Risk Factor Profile of Ischemic Stroke Patients

Agus Yudawijaya [a,b*],
Ruth Arthesya Nauli Basa Sihombing [a],
Christina Roseville Lasma Aritonang [a,b]
and Patria Adri Wibhawa [a,b]

[a] *Department of Neuroscience, Faculty of Medicine, Universitas Kristen Indonesia, Jakarta, Indonesia.*
[b] *SMF Neurologi General Hospital Universitas Kristen Indonesia, Jakarta, Indonesia.*

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Original Research Article

ABSTRACT

Aims: To determine the risk factor profile of ischemic stroke patients at the Indonesian Christian University Hospital in the period January 2018-January 2022

Place and Duration of Study: This research was conducted at the Indonesian Christian University Hospital with data collection and research time in July 2022-July 2023.

Methodology: The type of research taken for this research is descriptive research with a cross-sectional design. This research collected medical record data from ischemic stroke patients in the period January 2018-January 2022. Later the medical record data was obtained and analyzed to examine the risk factor profile of ischemic stroke patients at the Indonesian Christian University Hospital. The population used in this study were patients suffering from ischemic stroke who came

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*Corresponding author: E-mail: agus.yudawijaya@uki.ac.id;

to the Indonesian Christian University Hospital in the period January 2018-January 2022. The sampling technique used a total sampling technique where the amount of medical record data is the same as the number of samples used for research.

Results: The results showed that the most dominant age ≥61 years with a total of 42 patients (64.4%), the most dominant sex was male with 35 patients (53.8%), ischemic stroke patients worked 38 patients (68.5%), the most dominant risk factor was hypertension with 62 patients (95.4%), the obesity risk factor with 48 patients (73.8%), risk factor for the history of heart disease with a total of 35 patients (53.8%), smoking risk factors for 33 patients (50.8%), risk factors for not having diabetes mellitus for 36 patients (55.4%), risk factors for not having dyslipidemia for 36 patients (55.4%) and risk factors for having normal uric acid levels for 43 patients (66.2%)

Conclusion: From the research results it can be concluded that the Risk Factor Profile of Ischemic Stroke Patients at the Indonesian Christian University Hospital in The period January 2018-January 2022 includes gender which is dominated by men with worker group status. The most common risk factor suffered by ischemic stroke patients is the risk factor of hypertension.

1. INTRODUCTION

Stroke is a neurological disease that often occurs and can cause symptoms that can develop quickly if not treated quickly and can cause death [1]. Causes the death of brain cells or tissue [2]. Types of stroke can be divided into 2 types based on anatomical pathology and clinical symptoms, namely non-hemorrhagic stroke or what can also be called ischemic stroke and hemorrhagic stroke [2] Ischemic stroke is a stroke caused by the cessation of blood flow to the brain due to blood clots [3].

Stroke has typical symptoms, namely, weakness in the limbs that can cause paralysis, disproportionate or asymmetrical lips, loss of sensation in the face, difficulty swallowing, difficulty speaking or experiencing slurred speech (aphasia), decreased consciousness, nausea, vomiting, headaches and can experience decreased vision on one side or blindness can also occur [1]. Stroke patients can experience recovery (activities as usual) if treated quickly and precisely 6 hours after the attack on the patient to avoid disability [4]. If the patient has A stroke coming to the hospital 48 hours after the attack occurs can cause the patient to experience many neurological deficits [4]. Losing many neurological deficits causes the patient to experience psychological impacts such as lack of self-confidence, stress, and hopelessness because the patient is unable to carry out his role as an individual and also a social creature [4].

Stroke is the second most common cause of death and the third most common cause of disability in the world [5] In addition, stroke cases worldwide are estimated to reach 50 million people and 9 million of them suffer from severe disability [6]. According to data from the American Heart Association's 2020 Report on Statistics Heart Disease and Stroke estimates that: The prevalence of stroke in the United States in 2016 was 2.5%, with an estimated nearly 800,000 experiencing a stroke, and almost 150,000 experiencing death as a result of stroke [7]. Nationally according to analysis from Basic Health Research (Riskesdas) In 2018, an estimated 10.9% or 2,120,352 people experienced stroke in Indonesia. The provinces that experienced the highest prevalence of stroke were East Kalimantan Province at 14.7% and D.I. Yogyakarta at 14.6%, while Papua and North Maluku Provinces were the provinces that had the lowest prevalence of stroke compared to other provinces, namely 4.1% and 4.6. %.8 In 2018 Indonesia experienced an increase in stroke prevalence compared to 2013 from 7% to 10.9%.

