OR value = 1.64 with 95% CI 1.14-2.36. there is a relationship between physical inactivity and the incidence of non-hemorrhagic stroke. OR value = 4.86 with 95% CI 3.32-7.11. Whereas in the fisher's exact test, there was no correlation between drinking alcohol and the incidence of non-hemorrhagic stroke.

Keywords: Non-hemorrhagic stroke, risk factors, young adulthood.

INTRODUCTION

Stroke is often identified with the disease in the elderly. As a result of the demographic and technological transitions in Indonesia, resulting changes in patterns of non-communicable diseases such as strokes which were previously predominantly attacked by parents over the age of 50 years. But now there is also a tendency for patients under 50 years of age (Alchuriyah, 2016). The reality is almost 10% of strokes occur at a relatively young age (less than 45 years). It is estimated that the incidence of stroke at the age of under 45 years is between 7-15 cases/100,000 inhabitants/year and more rarely in the group of children that is 1-8 cases per 100,000 per year. The incidence increases according to age. At the age of fewer than 35 years, the incidence of stroke is less than 10/100,000 population/year, the age of 35-44 is around 22-45/100,000 population/year. The incidence of stroke in young people in the 35-44 year group is more common in men (Bevan, 1990; Griffi D, 2011). This can occur because of changes in lifestyle, especially young urban modern people. A number of behaviors such as consuming fast food containing high-fat content, smoking habits, alcoholic beverages, excessive work, lack of exercise and stress, have become a person's lifestyle, especially in urban areas, even though all these behaviors can be risk factors stroke (Sitorus, 2010).

Stroke affects socioeconomics due to the disability that results from it. Because the prevalence of stroke is increasing in Indonesia and is the number one cause of disability, prevention is very important to do through early detection of risk factors and control efforts (Hanchaiphiboolkul et al, 2011; Meretoja, 2011). Various studies have managed to identify stroke risk factors including hereditary, age, sex, socioeconomics, geography, foods high in fat and calories, lack of eating vegetables, smoking, alcohol, lack of physical activity, hypertension, obesity, diabetes mellitus, atherosclerosis, peripheral arterial disease, heart disease (heart failure), and dyslipidemia (Air EL, 2007: Sander D, 2008: Asberg, 2010; Huang Y. et al, 2014).

MATERIAL AND METHOD

This study aims to analyze the risk factors that cause the incidence of non-hemorrhagic stroke in young adults. This research was carried out in the Regional General Hospital of Makassar City, Stella Maris Makassar Hospital and Jakarta National Brain Center Hospital from March to December 2018. The main sources needed in this study are 1) medical record data of non-hemorrhagic stroke patients as cases and non-stroke as controls obtained

from hospital medical records 2) research subjects were inpatients and outpatients who had non-hemorrhagic strokes who had complete data in accordance with the research variable as a case group 3) inpatients and outpatients who did not have a non-hemorrhagic stroke who had complete data in accordance with the research variable as a control group 4) research subjects were male and female non-hemorrhagic stroke patients the maximum age is 45 years as a case group, while the control group is patients who do not experience strokes of male or female sex with a maximum age of 45 years, thus the sample size is 500 (250 for cases and 250 for controls).

Evidence of the effectiveness of this analysis is done in several steps 1) Secondary data obtained from hospital medical records for non-hemorrhagic stroke patients who are maximal 45 years of age, 2) secondary data of patients who have not had a stroke but have complete data on the variables studied retrieval of data by filling in the observation sheet in the form of a checklist whose data is obtained from the medical record, 4) Recording of variables made in the list which are then made in the frequency distribution table and analysis table.

