Research Article

Comparison of Tryglicerides Levels and Total Cholesterol in Ischemic Stroke and Haemorrhagic Stroke Patients

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ABSTRACT

Background: Stroke is the second largest cause of death in the world. Stroke is classified based on its etiology as ischemic stroke and hemorrhagic stroke. Most large-scale studies on the risk of total cholesterol and triglyceride levels in stroke are not distinguished between ischemic and hemorrhagic strokes. **Purposes:** The purpose of this study was to determine the comparison of triglyceride and total cholesterol levels in ischemic stroke patients with hemorrhagic stroke. **Method**: Descriptive analytic study using medical records of patients at Medan Haji General Hospital in 2018-2019. The number of ischemic stroke patients is 28 patients and hemorrhagic stroke 28 patients with a total sample of 56 patients. **Results**: In ischemic stroke patients, the average value of triglyceride levels was 144.75 mg/dL and the average value of total cholesterol was 250.93 mg/dL. In hemorrhagic stroke patients, the average value of triglyceride levels is 126.93 mg/dL and the average total cholesterol level is 174.25 mg/dL. **Conclusion:** From this study we found a significant difference in total cholesterol between ischemic and hemorrhagic strokes. No significant difference was found in triglycerides between ischemic and hemorrhagic strokes.

Keywords: Total Cholesterol, Triglycerides, Hemorrhagic, Ischemic, Stroke.

INTRODUCTION

According to WHO (World Health Organization) stroke is defined as a clinical symptom that develops rapidly due to neurological disorders of the brain both focal and global with symptoms that last for 24 hours or more and can cause death due to impaired blood flow in the brain. Stroke is also known as Cerebrovascular Accident (CVA) or apoplexy. Stroke is a cerebrovascular disease characterized by impaired brain function due to damage or death of brain tissue due to reduced or blocked blood flow and oxygen to the brain caused by blood vessels in the brain experiencing narrowing, blockage or bleeding due to rupture of these blood vessels (1).

Stroke is the second leading cause of death in the world and in the European region. Of the 56 million deaths that occur worldwide, 10.8% are caused by stroke. As many as 85% of deaths from stroke among all ages occur in developing countries. Overall stroke death rates have declined worldwide despite an increase in the percentage of people over 65 years (2). The causal relationship between lipid profile

and stroke is inconsistent and most studies on the large scale of cholesterol risk for stroke are not distinguished between ischemic and hemorrhagic strokes. A comparative evaluation of lipid profile levels against stroke types needs to be done so that good lipid profile reduction therapy can be given to reduce the incidence of stroke and death by seeking primary and secondary preventative measures (2).

Risk factors for ischemic stroke are still controversial, one of which is serum triglyceride levels (3). In several studies conducted showed that hypertriglyceridemia is a risk factor for stroke due to an increase in chylomicrons and LDL which can cause blockage of blood vessels, resulting in stroke (4). Research conducted by previous researchers states that if there are high total cholesterol levels in ischemic stroke patients, the mortality rate will increase. Conversely, in hemorrhagic stroke sufferers, a decrease in total cholesterol levels below 200 mg/dL will cause death (4).

The purpose of this study was to determine the comparison of triglyceride and total cholesterol levels in patients with ischemic stroke with hemorrhagic stroke at the Haji General Hospital in Medan, North Sumatra Province in 2018-2019.

METHODS

The type of this research is analytic descriptive research. The approach used in this research design is retrospective. The research sample was medical record data at the Haji General Hospital in Medan, North Sumatra in 2018-2019 from ischemic and hemorrhagic stroke patients who met the inclusion and exclusion criteria. Inclusion criteria were patients with acute ischemic stroke and acute hemorrhagic stroke, new ischemic stroke patients and new hemorrhagic strokes, patients with ischemic and hemorrhagic strokes are tested for triglyceride levels and total cholesterol levels. For the exclusion criteria were patients with ischemic stroke and hemorrhagic stroke who have a history of taking cholesterol drugs. This sample uses the simple random sampling method.

The minimum sample size in this study were 28 ischemic stroke patients and 28 hemorrhagic stroke patients. The total sample needed was 56 patients. All data collected is processed and arranged in the form of a frequency distribution table using IBM SPSS Statistics Base 22.0 and IBM SPSS Statistics Base 25.0. Description of Ethical Approval, Health Research Ethics Committee Faculty of Medicine University Muhammadiyah of Sumatera Utara, Nomor 341/KEPK/FK UMSU/2019.