Risk factors for stroke can be divided into two types, namely modifiable risk factors and non-modifiable risk factors. Risk factors that can be modified are risk factors such as; hypertension, obesity, history of heart disease, gout, dyslipidemia, and diabetes mellitus while risk factors cannot be modified, namely; ethnicity, race, and also age [8]. The risk factor most often experienced by stroke patients is hypertension, patients who suffer from hypertension have a 6 times higher risk of having a stroke than patients who do not have hypertension [9].

The male gender is less likely to die from stroke than the female gender, this is because women usually experience strokes in old age. Apart from that, there are also special conditions for women,

namely experiencing pregnancy, childbirth, and menopause which are related to hormonal imbalance [10]. However, men are more likely to suffer from stroke because women have the hormone estrogen which can protect themselves in the middle of their lives [9]. For this reason, we must know the risk factors that cause stroke for early prevention of stroke [10]. Apart from gender risk factors, risk factors Age can also have an influence. This is because if you are old, you have a habit of eating foods that contain a lot of cholesterol, such as fried foods and meatballs, this food can cause plaque formation in the bloodstream, which in turn, if there is plaque that has accumulated, it can affect the blockage of blood flow to the brain and also the older the blood vessels get. becomes thinner so that plaque accumulated in the bloodstream can burst if blood circulation is blocked, which will later cause a stroke [11]. In addition, age is an ongoing risk factor for stroke with an increase in incidence and prevalence twice every 5 consecutive years after the age of 60 years.

In connection with the background that I have described above, I researched the "Ischemic Stroke Risk Factor Profile at Indonesian Christian University Hospitals for the period January 2018-January 2022". The research problem What is the risk factor profile of ischemic stroke patients at the Indonesian Christian University Hospital in January 2018-January 2022?

2. MATERIALS AND METHODS

2.1 Research Design

The type of research taken for this research is descriptive research with a cross-sectional design. This research collected medical record data from ischemic stroke patients in the period January 2018-January 2022 and then the medical record data that has been obtained and analyzed to examine the risk factor profile of ischemic stroke patients at the Indonesian Christian University Hospital.

2.2 Place and Time of Research

This research was conducted at the Indonesian Christian University Hospital, Jakarta Indonesia with data collection and research time in July 2022-July 2023.

2.3 Research Population

The population used in this study were patients suffering from ischemic stroke who came to the Indonesian Christian University Hospital in the period January 2018-January 2022

2.4 Research Sample

The sample used in this research is a total sampling technique where the amount of medical record data is the same as the number of samples used for the research.

2.5 Research Criteria

2.5.1 Inclusion criteria

1. Patients who came for treatment at the Indonesian Christian University Hospital in the period January 2018-January 2022
2. Patients diagnosed with ischemic stroke
3. Patients who have complete medical record data

2.5.2 Exclusion criteria

Patients who do not have complete medical records

2.6 Research Instrument

The research instrument used in this study was secondary data in the form of medical records of ischemic stroke patients in patients at the Indonesian Christian University Hospital for the period January 2018-January 2022.

2.7 Data Processing and Analysis

2.7.1 Edit data

Enter and examine the data that has been obtained into the IBM SPSS version 25 program where the data later be edited and from the results of the editing, complete data was obtained.

2.7.2 Tabulation

In this stage, the data was grouped into tables so that analysis can be carried out. All data that has been obtained entered into the IBM SPSS (Statistical Package for the Social Science) version 25 program, the table used in this research is a frequency distribution table.

2.7.3 Data analysis

The statistical data analysis used in this research uses descriptive statistical data methods with frequency analysis.

3. RESULTS AND DISCUSSION

3.1 Results

In this study, the results obtained from data on patients suffering from ischemic stroke who were treated at the Indonesian Christian University Hospital in the 2018-2022 period were 65 patients whose criteria met the inclusion criteria. In this data, data results were obtained in the form of age, gender, work history, obesity, dyslipidemia, hypertension, diabetes mellitus, history of heart disease, and gout which can be used as variables in this study.

