ANALYSIS OF HIGH RISK FACTORS FOR NON-COMMUNICABLE DISEASE, STROKE IN THE SIDOARJO DISTRICT HEALTH SERVICE

Luluk Widarti* , Muhammad Afif Hilmi Masyfahani , Dony Sulystiono , Kusmini Suprihatin , Hotmaida Siagian , Siti Maemonah

Health Polytecnic, Ministry of Health, Surabaya, Indonesia

Research Report

ABSTRACT

Introduction: Stroke is the number one cause of disability and the number three cause of death in the world. The burden caused by stroke is mainly caused by disability (a public health problem) which also creates a high cost burden for the sufferer, their family, society, and the government. **Methods:** The type of research in this research is a case study using quantitative descriptive design methods. This research was conducted in the working area of the Candi, Urang Agung, and Prambon Community Health Centers which are Community Health Centers in the Sidoarjo Regency Health Service Area. This research uses primary data and secondary data as sources of research data. Data samples were taken from 100 respondents at 9 Integrated Development Posts for Non-Communicable Diseases (IDP NCD) at the Prambon Health Center, Urangagung Health Center, and Candi Health Center, Sidoarjo Regency. **Results:** The research showed that the high-risk factors for stroke were hypertension in the high category at 41%, random blood sugar in the high category at 49%, cholesterol in the high category at 52%, and BMI in the high category at 40%. **Conclusions:** Based on the research results, the highest risk factors for stroke are cholesterol, random blood sugar, hypertension, and BMI which indicates obesity. The results of the analysis of stroke risk factors are still high, so it is necessary to optimize advocacy and integrated partnerships in stroke prevention and control through promotive, preventive, curative, and rehabilitative activities in an integrated and sustainable manner.

INTRODUCTION

Stroke is the number 1 cause of disability and the number 3 cause of death in the world. The burden caused by stroke is mainly caused by disability (a public health problem) which also creates a high cost burden for the sufferer, their family, society and the government (Katan & Luft, 2021). The results of the 2018 Riskesdas show that the prevalence of non-communicable diseases has increased compared to the 2013 Riskesdas, including stroke, diabetes mellitus and hypertension (Kemenkes RI, 2018). Based on 2022 PTM Surveillance data at the Sidoarjo District Health Service, data was obtained on hypertension for 162,387 people, coronary heart disease for 2,792 people, heart failure for 2,271 people, stroke for 2,875 people, hypercholesterolemia for 3,058 people, and diabetes mellitus for 15,788 people (Dinkes Sidoarjo, 2022).

In efforts to reduce the number of patients with recurrent strokes, it is important for patients not only to understand the importance of the rehabilitation process but also to understand the importance of controlling stroke risk factors. The National Stroke Guidelines identify lifestyle factors as risk factors that should be targeted for secondary prevention (Kleindorfer et al., 2021). Based on the American Heart Association (AHA), stroke prevention guidelines such as controlling hypertension, diabetes mellitus, cholesterol, and BMI related to obesity can reduce stroke mortality and also stroke recurrence (Utama & Nainggolan, 2022).

Death from stroke is often caused by high blood pressure (Ishitsuka et al., 2014). Hypertension is high blood pressure with systole above 140 mmHg and diastole above 90 mmHg (Unger et al., 2020). It is also estimated that stroke deaths are caused by high blood glucose levels in the body (Mosenzon et al., 2023). Pathologically high blood sugar levels in the body play a role in increasing the concentration of glycoproteins, which is the trigger for several vascular diseases. High blood glucose levels during a stroke will increase the possibility of expansion of the infarct area due to the formation of lactic acid due to anaerobic glucose metabolism which damages brain tissue (Mosenzon et al., 2023).

Based on research with 100 respondents who had risk factors for stroke related to hypertension in the high category of 41%, blood sugar in the high category of 49%, cholesterol in the high category of 52%, and BMI in the high category of 40%. This shows a high risk factor for stroke.

MATERIALS AND METHODS

The type of research in this research is a case study using quantitative descriptive design methods. This
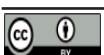
research was conducted in the working area of the Candi, Urang Agung and Prambon Community Health Centers which are Community Health Centers in the Sidoarjo Regency Health Service Area. This research uses primary data and secondary data as sources of research data. This research used a random sampling technique and took data samples from 100 respondents at 9 Integrated Development Posts for Non-Communicable Diseases at Prambon Health Center, Urangagung Health Center, and Candi Health Center, Sidoarjo Regency.