RESULT AND DISCUSSION

Risk factors for non-hemorrhagic stroke

Determination of risk factors for stroke in this study is based on theory, which can be divided into three parts, namely risk factors that cannot be modified, which can be modified and potentially modified risk factors (Wirawan, 2009; Misbach, 1999). The variables that are risk factors for the incidence of non-hemorrhagic stroke in young adults in this study are age, sex, hypertension, diabetes mellitus (DM), hypercholesterolemia, atrial fibrillation, obesity, and physical inactivity. These risk factors are used because the results of the study show that the factors of age, sex, hypertension, diabetes mellitus, hypercholesterolemia, atrial fibrillation, obesity, and physical inactivity have the greatest likelihood of occurrence of non-hemorrhagic strokes in young adulthood. Hypertension has an opportunity of 4.117 times greater for stroke than non-hypertensive patients. This can occur because the presence of increased systemic blood pressure will make the blood vessels of the brain contract, which the degree of contraction depends on the high and low pressure on the blood (Ramadhanis, 2012; Sofyan, 2012). Diabetes has approximately twice the risk of stroke compared to non-diabetes. This happens because high glucose levels in the blood can damage blood vessels in the form of hardening and narrowing of blood vessels to the brain resulting in strokes. Debette et al. (2011) stated that cholesterol levels below 200 mg/dl were considered safe, whereas above 240 mg/dl were dangerous and put a person at risk of heart disease and stroke. Febrile atria are a type of irregular heartbeat, as a result, blood clots are more likely to form in the heart, increasing the risk of stroke. If a blood clot forms in the heart, it is possible to walk along with the bloodstream to the brain. If the clot blocks one of the arteries leading to the brain, it will cause a stroke. Smoking increases the risk of stroke threefold and exposure to environmental fumes at home increases the risk of stroke by 1.5 times. There was a strong association between smoking and the incidence of intracerebral hemorrhage (ICH), subarachnoid hemorrhage (SAH) and non-hemorrhage stroke (Shah, 2010). There are four important things about the relationship between obesity and the risk of stroke. First compared to body mass index, where a measure of central obesity is a better predictor of stroke. Second, the relative risk of stroke associated with obesity is higher in middle-aged people compared to older people. Third, the association of obesity with ischemic and intrauterine bleeding. The relationship between obesity and the increased risk of stroke is substantially explained by hypercholesterolemia,

hypertension and diabetes mellitus (Keman et al, 2013). Men who do physical activity have less risk of acute ischemic stroke 13.95 times greater than those who do enough physical activity. Regular exercise activities can reduce blood pressure, blood glucose levels, increase HDL cholesterol levels and reduce LDL cholesterol and lose weight (Hermawan, 2013). Thus the factors of age, gender, hypertension, diabetes mellitus, hypercholesterolemia, atrial fibrillation, obesity, and physical inactivity can be used as a variable risk factor for the occurrence of non-hemorrhagic strokes in young adulthood.

Risk factors that cannot be modified

Risk factors that cannot be modified in this study are age and gender. The results showed that respondents who were at high risk (> 40 years) had more non-hemorrhagic strokes than those who were not affected by non-hemorrhagic strokes, as well as those at low-risk age who were not affected by non-hemorrhagic strokes than those who had a non-hemorrhagic stroke. In gender factors, more men are affected by non-hemorrhagic strokes than those not affected by non-hemorrhagic strokes, whereas in female sex there are more non-hemorrhagic strokes than those who have a non-hemorrhagic stroke. For more details, can be seen in Table 1.

Table 1. Large Age and Gender Risk Suffering from Non-Hemorrhagic Stroke

Variable		Non-hemorrhagic strokes and Kontrol				Total		p	OR
		Cases		Control					
		n	%	n	%	n	%		
Age	High risk	159	63,6	150	60	309	61,8	0,407	1,17 (0,81 – 1,67)
	Low risk	91	36,4	100	40	191	38,2		
Total		250	100	250	100	500	100		
Gender	Men	164	65,6	113	45,2	277	55,4	0,000	2,31 (1,61 – 3,32)
	Women	86	34,4	137	54,8	223	44,6		
Total		250	100	250	100	500	100		

The results of the statistical test with Chi-square showed no significant relationship between age and the incidence of non-hemorrhagic stroke in young adults with p = 0.407> 0.05, where OR = 1.17 with 95% CI 0.81 - 1.67, meaning that age is a risk factor for the incidence of non-hemorrhagic strokes and respondents who are at high risk will be at risk of having a non-hemorrhagic stroke 1.17 times compared to the age of low risk. In the sex factor, there is a significant relationship between gender and the incidence of non-hemorrhagic stroke in young adults with p = 0.000 <0.05, where OR = 2.31 with 95% CI 1.61 - 3.32, which means gender is a risk factor for the incidence of non-hemorrhagic stroke, where male respondents will be at risk of having a non-hemorrhagic stroke 2.31 times compared to women.