3.1.1 Data on distribution of patient demographic characteristics

Data on the distribution of patient demographic characteristics is presented in Table 1.

Based on the results of the data from Table 1, the results show that the population of ischemic stroke patients aged more than 60 years is 42 people (64.6%), and for the age range 51-60 there are 15 people (23.1%), 41-50 years old. 6 people (9.2%) and the age range 31-40 people amounted to 2 people (3.2%). For patients by gender category, the data obtained from the sample number of patients suffering from ischemic stroke were 35 patients (53.8%) and 30 patients (46.2%) for women. Meanwhile, for patients in categories based on work, the results were 27 (41.5%) not working, 15 patients were civil servants (23.1%), 15 patients were private employees (23.1%), and 8 patients were retired (12.3%).

3.1.2 Data on distribution of patient risk factor characteristics

Data on the distribution of patient risk factor characteristics are presented as data in Table 2.

Based on the data in Table 2, the results showed that 62 people (95.4%) were ischemic stroke patients with hypertension risk factors and 3 people (4.6%) did not have it. For the category of patients based on obesity risk factors, the results were 48 people (73.8%) and 17 people (26.2%) who were not obese. For the category of ischemic stroke patients who had risk factors for diabetes mellitus, there were 29 (44.6%) patients, and those who did not had 36 (55.4%) patients. For the category of patients with risk factors for dyslipidemia, there were 29 people (44.6%) and those without dyslipidemia were 36 people (55.4%). For the category of patients with

risk factors and a history of heart disease, there were 35 patients (53.8%), and ischemic stroke patients who did not have a history of heart disease were 30 patients (46.2%). For the category of patients who have risk factors for uric acid with normal levels, there are 43 patients (66.2%), and for those with high uric acid levels are 22 patients (33.8%) and for the category of ischemic stroke patients who have a history of smoking habits, it is 33 patients (50.8%) and those who did not have a smoking habit were 32 patients (49.2%).

3.2 Discussion

3.2.1 Demographic characteristics distribution data

Based on the data in Table 1, the dominant age results are those aged ≤ 61 years. The same results were obtained by research conducted by Nabila (2018), the most dominant age prevalence was age >51 years [12].

Age is one of the sciences of epidemiology that plays an important role in various diseases because various frequencies can be found that are caused by age [13]. Strokes are more common in old age because as age progresses, the organs in the body experienced a decline in function, one of which is blood vessels in the body. Over time, blood vessels in the body experienced problems in terms of elasticity, especially in the intima, the endothelium experienced thickening because this causes the lumen of the blood vessels to narrow and have an impact on disrupting blood flow into the brain, which cause atherosclerosis to form [13,14].

Ischemic stroke patients based on gender category showed that the majority of patients were male. Similar results were obtained in research conducted by Trismarani (2019). The results of this study showed that men suffered more from ischemic stroke. compared to women [2].

This can happen because the female sex has the hormone estrogen which can protect her from stroke and heart disease until the middle of her life [11]. This hormone can also act as an increase in HDL levels in the blood so this can be a preventative measure against the formation of atherosclerosis which is formed. a result of plaque buildup in the blood. This is what causes men to suffer ischemic strokes more often because they do not have the hormone estrogen, but if the production of the estrogen hormone

decreases or is not produced again, the risk of ischemic stroke affecting women will be the same as in men [15].

For the category of ischemic stroke patients based on occupation, it was found that the dominant patients were working patients. Similar results were also obtained from research conducted by Jeremia (2019) where the results showed that the prevalence of ischemic stroke patients was dominated by those who worked compared to those who did not work [16]. This can be caused by people who have jobs experiencing psychological stress due to work, which can increase the risk of ischemic stroke [17]. According to Hartono, one of the factors that can cause ischemic stroke is stress because this can trigger the performance of the thyroid and adrenal glands which will then release the hormone cortisol and adrenals which are the main hormones for stress [18]. Apart from this, the large amount of work often causes people to force themselves to do their work, which results in their health not being maintained [19].

3.2.2 Data on distribution of risk factor characteristics

Based on Table 2, the results show that ischemic stroke patients who have hypertension are more likely to suffer. These results are similar to the results of research conducted by Balgis (2018) that ischemic stroke patients are dominated by hypertension [12].

