

RELATIONSHIP BETWEEN HYPERTENSION, DIABETES MELLITUS, AND HYPERCOLESTEROLEMIA WITH ISCHEMIC STROKE

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ABSTRACT

Background: Stroke is a functional disorder of the brain in the form of nerve paralysis due to impaired blood flow in one part of the brain. Ischemic stroke is when blood flow to the brain is stopped due to a blood clot that blocks a blood vessel. The incidence of ischemic stroke occurs between 70% - 85% of stroke events. The prevalence of stroke in Indonesia in 2013 was 7% and increased in 2018 to 10.9%. Based on the 2018 Riskesdas, North Sulawesi ranks third in the highest number of stroke sufferers in Indonesia. **Objective:** to determine the relationship between hypertension, diabetes mellitus, and hypercholesterolemia with the incidence of ischemic stroke in Banjarmasin Hospital. **Methods:** This study used an analytic observational study with a case-control design and used the Chi-Square test. The population in this study were all outpatients who came for treatment at the Neurology Polyclinic, Banjarmasin Hospital. The number of samples for the case and control groups was 72 respondents. This study uses secondary data in medical record files using a checklist. **Results:** The results showed that hypertension was associated with ischemic stroke. The results of the chi-square test obtained $p = 1,000$ ($p > 0.05$) and $OR = 1.24$ (95% CI; 0.342 - 4.498). The **conclusion:** there is a relationship between hypertension and ischemic stroke and there is no relationship between diabetes mellitus and hypercholesterolemia and ischemic stroke.

INTRODUCTION

Stroke is a disease of functional brain disorders in the form of paralysis of the nerves (*neurologic deficit*) due to impaired blood flow to one part of the brain. Strokes hemorrhagic is incident Where vessels blood broken so that Genre blood to be abnormal. In an ischemic stroke, blood flow to the brain is stopped because of this clot blood Which clog vessels blood (Adib, 2011, Pratiwi, 2022).

Riskesdas data in 2018 states that the prevalence of stroke (permil) based on diagnosis doctor province with sufferer strokes highest There is on East Kalimantan Province (14.7) and the lowest in Papua Province (4.1). In the year of 2018 Alone Sulawesi North occupy order to three highest For sufferer stroke in Indonesia. Stroke sufferers at RSU GMIM Pancaran Kasih Manado in May 2018 – December 2018 there were 251 cases of stroke, and in January 2019 - September 2019 It is known that the number of cases of stroke in Banjarmasin Hospital is as many as 504 cases.

Factor risk incident stroke ischemic shared become factor Which No can modifiable (*non-modifiable risk factors*) such as age, sex, race, genetics, and history TIA (*Transients ischemic attack*), And factor Which can modified (

modifiable risk factors) like hypertension, diabetes, cholesterol tall (hypercholesterolemia), smoking behavior, obesity, heart disease, alcohol consumption overuse, atherosclerosis, drug abuse, and sleep-disordered breathing (Hernanta, 2013, Afida, 2022).

Hypertension can trigger atherosclerosis. It can encourage *Low Density Lipoprotein* (LDL) cholesterol to make it easier to enter the layers intima lumen of blood vessels and reduce the elasticity of these blood vessels (Yueniwati, 2015, Al Mahdi, 2020). Diabetes can increase the risk of stroke twofold. The more tall rate sugar in blood, check it out easy caught strokes (Pinson, 2019, Al Mahdi 2022). Hypercholesterolemia is an increase in cholesterol levels in the blood. Cholesterol in body Which excess will hidden in wall vessels blood And can raises something condition Which called atherosclerosis Which can cause disease strokes (Anies, 2015, Chrismilasari, 2022).

Study previously Which done by Khairatunnisa (2017), is known that results analysis bivariate showing that factor risk Which proven Associated with the incidence of stroke is hypertension. Blood pressure is wrong One

factor Which must noticed in incident disease strokes. Hypertension is a major risk factor for ischemic and hemorrhagic stroke (Yueniwati, 2015, Guarantee 2020). Study This aim For know connection between hypertension, diabetes mellitus, and hypercholesterolemia with the incidence of stroke iskmik in patients take care road in Polyclinic Nerve in Banjarmasin Hospital.

