

COMPARISON OF SEVERITY OF NON-HEMORRHAGIC STROKE WITH DIABETES MELLITUS (DM) TYPE 2 AND WITHOUT DIABETES MELLITUS (DM) TYPE 2 BASED ON NIHSS

Nurul Ariva Sulistiani. M^{1*}, Fitriah Handayani², Muh. Nur Ikhsan Liwang³, Mohammad Salman⁴

^{1*}Study Program of Medical Education, Medical Faculty, Tadulako University, Palu, Indonesia

²Departemen of Neurology, Medical Faculty, Tadulako University, Palu, Indonesia

³Departemen of Internist, Medical Faculty, Tadulako University, Palu, Indonesia

⁴Departemen of Pediatrics, Medical Faculty, Tadulako University, Palu, Indonesia

ARTICLE INFO

Keywords :

Stroke, Diabetes Mellitus (DM) Type 2, NIHSS (The National Institute of Heart Stroke Scale)

Email :

nurularivasulistiani@gmail.com
fitriahhandayani.pspduntad@gmail.com
ikhsanliwang@yahoo.com
msalman30000@gmail.com

ABSTRACT

A stroke is a disease or functional problem of the brain that manifests as nerve paralysis due to a blockage in the blood supply to the brain. Acute stroke is a brain disorder caused by the interruption of blood flow to the brain due to a blockage (ischemic stroke) or hemorrhage (hemorrhagic stroke). Individuals with diabetes mellitus with ischemic stroke exhibit a distinct clinical pattern and a more favorable neurovascular outcome than patients without diabetes. Objective: to compare the severity of non-hemorrhagic stroke between individuals with Diabetes Mellitus (DM) Type 2 and those without Diabetes Mellitus (DM) Type 2 using The National Institutes of Health Stroke Scale (NIHSS). Methods: Analytical observational research design with a retrospective methodology. 30 responders were divided into 15 stroke patients with Diabetes Mellitus (DM) Type 2 and 15 stroke patients without Diabetes Mellitus (DM) Type 2. The average value or mean rank for the Stroke group with Diabetes Mellitus (DM) Type 2 was 18.77, while it was 12.23 for the Stroke group without Diabetes Mellitus (DM) Type 2. The P-Value for the test is 0.076. Results The P value is greater than 0.05, indicating that there is no significant difference between stroke with Diabetes Mellitus (DM) Type 2 and stroke without Diabetes Mellitus (DM) Type 2 with regard to severity. As stated previously, the outcomes can be affected by the risk factor of Diabetes Mellitus (DM) Type 2, which comprises of multiple risk factors that can have an effect.

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1. INTRODUCTION

Stroke is a disease or functional disorder of the brain in the form of nerve paralysis due to obstruction of blood flow to the brain. In simple terms, acute stroke is a brain disease due to the cessation of blood supply to the brain due to blockage (ischemic stroke) or bleeding (hemorrhagic stroke)[1]. Stroke is one of the diseases that is a problem in the world. This is illustrated by the commemoration of World Stroke Day on October 29. The world stroke organization has disabled nearly 85% of people at risk of a stroke, but this can be avoided if there is awareness to address risk factors early on. The world health agency predicts that the cause of death in the world caused by stroke will increase along with the deaths from heart disease and cancer, from approximately six million in 2010 to eight million in 2030[2].

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The leading cause of the high incidence of stroke in Indonesia is unhealthy lifestyles and patterns of people, such as laziness to move, eating fatty foods, and high cholesterol, so many of them suffer from diseases that trigger strokes. More strokes are triggered by hypertension, known as the silent killer, diabetes mellitus, obesity, and various health problems associated with degenerative diseases[3].

Stroke risk factors consist of modifiable and non-modifiable risk factors. Non-modifiable risk factors are age, gender, race, heredity, and congenital vascular disorders. Modifiable risk factors include hypertension, diabetes mellitus, smoking, hypercholesterolemia, obesity, alcohol use, lack of exercise, heart disease, high-fat diet, drug abuse, use of contraceptive drugs, and stress. By knowing the risk factors that cause stroke at the productive age, it will be possible to carry out primary prevention efforts through preventive and promotive activities so that the incidence of stroke at the practical age can be prevented. In connection with this, it is necessary to study the risk factors for stroke in patients of productive age through a study[4].

