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Risk Factors for Stroke Events in Bahteramas Hospital, Southeast Sulawesi Province

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ABSTRACT

Introduction: Based on Stroke data in the Bahteramas Hospital of Southeast Sulawesi Province in 2019, there were 53 cases. In 2020 the number of stroke cases was 119 cases and in 2021 the number of stroke cases was 164 cases. The purpose of the study was to analyze the risk factors for Hypertension, DM, Cholesterol and Diet against the incidence of Stroke in the Bahteramas Hospital, Southeast Sulawesi Province.

Method: This study used a Case Control Study approach. The population numbered 136 people. The Study Sample totaled 68 of Stroke patients and 68 of patients who did not stroke. The sample technique is Simple Random Sampling. The data is processed using the Odds Ratio Test and logistic regression.

Result: Hypertension is a risk factor with an OR value of 12,963, Diabetes Mellitus or OR value of 2,263, cholesterol OR value of 7,756 and a diet of OR value of 1,304. Regression tests showed that hypertension and cholesterol were the factors most at risk for stroke.

Conclusion: Hypertension, diabetes mellitus, cholesterol and diet are risk factors for the incidence of stroke in the Bahteramas Hospital, Southeast Sulawesi Province. The most dominant factors at risk for the incidence of stroke are hypertension and cholesterol.

Introduction

Stroke is a disease that can be fatal in either death or long-term disability. Stroke affects residents in developed and developing countries in the world. This disease is a disease that is generally limited to older adults and the elderly, but the worrying thing is that there is a tendency to have an increasing number of young adults suffering from this disease around the world. The incidence of stroke events in the world at risk is 150-250 per100,000 and the prevalence is 300-700 per100,000.[1]

The World Health Organization (WHO) stated that Indonesia is ranked 97th in the world for the highest number of stroke sufferers with the

number of deaths reaching 138,268 people or 9.7% of the total deaths that occurred in 2011. Every year in the United States about 795,000 people have strokes, of which 610,000 have had strokes for the first time, 185,000 people with recurrent strokes and of which more than 140,000 people die per year. The data shows that every 4 (four) minutes one person dies from a stroke. The incidence of bleeding stroke is between 15%-30% with an estimated increase of 15% and ischemic stroke between 70%-85% with an estimated increase of 15%. Two-thirds of strokes occur in developing countries or Asia with a bleeding stroke incidence of about 30% and ischemic 70%, while in western societies, 80% of patients have an ischemic stroke and 20% have a hemorrhagic stroke.[2]

The prevalence of stroke based on doctor's diagnosis in the population aged ≥ 15 years increased compared to 2013 (from 7% to 10.9%) or estimated at 2,120,362 people, the highest in East Kalimantan Province (14.7%) and in Yogyakarta (14.6%), the lowest in Papua Province (4.1%) and North Maluku (4.6%). Meanwhile, stroke cases in Southeast Sulawesi in 2018 were 9.3 per 1000 population.[3]

Stroke is the main cause of disability in Indonesia. Various post-stroke abnormalities can affect the quality of life of sufferers. Post-stroke psychiatric disorders reach 30% and are often overlooked thus providing challenges to overcome them. The frequent post-stroke psychiatric disorders are depression, anxiety, fatigue and apathy while the rare ones are psychosis, mania, and personality changes. The causes of post-stroke psychiatric disorders are not yet known and their relationship with the location of the lesions is unclear. Research is needed to identify the cause and clinical trials through therapies carried out by dr. Terawan, namely DSA (Digital Subtraction Angiography), is a medical examination method that uses fluoroscopy techniques that aim to provide an overview of blood vessels that are closely related to stroke. You do this by inserting a catheter through a blood vessel and later a contrast media spraying will be carried out. After that, the X-ray machine will capture the picture inside the blood vessels. DSA is able to provide an overview of the body's blood vessels of any part including the heart and brain while heparin is used as an anti-coagulant (blood thinner) to prevent blood clots before surgery as well as to treat blood clots for the prevention and treatment of stroke.[4]

Method

This type of research is quantitative research with observational methods. The design of this study uses a Case Control Study, namely to analyze the Risk Factor between independent variables and dependent variables retrospectively. This study used a Case Control Study approach. The study has been carried out for 30 days. The population numbered 136 people. The Research Sample totaled 68 samples of Stroke patients and 68 samples of patients who did not stroke. The sample technique in this study is Simple Random Sampling. The data was processed using the Data Normality Test (Kolmogrov Smirnov Test) Odds Ratio Test and logistic regression.