Hypertension commonly known as high blood pressure is an increase in blood pressure that is abnormal and occurs continuously, this can be caused by one or a combination of several factors that are related to maintaining normal blood pressure conditions [13]. Ischemic stroke can be caused by hypertension through several mechanisms. High intraluminal pressure can trigger changes in the function of the endothelium and smooth muscle in the intracerebral arteries. As a result of changes in the endothelium, the permeability of the blood barrier in the brain increases and this causes multi-focal formation and edema in the brain. Apart from that, hypertension can also result in accelerated atherosclerosis, increasing the possibility of cerebral lesions associated with stenosis and the formation of emboli originating from the aortic arch, large extracranial blood vessels, and the heart [12].

Hypertension has an important role in the formation of atherosclerosis this can result in ischemic stroke due to blockage of the arteries by embolism between the arteries or thrombus where which can cause narrowing of the blood vessels that flow to the brain.

The results obtained in Table 2 show that obesity dominates and this result is similar to the results of research conducted by Aditya (2019) where the prevalence of ischemic stroke with obesity is higher compared to those without obesity [20].

Obesity is a condition where the person has a body mass index of more than 23 [14]. According to WHO obesity is a condition where there is excessive fat which can result in a risk of other diseases or this accumulation of fat can have a bad effect on health. Apart from that, obesity also has an increased impact on the risk of ischemic stroke. A situation where there is excess fat in the body can put pressure on the blood vessels, resulting in poor blood flow in the body [19].

Table 1. Patient Demographic Distribution Table (n=65)

Respondent Characteristics	Amount (n)	Percentage (%)
Age		
31-40	2	3,2
41-50	6	9,2
51-60	15	23,1
≤61	42	64,6
Gender		
Malei	35	53,8
Female	30	46,2
Job		
Doesn't work	27	41,5
Government employees	15	23,1
Private employees	15	23,1
Retired	8	12,3

Table 2. Patient Risk Factor Distribution Data (n=65)

Respondent Characteristics	Amount (n)	Percentage (%)
Hypertension		
Yes	62	95,4
No	3	4,6
Obesity		
Yes	48	73,8
No	17	26,2
Diabetes Mellitus		
Yes	29	44,6
No	36	55,4
Dyslipidemia		
Yes	29	44,6
No	36	55,4
Heart disease		
Yes	35	53,8
No	30	46,2
Gout		
Normal	43	66,2
High	22	33,8
Smoke		
Do not smoke	32	49,2
Smoke	33	50,8

A person who is overweight makes the heart work harder in pumping blood to circulate throughout the body, which increases blood pressure. Apart from that, people with obesity can also experience an increase in LDL cholesterol levels, and serum triglycerides, as well as an increase in blood sugar content and a decrease in HDL cholesterol. High levels of LDL cholesterol can disrupt the function of the endothelium resulting in the initial formation of atherosclerosis which is caused by the presence of cholesterol deposits in the arterial blood [20].

The predominant risk factor for ischemic stroke with diabetes mellitus is that there is no diabetes mellitus. This result is by research conducted by Glen (2015). In this study, the most data were patients who did not have a history of diabetes mellitus [12].

DM blood vessel. This causes an impact in the form of disruption in blood flow to the brain. Lack of supply of nutrients and oxygen to the brain will minimize the death or damage to cells in the brain. Apart from that, excessive amounts of sugar in the body will also disrupt the elasticity in the blood vessels, resulting in the process of atherosclerosis because this can cause ischemic stroke [15].

Loss of fluids in the body as a result of glucosuria will cause blood clots commonly known as thrombosis which can influence the formation of atherosclerosis which has an impact on the narrowing of blood vessels in the brain. Diabetes Mellitus can cause the blood vessels to thicken so that the inner diameter of the blood vessels decreases which impacts the blood flow to the brain being disrupted [12]. Research data shows that the prevalence of patients who do not have diabetes mellitus is greater. This is because the majority of patients who experience The first attack of an ischemic stroke is not due to having a history of diabetes mellitus [12].

The risk factor for dyslipidemia is more common in patients who are not affected. The prevalence of this data is by research obtained by Dimas (2019). From this study, the prevalence of data for ischemic stroke patients who do not have dyslipidemia is greater than those who have dyslipidemia [21].