The Inclusion criteria include: willingness to be a respondent, coverage of posbindu respondents with non-communicable diseases, respondent age over 40 to 60 years, having risk factors for non-communicable diseases such as hypertension and high blood sugar, and having risk factors for stroke. The exclusion criteria include: having complications from non-communicable diseases and having suffered a stroke.

This research was conducted from September to October 2024. The research instruments were in the form of questionnaires and observation sheets.

RESULTS

Table 1. Frequency distribution of respondents' blood pressure in the Sidoarjo district health service in 2023 (n=100).

| Risk factors | Criteria for High-Risk Factors for NCD Stroke | | | | | | | |
| | Good | | At the moment | | Bad | | Amount | |
	F	%	F	%	F	%	F	%
Normal (<130/80mmHg)	16	16					16	16
At the moment (130-139/80-90mmHg)			43	43			43	43
Tall (>140/>90)					41	41	41	41
Total							100	100

Based on table 1 above, the findings of PTM complications, the risk of stroke in 100 respondents who came to the Integrated Development Post for Non-Communicable Diseases for blood pressure showed that the results were mostly in the moderate category, amounting to 43 people (43%), and 41 people (41%) in the moderate category.

Table 2. Random blood sugar frequency distribution of respondents in the Sidoarjo Regency Health Service in 2023 (n=100).

| Risk factors | Criteria for High-Risk Factors for NCD Stroke | | | | | | | |
| | Good | | At the moment | | Bad | | Amount | |
	F	%	F	%	F	%	F	%
Good (80-144mg/dL)	15	15					15	15
At the moment (145-200mg/dL)			36	36			36	36
Tall (>200mg/dL)					49	49	49	49
Total							100	100

Based on table 2 above, the findings of NCD complications, the risk of stroke in 100 respondents who came to the Integrated Development Post for Non-Communicable Diseases for random blood sugar checks, mostly resulted in 36 people (36%) in the moderate category, and 49 people (49%) in the high category.

Table 3. Frequency distribution of respondents cholesterol in the Sidoarjo district health service in 2023 (n=100).

| Risk factors | Criteria for High-Risk Factors for NCD Stroke | | | | | | | |
| | Good | | At the moment | | Bad | | Amount | |
	F	%	F	%	F	%	F	%
Good (18.5-22.9)	17	17					17	17
Medium (23-24)			31	31			31	31
High (>25)					52	52	52	52
Total							100	100

Based on table 3 above, the findings of PTM complications, the risk of stroke in 100 respondents who came to the Integrated Post for Non-Communicable Diseases, cholesterol mostly resulted in 31 people (31%) in the moderate category, and 52 people (31%) in the moderate category, and 52 people (52%) in the high category.

Table 4. Frequency distribution of respondents bmi in the Sidoarjo district health service in 2023 (n=100).

Risk factors	Criteria for High-Risk Factors for NCD Stroke							
	Good		At the moment		Bad		Amount	
	F	%	F	%	F	%	F	%
Good (18.5-22.9)	21	21					21	21
Medium (23-24)			39	39			39	39
High (>25)					40	40	40	40
Total							100	100

Based on table 4 above, the findings of PTM complications, the risk of stroke in 100 respondents who came to the Integrated Non-Communicable Disease Post, BMI mostly resulted in 39 people (39%) in the moderate category, and 40 people (39%) in the moderate category, and 40 people (40%) in the high category.