RESULT

Based on table 1 it can be seen that from ischemic stroke patients sufferers with female sex of 15 people (53.6%) and male sex as many as 13 people (46.4%). While in hemorrhagic stroke sufferers it can be seen that hemorrhagic stroke patients sufferers with male sex are 19 people (67.9%) and female sex as many as 9 people (32.1%).

Based on table 1 it can be seen that from 28 ischemic stroke sufferers with age group 51-55 years and age> 65 years as many as 9 people (32.1%) followed by the age group <51 years as many as 6 people (21.4%), and the lowest group aged 56-60 years and 61-65 years were 2 people (7.1%). Whereas in hemorrhagic stroke sufferers it can be seen that from 28 participants with hemorrhagic stroke with age group 61-65 years as many as 8 people (28.6%), age group 56-60 years as many as 7 people (25%), followed by age group 51-

65 55 years as many as 6 people (21.4%), the age group <51 years were 4 people (14.3%), and the lowest age group> 65 years were 3 people (10.7%).

Table 1. Frequency Distribution of Ischemic Stroke and Hemorrhagic Stroke Patients

Variable		Ischemic Stroke		Hemorrhagic Stroke	
		n	%	n	%
Gen	Male	13	46.4	19	67.9
	Female	15	53.6	9	32.1
Age (Year)	<51	6	21.4	4	14.3
	51-55	9	32.1	6	21.4
	56-60	2	7.1	7	25.0
	61-65	2	7.1	8	28.6
	>65	9	32.1	3	10.7

Based on table 2. it can be seen the average value of triglyceride levels in patients with ischemic stroke is 144.75 mg/dL. While the average value of triglyceride levels in patients with hemorrhagic stroke is 126.93 mg/dL.

Based on table 2 it can be seen that the average value of total cholesterol in patients with ischemic stroke is 250.93 mg/dL. While the average value of total cholesterol in patients with hemorrhagic stroke is 174.25 mg/dL.

Table 2. Average Triglyceride and Total Cholesterol Levels in Ischemic and Hemorrhagic Stroke Patients

		Mean ± min-max (mg/dL)
Triglyceride Levels	Ischemic stroke	144.75±69-269
	Hemorrhagic stroke	126.93±60-275
Total Cholesterol Levels	Ischemic stroke	250.93±177-356
	Hemorrhagic stroke	174.25±123-237

Based on table 3 show that the total cholesterol level of ischemic stroke sufferers with hemorrhagic stroke that the value of p = 0,000 means that there is a difference in total cholesterol levels in patients with ischemic stroke with hemorrhagic stroke.

Based on table 3 show that the triglyceride levels of ischemic stroke patients with hemorrhagic stroke that the value of p = 0.245 means that there is no difference in triglyceride levels in ischemic stroke sufferers with hemorrhagic stroke.

Table 3. Comparison of triglyceride levels and total cholesterol levels in patients with ischemic and hemorrhagic strokes

		P
Triglyceride Levels	Ischemic stroke	0.245*
	Hemorrhagic stroke	
Total cholesterol levels	Ischemic stroke	0.000**
	Hemorrhagic stroke	

Information

p value for total cholesterol levels using the unpaired t-test and p value for triglyceride levels using the Mann-Whitney test.

DISCUSSION

Based on the results of this study it was found that the most age group for ischemic stroke was the age group 51-55 years and age > 65 years as many as 9 people (32.1%). These results are in line with research at Dr. RSUP Kariadi Semarang, which received the highest average age of ischemic stroke, was shown in the age group of 51-60 years with a mean of 67.78 ± 6.67 and in line with research in RSUD dr. Moewardi who got the age of ischemic stroke patients, namely the most age group at > 65 years as many as 8 people (26.7%). While the age of the most hemorrhagic stroke patients is the age group 61-65 years as many as 8 people

(28.6%) followed by the age group of 56-60 years as many as 7 people (25%). These results are in line with research at Prof. Hospital. Dr. Margono Soekarjo who showed that the mean age of hemorrhagic stroke sufferers was 62.32 ± 7.04 and in line with research at Sanglah Hospital Denpasar which showed that the average age of hemorrhagic stroke sufferers was 54.22 ($\pm$ 14.63) years (5–8).

The results of this study are in accordance with the theory which states that basically stroke can occur regardless of age even at a young age. However, in each region the incidence of stroke is more common in the older age groups. This is caused by stroke is a disease that occurs due to disruption of blood flow. As we know, older people's blood vessels tend to undergo degenerative changes and the results of the atherosclerosis process begin to appear. Every time the addition of 10 years of age is calculated from the age of 35 years the risk of stroke has doubled. The risk of stroke has increased since age> 50 years. At the age of > 50 years and over many people suffer from hypertension which is a major risk factor for stroke (9,10).