Result

Table 1 showed that of the 68 patients who suffered a stroke, there were 56 (82.4%) respondents who were at high risk and 12 (17.6%) respondents who were at low risk. Of the 68 patients who did not suffer from stroke, there were 18 (26.5%) who were at high risk of hypertension and 50 (73.5%) respondents who were at low risk. Based on the results of statistical tests using the chi square test obtained results X^2 Calculate 40.581 > X^2 Tab 3.841 (df = 1), for the value of φ = 0.561 shows that there is a moderate relationship between hypertension and the incidence of stroke in Bahteramas Hospital, Southeast Sulawesi Province. The odds ratio analysis that the OR value was 12,963, showed that hypertension was at 13 times the risk of stroke compared to non-hypertensive ones.

Table 2 showed that of the 68 patients who suffered a stroke, there were 33 (48.5%) respondents who were at high risk and 35 (51.5%) respondents who were at low risk. Of the 68 patients who did not suffer from stroke, there were 20 (29.4%) who were at high risk of Diabetes Mellitus and 48 (70.6%) respondents who were at low risk. Based on the results of statistical tests using the chi square test obtained results X^2 Calculate 4,452 > X^2 Tab 3,841 (df = 1), the value of φ = 0.196 shows that there is a weak

relationship between diabetes mellitus and the incidence of stroke in Bahteramas Hospital, Southeast Sulawesi Province. The odds ratio analysis that the OR value was 2,263, showed that diabetes mellitus was at risk 3 (three) times the incidence of stroke compared to those who were not diabetes mellitus.

Table 3 showed that of the 68 patients who suffered a stroke, there were 55 (80.9%) respondents who were at high risk and 13 (28.5%) respondents who were at low risk. Of the 68 patients who did not suffer from stroke, there were 24 (35.3%) who were at high risk of cholesterol and 44 (64.7%) respondents who were at low risk. Based on the results of statistical tests using the chi square test obtained results X^2 Calculate 27.182 > X^2 Tab 3.841 (df = 1) and the φ value of 0.462 showed that there was a moderate relationship between cholesterol and stroke events in Bahteramas Hospital, Southeast Sulawesi Province. Odds ratio analysis that the OR value of 7,756 shows that cholesterol is at risk 8 (eight) times the incidence of stroke compared to non-cholesterol.

Table 4 showed that of the 68 patients who suffered a stroke, there were 31 (45.6%) respondents who often consumed stroke-inducing foods and 37 (54.4%) respondents who rarely consumed stroke-inducing foods. Of the 68 patients who did not suffer from stroke, there were 16 (23.5%) respondents who often consumed stroke-inducing foods and 52 (76.5%) respondents who rarely consumed stroke-inducing foods. Based on the results of statistical tests using the chi square test obtained results X^2 Calculate 6,372 > X^2 Tab 3,841 (df = 1), the value of φ 0.232 shows that there is a weak relationship between diet and the incidence of stroke in Bahteramas Hospital, Southeast Sulawesi Province. The odds ratio analysis that the OR value of 2,723 showed that frequently consuming stroke-triggering foods was at 3 (three) times the risk of stroke events compared to those who rarely consumed stroke-triggering foods.

Table 1
Risk Factors for Hypertension to the Incidence of Stroke in the Bahteramas Hospital Southeast Sulawesi Province in 2022

Hypertension	Incidence of Stroke						X^2count	X^2table	ϕ	OR
	Suffer		Does not suffer		Total					
	n	%	n	%	n	%				
High Risk	56	82,4	18	26,5	74	54,4	40,581	3,841	0,561	12,963
Low Risk	12	17,6	50	73,5	62	45,6				
Sum	68	100	68	100	136	100				

Table 2
Risk Factors for Diabetes Mellitus to the Incidence of Stroke in the Bahteramas Hospital Southeast Sulawesi Province in 2022

Diabetes Mellitus	Incidence of Stroke						X^2count	X^2table	ϕ	OR
	Suffer		Does not suffer		Total					
	n	%	n	%	n	%				
High Risk	33	48,5	20	29,4	53	39,0	4,452	3,841	0,196	2,263
Low Risk	35	51,5	48	70,6	83	61,0				
Sum	68	100	68	100	136	100				

Table 3
Risk Factors for Cholesterol to the Incidence of Stroke in the Bahteramas Hospital Southeast Sulawesi Province in 2022

Cholesterol	Incidence of Stroke						X^2count	X^2table	ϕ	OR
	Suffer		Does not suffer		Sum					
	n	%	n	%	n	%				
High Risk	55	80,9	24	35,3	79	58,1	27,182	3,841	0,462	7,756
Low Risk	13	28,5	44	64,7	57	41,9				
Sum	68	100	68	100	136	100				

Table 4
Risk Factors for Dietary to the Incidence of Stroke in the Bahteramas Hospital Southeast Sulawesi Province in 2022

