Relationship Between Controlled and Uncontrolled Type 2 Diabetes Mellitus Against Ischemic Stroke

Linda
Universitas Muhammadiyah Banjarmasin

ARTICLE INFO	ABSTRACT
Keywords: *Diabetes mellitus type 2,* *ischemic Stroke,* *Diabetes type mellitus 2* *controlled.*	Stroke is a cerebrovascular disease that causes death and disability in the third world. In 2015, the World Health Organization (WHO) estimated that there are 20 million people with will die from a stroke. Ischemic Stroke is caused by a supply interruption of blood to the brain. The risk factor for ischemic Stroke is a non -*modifiable factor risk factors* such as age, race, gender, genetics, and modifiable risk factors in the form of a history of *Transient Ischemic Attack* or previous Stroke, hypertension, smoking, obesity, dyslipidemia, diabetes mellitus type2. An analytic observational study of 60 T2DM patients diagnosed with ischemic Stroke in Batang Hospital using medical record data then records the value of fasting blood sugar levels and Blood Sugar 2 Hours Post Prandial. The data was then analyzed using the chi-square test method with a mark of p<0.05. There is a connection Which significant between Diabetes mellitus controlled And not controlled to stroke incident ischemic with mark p.s: 0.023 And mark OR (95%CI) = 4.71. The connection between Diabetes mellitus type 2 controlled And not controlled to incident strokes is ischemic significant.
Email : candra14780@yahoo.com	

1. INTRODUCTION

Stroke is a cerebrovascular disease that can lead to a second death and a third disability worldwide. Strokes are circumstances found in clinical sign form to decrease neurological focal And global, which can be aggravating and last for a long.(Afida, 2022)

According to World Health Organization (WHO) year 2015, estimate there is Twenty million people will die from strokes, increasing death consequences, heart disease, and cancer. (Country, 2022)

In countries That include ASEAN, disease strokes are a serious problem That causes death. Prevalence of strokes in Indonesia in 2018 based on a doctor's diagnosis ≥ 15 years by 10.9% or around 2,120,362 people. Of whole disabled strokes in Indonesia, 87% are disabled strokes ischemic the rest is hemorrhagic strokes. (Dinkes Central Java, 2019)

According to data from Riskesdas year 2018 , the prevalence of strokes on age ≥ 15 years in Java Middle as big 11.80%. Whereas specifically in Batang Regency, according to Profile Health Regency Stem 2017 , there is a stroke prevalence of 2.1% of the disease. No infectious other. (Office of Health Central Java, 2019).

Strokes ischemic are strokes caused by a disturbance in blood supply to the brain, usually due to vessels clogged by plaque clots. Factor risk, Which can become tall incident ischemic stroke, cannot be modified (*non-modifiable risk factors*) such as age, race, gender, or genetics. Whereas factors That can modify (modifiable risk factors) form a history of *transients ischemic attacks* or strokes previously, hypertension, smoke, obesity, dyslipidemia, and diabetes mellitus type 2. (Riskesdas, 2018)

Diabetes mellitus type 2 is a disease found with a sign of hyperglycemia And Is marked by a disturbance metabolism of carbohydrates, fat, And proteins. This disturbed Then connected with a lack in manner absolute or relatively a secretion of insulin. Type 2 diabetes mellitus can result in acute or chronic complications. Complications I like ketoacidosis diabetic, hyperosmolar hyperglycemia, and hypoglycemia, whereas complications chronic like nephropathy, retinopathy, and

Stroke. DMs that don't control can cause complications micro or macrovascular Which are difficult And protective. (Country, 2019)

Diagnosis DMT2 set based on inspection glucose plasma fast ≥126 mg/dl, inspection glucose plasma ≥200 mg/dl 2 O'clock after test tolerance glucose orally (TTGO) with glucose 75 grams, and glucose checks plasma when ≥ 200 mg/dl with a classic complaint. [5] High blood sugar levels in DMT2 sufferers can increase the risk of being hit by a stroke, two times more risky than the rate person's controlled blood sugar. (Soelistijo *et al* , 2019)