One of the risk factors for stroke is Diabetes Mellitus (DM) Type 2. Diabetes mellitus is a cause of hyperglycemia. Various things cause hyperglycemia, but hyperglycemia is most often caused by diabetes mellitus. One of the mechanisms of Diabetes Mellitus (DM) Type 2 causing an ischemic stroke is the process of atherosclerosis. Approximately 30% of patients with cerebral atherosclerosis have diabetes. Hyperglycemia can cause damage to the walls of large blood vessels and peripheral blood vessels, increase platelet aggregation, and increase blood viscosity which will cause an increase in blood pressure or hypertension and lead to ischemic stroke. The pathogenesis of stroke in patients with Diabetes Mellitus (DM) Type 2, hypoglycemia, and hyperglycemia will affect worse outcomes[5]. Diabetes Mellitus (DM) Type 2 is an independent risk factor for stroke. Patients with Diabetes Mellitus (DM) Type 2 have endothelial cell function changes and vascular relaxation failure. Diabetes Mellitus (DM) Type 2 patients also experience the inability to increase cerebral blood flow in response to vasodilator stimulation caused by diabetic autonomic neuropathy and/or endothelial abnormalities and cause thickening of the basement membrane[6].

Atherosclerosis is a significant contributor to coronary heart disease and ischemic stroke. In patients who have been diagnosed with the disease, despite significant reductions in LDL cholesterol, the residual risk of recurrence is still present. Increasing HDL levels conducted an experimental study. The results showed an improvement in the burden of atherosclerotic plaques. There is an inverse relationship between HDL cholesterol and the development of cardiovascular disease. This is related to HDL's function in reverse cholesterol transport (RCT) [7].

According to the American Diabetic Association (ADA 2009), the Classification of Diabetes is divided into Diabetes Mellitus (DM) Type 1, Diabetes Mellitus (DM) Type 2, Other Types of Diabetes Mellitus, and Gestational Diabetes. There are generally two types of stroke, namely hemorrhagic stroke, caused by the rupture of a blood vessel in the brain, resulting in bleeding in the brain, while non-hemorrhagic or ischemic stroke is a stroke that occurs when blood flow to the brain is blocked or blocked[8]. Bleeding and blockages in blood vessels cause the flow of blood that carries oxygen, and the supply of nutrients to the brain will be reduced, causing a stroke[9][10].

Diabetes Mellitus (DM) Type 2 for 90-95% of the total diabetic population. A lack of insulin secretion does not cause type 2 diabetes, but because insulin target cells usually fail or cannot respond to insulin. The hormone insulin functions to regulate the balance of glucose levels in the blood. Impaired insulin production and function increase blood sugar levels above average (hyperglycemia), eventually increasing blood pressure (hypertension). Handayani's research[6] shows that the biggest comorbidity that accompanies type 2 diabetes mellitus is hypertension in as many as 24 (33, 80%) patients [11].

To assess stroke severity, The National Institutes of Health Stroke Scale (NIHSS) is a quick, easy and sensitive assessment of stroke severity. In addition, The National Institutes of Health Stroke Scale (NIHSS) is used as an independent predicate on stroke patient outcomes. The National Institutes of Health Stroke Scale (NIHSS) is the gold standard for assessing stroke severity after the first successful trial of acute stroke therapy. Classification of stroke severity using The National Institutes

of Health Stroke Scale (NIHSS) based on neurological deficits, namely, mild neurological deficits if the score <4, moderate score 5-15, heavy score 15-20, and hefty score 21-42[12].

2. METHOD

The method used in this study was Analytical Observation with a Retrospective approach which was chosen based on whether or not there were differences in the severity of stroke patients with Diabetes Mellitus (DM) Type 2 and the severity of stroke without Diabetes Mellitus (DM) Type 2 at Anutapura Hospital Palu in 2019 - 2020. Respondents as many as 30 people with a division of 15 are stroke patients with Diabetes Mellitus (DM) Type 2, and 15 are stroke patients without Diabetes Mellitus (DM) Type 2. Thirty subjects were taken by random sampling method with the criteria set by the researcher. The research sample must meet the inclusion and exclusion criteria. The requirements are as follows[13][14]:

Inclusion Criteria

- Patients aged 45-60 years and >60 years.
- First stroke patient with a history of Diabetes mellitus.
- Having a history of Diabetes Mellitus (DM) Type 2 in the last year stated by a clear doctor's diagnosis in the patient's medical record.
- Stroke patients without Diabetes Mellitus (DM) Type 2

Exclusion criteria

- Incomplete patient medical records.
- Having a disease other than a vascular disorder.
- Has a history of head trauma, head tumors, brain infections, and other brain structure disorders.
- The patient has risk factors other than Diabetes Mellitus (DM) Type 2.

This study's independent variable was a Diabetes Mellitus (DM) Type 2 history. The dependent variable in this study was a history of Non-Hemorrhagic Stroke. The analysis used is the Kolmogorov-Smirnov test which is tested with a computer-based program SPSS ver.26.

The data of this study were obtained through secondary data taken in the medical record room of Anutapura Hospital. The research data was taken after obtaining ethical approval from the research ethics committee of the Faculty of Medicine, Tadulako University.