Dietary	Incidence of Stroke						X^2count	X^2table	ϕ	OR
	Suffer		Does not suffer		Sum					
	n	%	n	%	n	%				
Often	31	45,6	16	23,5	47	34,6	6,372	3,841	0,232	2,723
Infrequently	37	54,4	52	76,5	89	65,4				
Jumlah	68	100	68	100	136	100				

Discussion

Hypertension or high blood pressure is a strong risk factor that can lead to stroke. Both high systolic and diastolic pressure are risk factors for stroke. Diabetes mellitus is a risk factor for stroke but not as strong as hypertension. One of the important risk factors for the occurrence of stroke is hypertension.[5]

Hypertensive patients have a 4,117 chance of suffering a stroke compared to non-hypertensive patients. The existence of stroke risk factors, proves that stroke is a disease that can be foreseen in advance and is not something that just happens, so the term cerebrovascular accident has been abandoned. Stroke is damage to the target organ in the brain caused by hypertension. Strokes arise due to bleeding, elevated intra-cranial pressure, or due to an embolus detached from non-cerebral vessels exposed to high pressure. If there is an increase in one of these variables that is not compensated, it can cause hypertension. The body has a system that serves to prevent acute changes in blood pressure caused by circulatory disorders and maintain blood pressure stability in the long term.[6]

Failure to supply blood will lead to impaired functioning of the part of the brain or affected or nerve cell death (necrosis) and this event is called a stroke. One of the causes of the increasing cases of vascular diseases, such as heart disease and stroke, is the lack of public awareness to implement a healthy lifestyle pattern.[7]

Diabetes Mellitus is a condition where there is an increase in insulin in the blood in diabetes mellitus which is currently increasing in number in the community, the condition increases the absorption of the amount of sodium in the body. Absorption of sodium will increase potassium levels in the blood and will lead to stimulated sympathetic nervous system. This is thought to cause structural changes in the blood that affect heart function and blood pressure. Vascular problems that arise due to diabetes and are aggravated by hypertension, poor diet and lack of physical activity. So that diabetes mellitus is a condition that will indirectly affect the occurrence of hypertension.[8]

Diabetes mellitus patients, where in a state of excessive blood sugar in the body, it can cause an increase in free radicals or ROS (Reactive

Oxigen Species), thus causing damage to the DNA strand in the cells which will cause endothelial dysfunction. In addition, there are metabolic disorders in diabetes mellitus, namely an increase in levels of PAI-1 (plasminogen activator inhibitor-1), so it tends to form abnormal clots, as a result of which it will increase the intravascular coagulation process. From this process will result in the formation of a thrombus, if the thrombus is released, it can cause an embolus and can enter the blood vessels of the brain so that it will inhibit the flow of blood to the brain. As a result, the brain lacks the supply of oxygen and glucose so that the cells in the brain cannot produce energy (ATP). If the brain lacks energy, cell death (apoptosis) occurs which causes death in the brain.[9]

High levels of total cholesterol are one of the modifiable risk factors, which can lead to the occurrence of ischemic stroke. High levels of total cholesterol can cause the occurrence of atherosclerosis, which is a basic pathology in the occurrence of ischemic strokes or non-hemorrhagic strokes . High levels of total cholesterol can be found in 19% of total ischemic stroke survivors, and have been shown to be an independent predictor for low totals associated with the incidence of microaneurysms that can cause intracerebral hemorrhage (ICH).[10] There is an inverse relationship between total cholesterol levels and the incidence of hemorrhagic stroke. It is associated with the function of cholesterol in strengthening and stabilizing the walls of blood vessels, especially when the walls of blood vessels require greater strength to withstand high blood pressure.[11]

The triglycerides recorded in the study were high ≥ 200 mg / dl amounting to 61 0rang (63.5 %). The high levels of triglycerides are largely due to food and lifestyle factors (life style) that are commonly consumed, 67 families said they consume foods that contain fat. Excessive fat input will result in abnormal cholesterol deposits in the blood that line up to the walls of blood vessels causing atherosclerosis, and stroke.[12]

An abnormal diet is triggered by two factors, namely the habit of consuming large amounts of food and irregular eating habits. When a person has a good diet, it is less likely that a person will have a stroke than those who lack or are not good in their diet. A good diet stimulates the body to secrete antioxidants that can protect the body from the negative effects of free radicals.[13]There is a lifestyle relationship with the incidence of stroke. A healthy lifestyle requires a good defense by avoiding excesses and deficiencies that cause imbalances that lower immunity and all that brings disease. This also causes that to get excellent health the best way is to change lifestyle, namely the diet that can be seen from activities by maintaining health.[14]

Conclusion

Research shows that hypertension, DM, cholesterol and diet are risk factors for the incidence of stroke in the Bahteramas Hospital, Southeast Sulawesi Province.

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