2. METHODS

Study This held on month March and April 2022. Study This is an observational analytic with a cross-sectional approach. Sample Which used as much 60 patients DMT2 in Batang Hospital from January to December 2021, Which fulfill criteria inclusion And exclusion. Criteria inclusion Respondents diagnosed strokes ischemic by the doctor with CTScan inspection and Data on Inspection sugar blood fast And sugar blood 2 hours postprandial. Exclusion criteria cover patients with tumor brain, patient Bell palsy, Stroke hemorrhagic, hypertension, dyslipidemia, data No complete, strokes the ischemia not hit DMT2. Method collection data used secondary data obtained from medical records of patient strokes ischemic in HOSPITAL Stem. Data used covers identity, age, sex, level of GDP, and level of GD 2PP. Data analysis using application analysis statistics. Univariate analysis is done To analyze each variable's average, minimum, maximum, standard deviation, frequency, And percentage. Analysis bivariate use test Chi-Square with p<0.05.

3. RESULTS AND DISCUSSION
Sample Characteristics

Table 1. Univariate Age Analysis

	Minimum	Maximum	Means	std. Deviation
Age	45	70	56,53	5.93

Table 1 explains that the subject average age sufferer strokes ischemic with DMT2 in the Study. This is 56.53 ± 5.93 years, with the lowest age being 45.

Table 2. Univariate Analysis of Gender

	Frequency	Percentage
Type sex		
Man	26	43,3 %
Woman	34	56,7 %
Total	**60**	**100**

Table 2 shows the distribution type sex of the whole respondent. Type most sex Lots are Women with a frequency of 34 respondents (56.7).

Table 3. Univariate Analysis of Diabetes Mellitus Type 2

	Frequency (N)	Percentage (%)
DMT2		
Controlled	25	41.7%
out of control	35	58.3%
Total	**60**	**100 %**

Table 3 shows the distribution of DMT2 on the whole respondent. Category DMT2 Which most Lots are Uncontrolled DMT2 with a frequency of 35 respondents (58.3%).

Table 4. Univariate Analysis of Ischemic Stroke

	Frequency (N)	Percentage (%)
Ischemic Stroke		
I	44	73.3%
Recurrences	16	26.7%
Total	**60**	**100%**

Table 4 shows the distribution of strokes ischemic on the whole respondent. Category strokes ischemic: Most often are acute ischemic strokes with a frequency 44 respondents (73.3%).

CONNECTION DMT2 CONTROLLED AND NOT CONTROLLED WITH STROKE ISCHEMIC

The results of the relationship chi-square test Diabetes Mellitus type 2 controlled And uncontrollable with Strokes ischemic can be seen in Table 5.

Table 5. Chi-square test for the relationship between controlled and uncontrolled type 2 diabetes mellitus and ischemic Stroke

Variable	Strokes ischemic		p.s	OR (95% CI)
	I	Recurrences		
DMT2				
out of control	30 (85.7%)	5 (14.3%)	0.023	4.71 (1.37 – 16,18)
Controlled	14 (56%)	11 (44%)		

From the results of the chi-square test, on the data DMT2, Which was not controlled, obtained strokes ischemic I as much 30 person (85.7%) And recurrences much five person (14.3%) with a total of 35 people. On data DMT2 controlled, There were 14 acute ischemic stroke people (56%) and recurrences (44%) with a total of 25 people. On DM obtained mark p.s < 0.05, so that can conclude obtained connection meaning between DM to ischemic Stroke with OR value (95%CI) = 4.71 (1.37 - 16.18) which means DM No controlled risky happen strokes ischemic I 4.71 time bigger compared to DM controlled.

Discussion

Based on the test chi-square, Which done showing diabetes mellitus type Two controlled And not controlled own significant correlations to the occurrence of ischemic strokes. Results from the following review References, Which have been mentioned previously. Hanjaya et al. (2019) show that sugar blood fast, Which is not controlled, relates to mark *NIHSS* (National Institutes of Health Strokes Scales) bad or bad outcomes. (Hanjaya *et al* , 2019)

Statement This is strengthened by Huang *et al.* (2020) DMT2, Which is not controlled, related tight to enhancement plaque on the intracranial, Which can cause ischemic Stroke. (Huang *et al.*, 2020)