Modifiable risk factors

The risk factors that can be modified in this study are hypertension, diabetes mellitus, hypercholesterolemia, and fibrillation atria. These risk factors are interrelated with one another thus it can be said that stroke risk factors are very complex there by it is difficult to determine the diagnosis of the causal factors. The results showed that modifiable risk factors were the highest factors causing non-hemorrhagic stroke compared to other factors (Ramadhanis, 2012; Debette et al,

2011; Sofyan et al, 2012). For details, it can be seen in Table 2.

Table 2. Large Modifiable Risk Factors Causing Non-Hemorrhagic Stroke

Variable (risk factors)		Non-Hemorrhagic Stroke				Total		p	OR
		Cases		Control					
		n	%	n	%	n	%		
Hypertension	Yes	138	55,2	98	39,2	236	47,2	0,000	1,91 1,34 – 2,73
	No	112	44,8	152	60,8	264	52,8		
Total		250	100	250	100	500	100		
Diabetes mellitus	Yes	146	58,4	176	70,4	322	64,4	0,005	O,59 0,41 – 0,86
	No	104	41,6	74	29,6	178	35,6		
Total		250	100	250	100	500	100		
hypercholesterolemia	Yes	104	41,6	30	12,0	134	26,8	0,000	5,22 3,31 – 8,25
	No	146	58,4	220	88,0	366	73,2		
Total		250	100	250	100	500	100		
Atrial fibrillation	Yes	133	53,2	36	14,4	169	33,8	0,000	8,76 4,39 – 10,4
	No	117	46,8	214	85,6	331	66,2		
Total		250	100	250	100	500	100		

The results of the Chi-square test showed that there was a significant relationship between hypertension and the incidence of non-hemorrhagic stroke with p = 0,000 <0,05, where OR = 1,91 with 95% CI 1.34 - 2,73 which meant that respondents with hypertension would be at risk of experiencing non-hemorrhagic stroke 1.91 times compared to respondents who were not hypertensive. Diabetes mellitus factors indicate that there is a relationship between diabetes mellitus and non-hemorrhagic stroke with p=0.005 <0.05, where OR = 0,59 with 95% CI 0.41 - 0.86, which means that Diabetes Mellitus is a protective factor in the incidence of non-hemorrhagic stroke. The factor of hypercholesterolemia has a significant relationship with the incidence of non-hemorrhagic stroke with p = 0,000<0,05, where OR = 5,22 with 95% CI 3,31 - 8,25 which means hypercholesterolemia is a risk factor, where respondents who have hypercholesterolemia have the risk of having a non-hemorrhagic stroke is 5.22 times compared to those without hypercholesterolemia. Atrial fibrillation factors showed a significant association between atrial fibrillation and the incidence of non-hemorrhagic stroke with p = 0,000 <0,05, where OR = 6,76 with 95% CI 4,39 - 10,4 which means atrial fibrillation is a risk factor non-hemorrhagic stroke, where respondents who experience atrial fibrillation will be at risk of having a non-hemorrhagic stroke 6.76 times compared to respondents who did not experience atrial fibrillation

Potentially modified risk factors

Potentially modified risk factors are generally factors caused by lifestyles, such as smoking, obesity, physical inactivity, and hypercholesterolemia. These lifestyle changes mainly occur in modern urban youth. A number of behaviors such as consuming fast food containing high-fat content, smoking habits, alcoholic beverages, excessive work, lack of exercise and stress, have become a person's lifestyle, especially in urban areas, even though all these behaviors can be risk factors stroke (Sitorus, 2010). These factors have an influence on the occurrence of stroke. For more details, can be seen in Table 3.