METHODS

Study This is studies observational analytic with design *case control* . Study done in Banjarmasin Hospital on month October - December 2019. The population in this study were all outpatients the way who came for treatment at the Neurology Polyclinic at the Banjarmasin Hospital, sample case group and control group each of 36 respondents with a ratio of 1:1 (72 respondents). Sampling was done by technique *Non Probability Random Sampling* uses *purposive sampling*, with criteria Inclusions are outpatients at the Neurology Polyclinic at Banjarmasin Hospitalsince the first diagnosis of ischemic (non-hemorrhagic) stroke. Instrument in this study is a *checklist* that is used to record medical record data patient. Analysis data done with analysis univariate And bivariate withuse *Chi-square* test Which Also see OR value on every variable free.

RESULTS AND DISCUSSION

Characteristics Respondents Based on Type Sex And Age

Table 1. Distribution respondent based on type sex

Gender	Case		Control	
	n	%	n	%
Man	25	69.5	25	69.5
Woman	11	30.5	11	30.5
Amount	36	100	36	100

Distribution of respondents based on gender in the case group and the group control, highest on type sex man with amount each 25 respondents (69.5%) and the lowest was in the female sex with the number of each respectively 11 respondents (30.5%).

Table 2. Distribution respondent based on Age

Age	Case		Control	
	n	%	n	%
0-55 years	9	25	18	50

>55 years	27	75	18	50
Amount	36	100	36	100

Distribution Respondents based on age in the case group, the highest was at age > 55 years by 27 respondents (75%) and the lowest at ages 0-55 by 9 respondents (25%), while the control group, at ages 0-55 by 18 respondents (50%) and at age> 55 years there were 18 respondents (50%).

Kabi's research (2015) in sustainable (2022) also has the number of stroke respondents by gender male more than female respondents. stroke incident ischemia is greater in men than in women (Yueniwati, 2015, Negara 2017). Matter This can happened Because until mid his life, Woman moreprotected from heart disease and stroke because it has the hormone estrogen (Kabi, 2015, Negara, 2020).

Buntaa dalam Negara (2022) states that there is a relationship between age and incidence hypertension. The older you are, the more the risk of it occurring hypertension. According to Yueniwati (2015) hypertension is factor Which mustThis is because hypertension is one of the main risk factors for the disease strokes.

Another study conducted by Dinata (2013) which shows that more 50% of stroke survivors are > 50 years old. The risk of having a stroke has increased since 45 years old. After reaches the age of 50, for each additional three years of age increases the risk of stroke by 11-20%. People over 65 years old haveThe risk is highest and stroke rarely occurs in children younger than 15 years (Feigin, 2009, Negara, 2022).

Relationship of Hypertension, Diabetes Mellitus, and Hypercholesterolemia with Ischemic Stroke

Table 3. Connection Hypertension, dm, And Hypercholesterolemia with Strokes ischemic

Variable	case		control		p-value	OR	95% CI
	n	%	n	%			
Hypertension	29	80.6	10	27,8	0.000	10,771	3.58-3.363
No Hypertension	7	19,4	26	72,2			
DM	6	16,7	5	13,9	1,000	1.24	0.342-4.498
No DMs	30	83.3	31	86.1			
Hypercholesterolemia	7	19,4	2	5,6	0.151	4.103	0.79-21.318
Not hypercholesterolemia	29	80.6	34	94.4			

Relationship of Hypertension with Ischemic Stroke Incidence

The proportion of respondents in the case group who had previously experienced hypertension were 29 respondents (80.6%) and those who did not experience hypertension were 7 respondent (19.4%). Proportion respondent on group control, Which previously ever had hypertension were 10 respondents (27.8%) and those who did not hypertension is 26 respondent (72.2%). Results test *chi-square* obtained mark $p.s = 0.000$ ($p < 0.05$) and OR = 10.771 (95% CI; 3.58 – 33.63). The results of the analysis, show that there is connection between hypertension with incident disease ischemic stroke, where respondents with hypertension had a 10.771 times greater chance to suffer an ischemic stroke compared to respondents who did not have hypertension. It also shows that hypertension is a factor risk from stroke events ischemia (Negara, 2019)

Research conducted by Wayunah (2016) shows this connection which is significant between hypertension and stroke ($p = 0.035$; OR = 7.5). Pressure High blood pressure is the main driving factor for ischemic stroke and stroke hemorrhagic. The higher the blood pressure, the greater the incidence of stroke can happen.

hafid (2014) do study similar And found results that group more cases (stroke sufferers) had a history of hypertension than in control group ($p = 0.026$) which shows that hypertension is associated with stroke and is a major cause of stroke. The blood pressure increase in a manner slowly can damage wall vessels blood with harden the arteries and encourage the formation of blood clots and aneurysms lead on strokes (Feigin, 2009).