Significant relationship DM no controlled own inclination positively correlated with the incidence of Stroke ischemic. Matter This showed from amount patients with DM not controlled Who own a history of strokes ischemic on this Study as many as 30 people (85.7%). Results by Study Jing *et al.* (2016) showed that DM does not but can raise damage to vessels and severe blood in the central nervous system and peripheral, thereby affecting the process of healing And outcome. (Jing *et al.*, 2016)

The blood sugar rate, Which is not controlled in T2DM patients, is closely related to glucose metabolism. Abnormal, for a long time, will raise the formation of atherosclerotic plaque, Which then experiences thrombosis, rupture, And disturbance function endothelium on vessels blood, Which causes a lesion. Hyperglycemia And ROS production also induce the Activation of PKC, activating the core factor NF-kB. Its activated factor core NF-kB cause enhancement production of inflammatory mediators on the vascular endothelium. Enhancement production mediators

inflammation, Which causes adhesion monocytes, extraction, And the formation of cell foam And ends in the formation of atherosclerosis. (Zheng Y *et al.*, 2018), (Al Mahdi, 2020).

Based on the test chi square DMT2 controlled obtained a significant relationship between strokes ischemic. Results following the Study by Li *et al.* (2021) showed that controlled glycemic levels could cause happening plaque atherosclerosis in the brain. However, The incidence is not as high as in Type 2 DM uncontrollable. (Li *et al.*, 2021)

Statement This is strengthened by a Study by Jiao *et al.* (2021) showing no difference in prevalence, Which is significant in enhancement formation plaque between patients without DM and those with controlled DM. On Study explains that patients with DM are not more prone to will formation plaque than patients without DM or DM controlled. Connection Which significant DM controlled down inclination correlated positive incident strokes ischemic. This matter is indicated by the number of patients with DM controlled. Which own history strokes ischemic on Study This as much 14 person (56%). Exposure to hyperglycemia continuously induces changes in the vascular network, for example. The whole cause of acceleration happening atherosclerosis. Fine on patient DM controlled or not controlled. You're welcome to experience mechanism shape atherosclerosis, only distinguished by amount And long exposure. (Jiao *et al.*, 2021)

Based on the chi-square diabetes test controlled and uncontrolled type 2 mellitus, there is a connection Which significant strokes recurrences. Matter This showed from some patients with controlled DM with a history of Stroke ischemic recurrences in the Study. This is 11 people (44%) and also uncontrolled by five people (14,3). The results following a Study by Long *et al.* (2016) showing Diabetes Mellitus is a factor predictive of recurrent ischemic Stroke. Level incident Stroke ischemic recurrence at the age old of is taller than at a young age and often occurs 12-36 months after the first Stroke. (Long *et al.*, 2016)

The strengthened research by Zhang et al (2021) shows a significant relationship between Diabetes Mellitus and the risk happening Strokes ischemic recurrences. (Zhang *et al.*, 2021), (Basid, 2023). In addition, research by Guo *et al.* (2021), DM is a risk factor for stroke recurrences after Stroke ischemic And TIA. According to research conducted in China, the possibility of recurrent Stroke is low awareness of the public will Diabetes Mellitus, the number of patients who know the disease Diabetes Mellitus is very low, and DM No treated in time Which long. Patients with DM tend to own rate CRP, Which is tall, leading to a recurrent stroke 90 days after ischemic Stroke or TIA. Mechanisms biological That cause recurrent Stroke in DM patients are not yet fully understood. First, DM cause traumatized vascular through vasodilation Which is caused by *nitric oxide* (NO). Injury vascular This causes various types of trauma system nerve center, for example, strokes.

Thereby, DM possibly increases the risk o f stroke recurrences through the endogenous cardiovascular system. Second, patients with DM tend to be hyperglycemic, Which is how pathophysiology influences the patient. Hyperglycemia increases lactate accumulation and acidosis intracellular through anaerobic glucose metabolism in the ischemic brain, thereby accelerating ischemia. The second process here is Which causes recurrent ischemic Stroke. (Guo *et al.*, 2021), (Ardila, 2022).

Limitations Study This is No know ever consumption drug diabetes mellitus type 2 controlled, not enough known ever patients suffer type 2 diabetes mellitus, and also absent HbA1C examination, which is the gold standard For known average sugar blood during three months.

4. CONCLUSION

Based on the results of Ujichi Square, there is a significant connection between type 2 diabetes mellitus under control and no controlled strokes ischemic.

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