3. RESULTS AND DISCUSSION

This research is quantitative; the data generated will be in the form of numbers. From the data that has been collected, analysis is carried out using SPSS software. This study aims to determine differences in the severity of non-hemorrhagic stroke in patients with Diabetes Mellitus (DM) Type 2 and without Diabetes Mellitus (DM) Type 2 based on The National Institutes of Health Stroke Scale (NIHSS). Data were collected by looking at the medical records of patients. A total of 30 medical records of patients, including 15 medical records of stroke patients with Diabetes Mellitus (DM) Type 2 and 15 medical records of stroke patients without Diabetes Mellitus (DM) Type 2.

This research was conducted in the medical record room of Anutapura Hospital Palu. The study entitled Comparison of Non-Hemorrhagic Stroke Severity Levels with Diabetes Mellitus (DM) Type 2 and Without Diabetes Mellitus (DM) Type 2 Based on NIHSS (The National Institute Of Health Stroke Scale). Respondents used secondary data from medical records, with a total of 30 medical records.

Table 1. Distribution of stroke patients with Diabetes Mellitus (DM) Type 2 and without Diabetes Mellitus (DM) Type 2 based on The National Institute of Health Stroke Scale (NIHSS) Scores.

Characteristics		N	Percentage (%)
Stroke with Diabetes Mellitus (DM) Type 2	Light	1	7%
	Currently	6	40%
	Medium to heavy	2	13%
	Heavy	6	40%

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Stroke without Diabetes Mellitus (DM) Type 2	Light	7	47%
	Currently	4	27%
	Medium to heavy	2	13%
	Heavy	2	13%

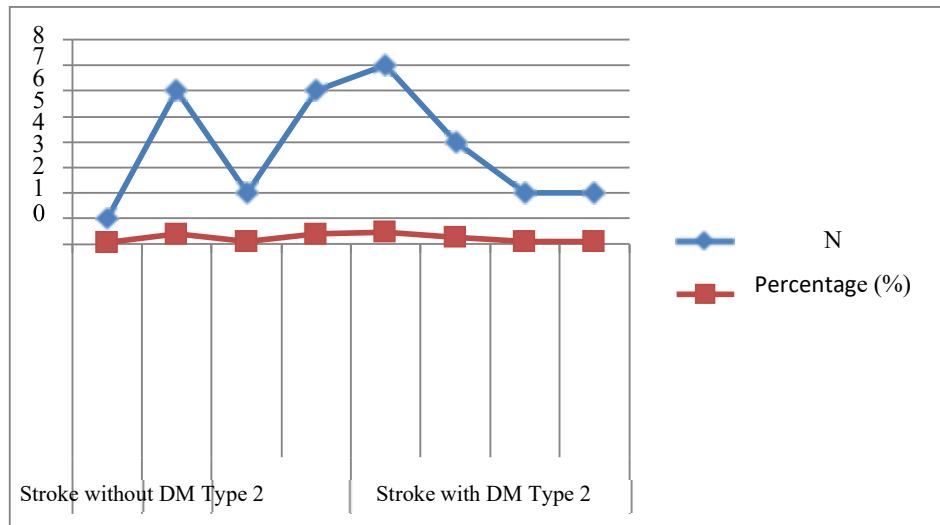


Figure 1. Distribution chart of stroke patients with Diabetes Mellitus (DM) Type 2 and without Diabetes Mellitus (DM) Type 2 based on The National Institute of Health Stroke Scale (NIHSS) Scores

Based on table 1, in the stroke group with Diabetes Mellitus (DM) Type 2 who had a score <4 and entered the Mild Stroke category, there was one person with a percentage of 7%, then those who had a score of 5-15 and joined the moderate stroke category were six people with a percentage of 40%, then in there are two people with a score of 16-20 who fall into the category of moderate to severe stroke with a percentage of 13%, on a score of 21-42 there are six people who fall into the category of severe stroke with a percentage of 40%. For the Stroke Group without Diabetes Mellitus (DM) Type 2 who have a score <4 and fall into the category of mild stroke there are seven people with a percentage of 47% then, for those who have a score of 5-15 with a moderate stroke category, there are four people with a percentage of 27%, then for a score of 16-20 which is an in the moderate to severe stroke category, there were two people with a percentage of 13%, then at a score of 21-42 for the severe stroke category there were two people with a percentage of 13%. From the table above, it can also be concluded that the group of stroke patients with Diabetes Mellitus (DM) Type 2 had the highest frequency in the moderate and severe categories, with a frequency of 6 each and a percentage of 40% each. Then, in the group of stroke patients without type 2 diabetes, the highest frequency was found in the mild category with a frequency of 7 and a percentage (47%).