Similar research that was also conducted by Ningsih (2018) shows that there is the relationship between hypertension and the incidence of stroke ($p = 0.000$) where respondents with a history of hypertension has a higher risk of suffering a stroke compared to respondents who did not have a history of hypertension. High blood pressure can trigger circumstances atherosclerosis Which can push *Low density Lipoproteins* (LDL) cholesterol to more easily enter the blood vessels and reduce elasticity vessels the blood (Yueniwati, 2015, Negara, 2018).

Relationship between Diabetes Mellitus and Ischemic Stroke

The proportion of respondents in the case group who had previously experienced diabetes mellitus is 6 respondent (16.7%) And Which No experience diabetes mellitus were 30 respondents (83.3%). The proportion of respondents in the control group who previously had diabetes mellitus was 5 respondents (13.9%) and those who did not have diabetes mellitus were 31 respondents (86.1%). *Chi-square* test results $p = 1.000$ ($p > 0.05$) and OR = 1.24 (95% CI; 0.342 – 4.498). Based on the results of this analysis, it shows that there is no relationship between Respondents who have diabetes mellitus with the incidence of stroke ischemic (Pandi, 2017).

Previous research conducted by Wayunah (2016) shows that History of diabetes was not associated with the incidence of ischemic or hemorrhagic stroke ($p = 0.512$; OR=1.5). Similar results were also shown by Totting's research (2017) in where there is no significant relationship between diabetes mellitus and the disease strokes ($p = 0.334$; OR = 1.5).

Diabetes mellitus can become Wrong One factor risk disease strokes Because The higher a person's blood sugar level, the easier it is to get sick stroke (Pinzon, 2019, Negara, 2019). In this study diabetes was not associated with incidence strokes ischemic because exists limitations in study, in where amount the sample is only a few and the research is carried out only in one particular place or characteristic limited.

Connection Hypercholesterolemia with Incident Strokes ischemic

The proportion of respondents in the case group who had previously experienced hypercholesterolemia is 7 respondent (19.4%) And Which No experience hypercholesterolemia were 29 respondents (80.6%). The proportion of respondents in the group control, who had previously experienced hypercholesterolemia were 2 respondents (5.6%) and those who did not experience hypercholesterolemia were 34 respondents (94.4%). The results of the *chi-square* test obtained the value of $p = 0.151$ ($p > 0.05$), OR = 4.103 (95% CI; 0.79 – 21.318). Based on results analysis the, can stated that No there is connection between respondent Which own disease hypercholesterolemia with disease occurrence strokes ischemic.

Koosgiarto (2015) who conducted similar research also stated that there is no significant

relationship between hypercholesterolemia and the incidence disease strokes ischemic nor hemorrhagic, Where respondent Which suffer stroke with high LDL cholesterol levels is less than respondent Which No have rate cholesterol LDL tall ($p=0.271$; $OR=1.3$).

Hypercholesterolemia can resulted incident disease strokes. However, different research results were found. This is probably caused by the respondents Those diagnosed with stroke in this study were caused by other risk factors(such as factors of heart disease, smoking behavior, and excessive alcohol consumption) or No only caused by increase cholesterol in the blood.

CONCLUSION

The conclusion that can be drawn from the research above is that there is a relationship between hypertension and the incidence of ischemic stroke in Banjarmasin Hospital, No there is connection between diabetes mellitus with incident ischemic stroke in Banjarmasin Hospital and there is no relationship between hypercholesterolemia and the incidence of ischemic stroke in Banjarmasin Hospital. Recommended for party House Sick For need carry out socialization or health promotion that can be done by doing counseling to patients. Health promotion can be done by utilizing health promotion facilities in the form of leaflets, posters and *standing banners* about factors risk disease infectious nor No infectious. Public need get used to healthy lifestyle such as maintaining a healthy diet, exercising, routine control and medical examination. For future researchers, it is hoped that they can examine risk factors disease strokes ischemic Which Not yet researched in study This like, disturbance breathing during sleep, and drug abuse in order to increase insight and knowledge public.

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