DISCUSSION
Blood Pressure

Based on the research results, the blood pressure of 43 respondents (43%) was in the medium category, and 41 people (41%) were in the high category. A person will be said to be hypertensive if they have systolic blood pressure ≥ 140 mmHg and/or diastolic blood pressure ≥ 90 mmHg. On repeated examinations the cause of hypertension was not yet known, but several risk factors were found. Many factors can increase a person's risk or tendency to suffer from hypertension, including individual characteristics such as age, gender and ethnicity, genetic factors, and environmental factors including obesity, stress, salt consumption, smoking, alcohol consumption, and so on. Several factors that may influence the emergence of hypertension usually do not stand alone, but together (Balqis, Sumardiyonno, 2022). Hypertension is a major risk factor for stroke. The American Heart Association (AHA) and the American Stroke Association (ASA) provide recommendations regarding things that must be controlled for hypertension so that it does not become a stroke. Such as preventing excess weight, maintaining a correct diet, reducing salt consumption, doing exercise or physical exertion, avoiding alcohol use, and consuming appropriate and regular therapy to control blood pressure (Cena & Calder, 2020). Utilization of non-pharmacological aspects includes motivation of patients and families as caregivers in carrying out treatment, rehabilitation and care; knowledge of disease; support from family and people closest to the patient, as well as changes in the patient's lifestyle by obeying germs through intelligent and obedient behavior.

In the research findings, the indicators used as risk factors for PTM stroke are blood pressure, blood sugar, cholesterol and BMI which are in the bad category. Technological advances in developing countries have resulted in a demographic and epidemiological transition characterized by changes in lifestyle and an increase in the prevalence of non-communicable diseases. One of the non-communicable diseases that is becoming a very serious health problem today is hypertension, which is known as the silent killer (Arifin et al., 2022).

As many as 60%-65% of DM sufferers experience hypertension. Hypertension in type one DM patients indicates kidney disease, proteinuria (Nazar, 2014). Hypertension should be recognized as quickly as possible and treated aggressively because it can worsen retinopathy, nephropathy, and macrovascular disease (Naha et al., 2021). In preventing and controlling risk factors for non-communicable diseases, stroke, the government focuses on promotive and preventive efforts without neglecting curative and rehabilitative efforts. These include: The Healthy Living Community Movement (GERMAS) in accordance with Presidential Instruction Number 1 of 2017, which this year is focused on early detection activities, increasing physical activity, and consuming fruit and vegetables (Sekretariat Kabinet RI, 2017). The Healthy Indonesia Program with a Family Approach is in line with the 5th Nawacita agenda, namely improving the quality of life of Indonesian people starting from the family, including hypertension sufferers receiving regular treatment and no family members smoking (Dirjen Peraturan Perundang-undangan Kemenkumham RI, 2016).

The main concept in dealing with non-communicable disease risk factors for stroke is to provide special treatment as soon as possible after the attack occurs. The problem that arises is that people do not recognize the early symptoms of stroke. A simple stroke assessment tool is "get to the hospital immediately" namely asymmetrical smile, sudden weakening of half of body movements, slurred speech or sudden inability to speak or not understanding words/speech, numbness or numbness, short-sightedness distant, Severe headaches that appear suddenly and impaired balance function. Don't take it lightly if you feel symptoms or signs of a stroke as above, don't wait until it gets worse, go to the hospital immediately. This recommendation is for families or people who happen to find a relative/friend showing these symptoms and signs and immediately take him to the hospital to receive treatment as soon as possible, because there is a golden period for stroke treatment so that the sufferer is helped. and reduces the risk of death or permanent disability. The golden period is a very valuable period in stroke treatment, namely less than 4.5 hours from the first symptoms and signs appearing until stroke treatment is carried out in hospital (Huttami & Hidajah, 2020). So the patient must arrive at the hospital in less than 2 hours.

Random Blood Sugar

Based on the research results, most of the random blood sugar checks resulted in 36 people (36%) in the medium category, and 49 people (49%) in the high category. Diabetes can cause stroke if blood sugar is not controlled properly. Blood sugar levels that are too high in the blood can cause blockages and the formation of fatty deposits in the blood vessels. High blood sugar levels can cause blood vessel complications. Microangiopathy (eye, kidney and nerve disorders) and macroangiopathy (stroke and heart disorders). If blood glucose is excessive, the glucose will bind to proteins including blood vessel wall cells. These bonds will cause damage to the structure and function of blood vessels (Gustian et al., 2023).