Table 3. Large Risk Modified Potential Factors Causes Non-Hemorrhagic Stroke

Variables (risk factors)		Non-Hemorrhagic Stroke				Total		p	OR
		Cases		Control					
		n	%	n	%	n	%		
Smoke	Yes	109	43,6	48	19,2	157	31,4	0,000	3,25 2,18 – 4,86
	No	141	56,4	202	80,8	343	68,6		
Total		250	100	250	100	500	100		
Obesity	Yes	169	67,6	140	56,0	309	61,8	0,008	1,64 1,14 – 2,36
	No	81	32,4	110	44,0	191	38,2		
Total		250	100	250	100	500	100		
Physical inactivity	Yes	160	64,0	67	26,8	273	54,6	0,000	4,86 3,32 – 7,11
	No	90	36,0	183	73,2	227	45,4		
Total		250	100	250	100	500	100		
Alcohol	Yes	2	0,8	1	0,4	3	0,6	1,000	2,00 0,18 – 22,29
	No	248	99,2	249	99,6	497	99,4		
Total		250	100	250	100	500	100		

The results of the Chi-square test showed that there was a significant relationship between smoking and the incidence of non-hemorrhagic stroke with p = 0,000, where OR = 3,25 with 95% CI 2.18 - 4.86 which means respondents who smoked would be at risk of having a non-hemorrhagic stroke 3,25 times compared to non-smoking respondents. The results of the analysis show that obesity is significantly associated with the incidence of non-hemorrhagic stroke with p = 0.008 <0.05, where OR = 1,64 with 95% CI 1.14 - 2.36, which means that obese respondents will be at risk of having a non-hemorrhagic stroke 1,64 times compared to non-obese. The results of the analysis showed that physical inactivity had a significant relationship with the incidence of non-hemorrhagic stroke with p = 0,000 <0,05, where OR = 4,86 with 95% CI 3,32 - 7,11 which meant that respondents with physical inactivity would be at risk of experiencing non-hemorrhagic stroke 4, 86 times compared to respondents who have enough physical activity. Fisher's exact test results showed that there was no significant correlation between drinking alcohol and the incidence of non-hemorrhagic stroke with p = 1,000> 0.05, where OR = 2,00 with 95% CI 0.18 - 22, 29 which means respondents who consumed alcohol risk of having a non-hemorrhagic stroke 2,00 times compared to respondents who did not consume alcohol.

The analysis showed that gender risk factors, hypertension, diabetes mellitus, hypercholesterolemia, atrial fibrillation, smoking, obesity, and physical inactivity, while age and alcohol factors did not show a significant association with the incidence of non-hemorrhagic stroke in young adults. It is recommended to prevent the occurrence of hypertension, diabetes mellitus, hypercholesterolemia, atrial fibrillation, smoking, and physical inactivity by improving healthy lifestyle patterns. Alcohol consumption factors, although not having a significant relationship to the occurrence of non-hemorrhagic stroke, but need to be avoided because alcohol has an influence on the occurrence of other risk factors as a cause of non-hemorrhagic stroke.

DISCUSSION

This study presents risk factors that cause non-hemorrhagic stroke in young adults. Sex and age characteristics have a relationship with blood pressure. This happens because gender and age factors are not a direct factor, but due to multi-factors in each sex for hypertension to occur. This is in line with the opinion of