Based on the results of the study, it was found that the most widely experienced sex sufferers of ischemic stroke in 2018-2019 in Medan Haji General Hospital were 15 female sex (53.6%). These results are in line with research from Palmaria (2014) in H. Adam Malik General Hospital Medan, patients with acute stroke who are more often found in the female sex as many as 50 people (56.2%). While the most experienced sex in patients with hemorrhagic stroke is male sex as many as 19 people (67.9%). This is in line with research at Sanglah General Hospital in Denpasar, where the most genders were 27 men (60%). In another study at RSUD DR. H. Abdoel Moeloek Bandar Lampung who got the most sexes was 127 men (50.8%) (8,11,12).

Women are better protected from heart disease and stroke until the middle of their lives due to the hormone estrogen they have which serves as protection in the process of atherosclerosis (13). When women experience menopause the risk of women having a stroke is higher (14). Men have the greatest potential for hemorrhagic strokes due to lifestyles including smoking and alcohol and hypertension which are generally more common in men, which causes hemorrhagic strokes (9).

Based on the results of the study it was found that the average value of triglyceride levels in patients with ischemic stroke was 144.75 mg/dL. This is in line with previous research at Salamun Hospital Bandung, where the average level of triglycerides in ischemic stroke patients is < 150 mg/dL. In another study at the RSUP Dr. Wahidin Sudirohusodo showed that more than half the number of ischemic stroke sufferers had normal triglyceride levels (<150 mg/dL). While the average value of triglyceride levels in patients with hemorrhagic stroke is 126.93 mg/dL. This is in line with previous research which found that the average level of triglycerides in hemorrhagic stroke sufferers was < 150 mg/dL (15,16).

Triglycerides are composed of 90% fat in food. The body needs triglycerides for energy. If the amount of triglycerides is too small it will be bad for the arteries, but high triglyceride levels will always increase the risk of atherosclerosis and disease of the coronary arteries. Blood triglyceride levels if more than 150 mg/dL result in a high risk of atherosclerosis. Atherosclerosis can reduce blood flow and cause oxygen forces

to decrease so that the organ cannot function properly (16,17).

In this study showed that there was no difference in triglyceride levels in patients with ischemic stroke with hemorrhagic stroke. This result is in line with the research of Zhang et al and Mahmood et al. Which states that there is no significant difference between triglyceride levels in ischemic stroke patients with hemorrhage, but there is a relationship between high concentrations of triglycerides and the risk of stroke (18,19). Because ischemic stroke and hemorrhagic stroke can be seen by other factors, not only triglyceride levels. In this study, researchers only paid attention to data on risk factors for total cholesterol and triglycerides, while other risk factors for stroke such as hypertension, dyslipidemia, metabolic syndrome, smoking, alcohol and others were not recorded (9).

Based on the results of the study found that the average value of total cholesterol levels in patients with ischemic stroke is 250.93 mg/dL. This is in line with previous studies at Salamun Hospital Bandung, which received an average total cholesterol level in ischemic stroke sufferers > 240 mg/dL. While the average value of total cholesterol in patients with hemorrhagic stroke is 174.25 mg/dL. This is in line with previous research which found that the average cholesterol level in hemorrhagic stroke sufferers was < 200 mg/dL (16).

Increased levels of total cholesterol in the blood will cause the accumulation of lipoprotein in tunica intima. Lipoproteins that are buried mainly are LDL and VLDL. Fatty deposits (atheromas) or plaque will damage the artery walls resulting in narrowing and hardening which causes reduced function in the tissue supplied by these arteries and can cause atherosclerosis.

Low total cholesterol levels will cause cerebrovascular endothelium to become fragile, making it more susceptible to microaneurysms, which are the main pathological findings in intracerebral hemorrhage (PIS). PIS is one of the causes of hemorrhagic stroke (20,21).

The results of this study indicate that there are significant differences in total cholesterol levels between patients with ischemic stroke and hemorrhagic stroke where ischemic stroke sufferers have higher total cholesterol levels compared to hemorrhagic stroke sufferers. These results are in line with previous research which states that there are significant differences in total cholesterol levels between patients with ischemic stroke and hemorrhagic stroke (2,6).

CONCLUSION

There is a significant difference in total cholesterol between ischemic stroke sufferers and hemorrhagic stroke. And there were no significant differences in triglycerides between ischemic stroke sufferers and hemorrhagic stroke.

ACKNOWLEDGMENT

entertainment, suggestion, and critims for me during this process.

CONFLICT OF INTEREST

I do not have conflict of interest, and no affiliation or connection to or with any entity or organization, which may raise a question of bias in discussion and conclusion of the manuscript.

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