Dyslipidemia is an abnormality in lipid metabolism with symptoms of an increase in total cholesterol levels (normal value > 240 mg/dl), triglyceride cholesterol (> 200 mg/dl), LDL cholesterol (> 160) and HDL cholesterol levels (< 40 mg/dl) which decreased. Lipid profiles that are often examined include; triglyceride cholesterol, LDL cholesterol, HDL cholesterol, and total cholesterol [22].

This lipid profile is carried in the blood by lipoproteins. Abnormal levels of lipid metabolism in the blood result in cerebrovascular disease, namely stroke [21]. An increase in the level of dyslipidemia can cause atherosclerosis. Atherosclerosis can cause thickening of the blood flow, resulting in narrowing of the blood flow and accumulation of fat. As a result of this, there is a disruption in the circulation of oxygen and blood in the body which will then flow to the brain, which results in an ischemic stroke. If cholesterol levels in the body increase, blood pressure will increase [23]. In dyslipidemia, there is a decrease in HDL cholesterol levels. The function of HDL cholesterol is to keep blood vessels dilated and through anti-inflammatory effects and antioxidant effects can help reduce damage to blood vessels [24].

Ischemic stroke patients with a history of disease risk factors are dominated by those who have this result, which is comparable to research conducted by Dayan (2018) with the results of ischemic stroke patients with a history of heart disease being more dominant than those without a history of heart disease [25].

One of the risk factors for ischemic stroke is heart disease because the heart is the central organ that carries blood throughout the body. If the center of blood flow in the body is damaged then the blood flow will experience problems in flowing throughout the body, followed by blood flow that will flow to the brain [26] Research conducted by Ivan (2019) said that ischemic stroke patients who had the most history of heart disease had atrial fibrillation, followed by endocarditis [27,28] Atrial fibrillation can have an impact in the form of an irregular heartbeat and blood that is not pumped properly, which can result in stasis in the blood which can then lead to the formation of thromboembolism. Because this can block blood vessels, resulting in ischemia and tissue death [12,13]. Endocarditis or an infectious disease that results in damage to the inner lining of the heart caused by the presence of germs that develop which results in the heart valves leaking or being damaged this will lead to the formation of thromboembolism which is the formation of ischemic stroke.

For the category of gout patients, the most data obtained were those with normal uric acid levels. The results of this study are in line with those conducted by Yossi (2018) who had more ischemic stroke patients without gout compared to ischemic stroke patients who had gout. Uric acid can play a role in the formation of atherosclerosis. An increase in uric acid levels can have an impact on increasing lipid oxidation and LDL oxidation. Apart from that, high uric acid levels can be closely related to increased platelet adhesion and smooth muscle cells in blood vessels that are undergoing proliferation [24] In women, uric acid is said to be in the high category if it has a value of >7.0 mg/dl, while men are said to be in the high category if the value is >5.7 mg/dl [29].

The role of uric acid itself is still unclear and certain about ischemic stroke. Several previous studies that have been conducted say that increased uric acid levels are a risk factor for stroke and heart disease and several studies say that uric acid plays an important role

as a "free radical scavenger and antioxidant" [30].

For ischemic stroke patients with a history of smoking habits that dominate, the results of this study are in line with research conducted by Hartaty [31] that the prevalence of data on those who smoke is greater than those who do not [31]. Stroke Risk Scorecard states that ischemic stroke patients who have a history of smoking habits are more at risk. compared to those who don't have this habit because cigarettes contain nicotine and carbon monoxide [32]. If these substances enter the body's circulation, it will cause the oxygen content in the blood to decrease and this will result in the heart beating faster, which will cause blood pressure in the body to become high, which in turn will cause the arteries to become damaged, which in turn will result in the arteries becoming narrower and the formation of atherosclerosis. Apart from that, people who have a smoking habit have high levels of fibrinogen in the blood which results in reduced blood density and reduced endothelial function [2].

4. CONCLUSION

From the research results it can be concluded that the Risk Factor Profile of Ischemic Stroke Patients at the Indonesian Christian University Hospital in the period January 2018-January 2022 includes gender which is dominated by men with worker group status. The most common risk factor suffered by ischemic stroke patients is the risk factor of hypertension.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of this manuscript.

CONSENT

As per international standards or university standards, patient(s) written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

As per international standards or university standards written ethical approval

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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