Julius (2008) that in women the risk of hypertension will increase after menopause which affects the decrease in the hormone estrogen which causes a decrease in levels of High-Density Lipoprotein (HDL). Likewise in male, the causes of hypertension are due to poor behavior towards health or prevention of hypertension, including alcohol consumption, smoking and physical activity (Carretero, et al, 2000, Sustrani et al., 2004; Novita, 2008). Thus it can be concluded that the most sex risk factor is male sex compared to women. Hypertension is the main risk factor for the occurrence of non-hemorrhagic strokes because hypertension causes physiological changes in blood vessels so that it can cause strokes (Feigin, 2011). This can occur because salt consumption and other precipitating factors such as smoking, physical inactivity and obesity can cause blood pressure to rise which will cause damage to the walls of blood vessels in the form of hardening of the arteries and encourage the formation of blood clots and aneurysms which all lead to stroke (Iskandar, 2004: Marhani, 2014; Shadine, 2010). The mechanism mentioned above will be faster if accompanied by the presence of other risk factors that will accelerate the formation of plaques and thrombus which are the direct causes of non-hemorrhagic strokes (Rahajeng, 2009). Diabetes mellitus is a group of metabolic diseases with hyperglycemia characteristics that occur in insulin disorders, this condition is associated with long-term damage in the form of dysfunction or failure of several organs such as eyes, kidneys, heart and blood vessels including brain blood vessels (Soegondo, 2002). Diabetes mellitus is not the only cause of non-hemorrhagic strokes but can also be a risk factor for other diseases such as heart and kidney disease. Therefore people with diabetes mellitus should maintain a diet accompanied by adequate physical activity to burn glucose that is buried in the blood (Micha, 2010). High cholesterol levels in the blood will cause changes in the walls of blood vessels which eventually lead to blockage of blood flow in the blood vessels of the brain there by it can lead to stroke (Indriyani, 2009). Increased cholesterol levels in the blood will react with other substances and experience deposition in blood vessels, especially blood vessels of the heart and brain (Rother et al., 2013). Smoking habits have become a lifestyle. People smoke, especially beginners, teenagers, smoking considered its a modern lifestyle so they smoke from the age they are still in school due to association with their peers who smoke. Smoking addiction is difficult to abandon, especially those who feel insecure if they don't smoke. This smoking habit will certainly increase the risk of damage to blood vessels or hardening of the arteries which will eventually lead to stroke.

Obesity is the impact of excess energy intake compared to the energy needed by the body therefore the excess is buried or stored in the form of fat. Physical activity is one of the factors that can increase energy needs thus it can prevent or reduce the occurrence of accumulation of fat in the body. Lack of activity will cause obesity to increase and moderate and high physical activity will reduce the occurrence of obesity (Soegih, 2009). The metabolic syndrome is a multiple risk factor for cardiocerebrovascular disease and this syndrome develops through the interaction between obesity and metabolic vulnerability. The metabolic syndrome is an independent risk for cardiovascular disease (Mexitalia et al., 2009). Doing physical activities will prevent us from various diseases. By doing an adequate physical activity can reduce the increase in blood sugar levels, cholesterol levels and avoid obesity and strengthen the heart. By doing an adequate physical activity can be

avoided the occurrence of strokes. Increased blood pressure caused by activities that are less likely to cause complications such as coronary heart disease, kidney function disorders, strokes and so on. Alcohol does not have a significant relationship to the occurrence of non-hemorrhagic strokes in young adulthood, but the consumption of alcoholic beverages is also associated with hypertension. Heavy alcohol drinkers also tend to be exposed to hypertension, although the mechanism for the onset of hypertension due to alcohol is not known exactly (Sheps, 2005). Excessive alcohol consumption will affect the body to cause other risk factors such as hypertension and liver disorders for non-hemorrhagic stroke. This statement is in line with the results of Malonda's research (2012) which states that alcohol consumption is one of the risk factors for hypertension.

CONCLUSION

This study has recommended that non-hemorrhagic strokes be caused by modifiable risk factors, modifiable risk factors, and potentially modified risk factors, which include sex factors, hypertension, diabetes mellitus, hypercholeste-rolemia, atrial fibrillation, smoking and physical inactivity. This finding is expected to contribute positively to improving the quality of life of the community, especially young adults. This finding also provides education to the community to carry out prevention by changing their lifestyle into a healthy lifestyle.

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