This study was conducted to determine how to stroke severity is compared with Diabetes Mellitus (DM) Type 2 and without Diabetes Mellitus (DM) Type 2 in Anutapura Hospital Palu. According to its definition, stroke is a neurological syndrome that can cause death or physical and mental disability and even premature death in acute stroke, usually due to neurological complications caused by brain stem compression. Changes in the early stages of stroke are very important to know the factors that play a role in cell damage in the first and second strokes. This is important to perform self-interventions that are expected to improve patients' healing and quality of life, shorten hospital stays, and prevent high deaths from stroke[15].

In this study, the number of samples used was 30 samples. Each sample was grouped into 15 medical records of patients suffering from stroke with Diabetes Mellitus (DM) Type 2 and 15 medical records of stroke patients without Diabetes Mellitus (DM) Type 2 . Then the researchers divided the

groups based on the NIHSS score, namely a score of <4 for the mild stroke category, a score of 5-15 for the moderate category, and a score of 16-20 for the moderate to severe stroke category, and a score of 21-42 for the severe stroke category. To assess the comparison of the severity of stroke in the two groups. The data obtained from the patient's medical record book at the Anutapura Hospital Palu includes primary diagnosis, secondary diagnosis, and general condition of the patient. Then the data is processed and analyzed to find precise results regarding whether there is a significant difference between the severity of stroke with Diabetes Mellitus (DM) Type 2 and stroke without Diabetes Mellitus (DM) Type 2.

From the analysis that has been carried out using the Kolmogorov Smirnov test, it is found that most stroke categories are in the group of stroke severity with Diabetes Mellitus (DM) Type 2, namely the Heavy and Medium types with a percentage of 40% and a frequency of 6 people. In comparison, the lowest number is one person, with a percentage of 7%. Then in the group of stroke severity without Diabetes Mellitus (DM) Type 2, the lowest score obtained was 2 with a percentage of 13% and the highest with a percentage of 47% with a frequency of 7 people.

The results of data analysis using the Kolmogorov Smirnov test, which was carried out using the SPSS for Windows version 26 computer program. Rejected as following the decision-making criteria, namely, accept H_0 if the probability value (Sig.) > 0.05 or reject H_0 if the probability value (Sig.) < 0.05. From these results, there is no significant difference between the severity of stroke with Diabetes Mellitus (DM) Type 2 and stroke without Diabetes Mellitus (DM) Type 2.

The results obtained that there is no difference in the severity of stroke with Diabetes Mellitus (DM) Type 2 and without Diabetes Mellitus (DM) Type 2 can be because the determining factor for stroke is also influenced by other risk factors besides Diabetes Mellitus (DM) Type 2 such as low daily activity, so that blood sugar is not controlled, Obesity or excess weight, alcohol consumption and smoking habits, as well as age and gender can make the immune response to a disease different. It can also be influenced by the condition of the patient's diabetes mellitus, whether it is controlled or uncontrolled.

4. CONCLUSION

Based on the results of the study Comparison of Non-Hemorrhagic Stroke Severity Levels with Diabetes Mellitus (DM) Type 2 and without Diabetes Mellitus (DM) Type 2 based on the NIHSS (The National Institute Of Health Stroke Scale), it can be concluded that: (1) Comparison of the severity of stroke with Diabetes Mellitus (DM) Type 2 and stroke without Diabetes Mellitus (DM) Type 2 using the Kolmogorov Smirnov test with the help of a computer-based program SPSS ver. 26 shows a P value of 0.076 which can be concluded that there is no significant difference between stroke with Diabetes Mellitus (DM) Type 2 and without Diabetes Mellitus (DM) Type 2. (2) The national institute of health stroke scale (NIHSS) score for patients found that the stroke group with Diabetes Mellitus (DM) Type 2 with a score <4 and entered the Mild Stroke category was one person with a percentage of 7%, a score of 5 -15 moderate stroke category there were six people with a percentage of 40%, a score of 16-20 types of moderate to severe stroke there are two people with a percentage of 13%, a score of 21-42 there are six people in the category of severe stroke with a percentage of 40%. For the Stroke Group without Diabetes Mellitus (DM) Type 2, which has a score of <4 types of mild stroke, there are seven people with a percentage of 47%, a score of 5-15 in the moderate stroke category, and there are four people with a percentage of 27%, a score of 16-20 in the moderate to severe stroke category is two people with a percentage of 13%, a score of 21-42 severe stroke there are two people with a percentage of 13%. In the comparison of the severity of stroke with Diabetes Mellitus (DM) Type 2 and without Diabetes Mellitus (DM) Type 2, it was also found that in both groups, stroke patients aged 45-60 years were the most dominant age range compared to those aged 60 years and over.

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