Based on research results, theory and related research. Researchers assume there is no relationship between blood sugar levels and stroke because strokes can be caused by many factors. These results are not in line with research by Letelay et al. (2019) which found a relationship between Type II diabetes mellitus and the incidence of stroke which was analyzed using the Chi-Square test, obtaining a value of $P = 0.002$. Thus, statistically there is a significant relationship between type II diabetes mellitus and the incidence of stroke. These findings are in accordance with the pathomechanism theory that influences hyperglycemia in the occurrence of stroke. Hyperglycemia can cause increased formation of sorbitol in cells, causing osmotic swelling so that endothelial cells become damaged (Hao et al., 2015). In hyperglycemia, the AGE protein glycosylation process occurs which causes an increase in the formation of plasma proteins containing glucose, such as fibrinogen, haptoglobulin, macroglobulin-α2 and clotting factors V-VIII. Thus the clotting tendency and blood viscosity increase so that the risk of thrombosis increases (González et al., 2023). Together with the increase in VLDL in the blood and the increased tendency for blood clotting promotes the formation of macroangiopathy and can lead to stroke.

This is in line with the pathophysiology of ischemic stroke in DM patients, where prolonged DM complications can cause damage to a number of large blood vessels which show histopathology in the form of atherosclerosis. Someone who suffers from DM has a higher risk of suffering from atherosclerosis than the general population who do not suffer from DM (Chen et al., 2017). Atherosclerosis is the result of a prothrombic process that has an influence on plaque development and rupture (Jebari-Benslaiman et al., 2022).

Cholesterol

Based on the research results, cholesterol resulted in 31 people (31%) in the medium category, and 52 people (31%) in the medium category, and 52 people (52%) in the high category. High cholesterol in a person's body can cause stroke. This occurs when there is too much fatty substance in the blood so that it can block blood flow to the brain. One of the common causes of stroke is the condition of cholesterol in a person's blood. Cholesterol is a fatty substance that circulates in the blood, is produced by the liver and is needed by the body, but excess cholesterol will cause problems, especially in the blood vessels of the heart and brain (Wamai et al., 2018).

According to researchers, cholesterol is a risk factor for recurrent stroke. Because people who have a history of high cholesterol levels can trigger blockages in the blood vessels in the brain. Increased cholesterol levels in the blood (hypercholesterolemia) initiate a spike in body fat which ultimately causes an increase in blood pressure. Thus, hypercholesterolemia has the risk of causing arteriosclerosis, which then causes damage to the cardiovascular system, covering the heart, blood vessels and blood (Ibrahim et al., 2021).

Body Mass Index

Based on the research results, BMI resulted in 39 people (39%) in the medium category, and 40 people (39%) in the medium category, and 40 people (40%) in the high category. Obesity can increase the risk of stroke in various ways due to excess fat accumulation. This condition can trigger blood flow disorders and the risk of blood clots. Obesity can also increase the risk of stroke through weight problems (Dorrance et al., 2016). A person who is overweight has a greater chance of having an enlarged left side of the heart, known as left ventricular hypertrophy.

Apart from obesity, risk factors that influence the incidence of stroke include gender, age, history of hypertension, blood cholesterol levels, coronary heart disease, smoking habits, lack of physical activity, consuming foods high in salt and sugar. In accordance with research by Kivioja et al. (2018) that the results of multivariable logistic regression analysis, significant risk factors for ischemic stroke consist of atrial fibrillation, cardiovascular disease, type I DM, type II DM, high density lipoprotein cholesterol, smoking status and family history of stroke. The risks of ischemic stroke that are closely related are: atrial fibrillation, cardiovascular disease, type I diabetes mellitus, type II diabetes mellitus. This is because risk factors such as atrial fibrillation, cardiovascular disease, diabetes mellitus type I, diabetes mellitus type II are comorbid factors which cause one of the predisposing factors for ischemic stroke, so that it can cause disability and even death in stroke sufferers. The World Health Organization defines obesity and overweight as abnormal or excessive fat accumulation that has the potential to harm health. Body mass index (BMI) is a simple measuring tool that is still used as an indicator of obesity in a person. A person is classified as overweight if their BMI value is between 25-29.9 kg/m2 and is classified as obese if their BMI value is ≥30 kg/m2. Body mass index was developed as an indicator of the risk of several diseases such as cardiovascular disease, high blood pressure, osteoarthritis, several types of cancer, and DM.

CONCLUSIONS

Several problems were found that must be addressed immediately, starting from the lowest level to the highest level, namely the existence of people who are known to be at risk of developing PTM Stroke as evidenced by the presence of bad blood pressure, bad blood sugar, cholesterol and bad BMI. This is an indicator of a high risk of stroke which requires immediate treatment, otherwise it will become a stroke.

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