

Neurologic Deficit Factors To Stroke Ischemic Patient's In Ulin General Hospital Banjarmasin

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ABSTRACT

Objective: To analyze factors related with neurologic deficits to patients with ischemic stroke in Seruni Central of Ulin Hospital Banjarmasin.

Methods: Analytical observational study with cross sectional approach, population and sample were outpatient ischemic stroke in Ulin Hospital. Taken sampling technique with accidental sampling in 13 March- 30 April 2017 amounted 30 people. Data collection used observation sheets, used two statistical analyzes is Mann Whitney Test and Pearson Correlation Test on the degree of confidence 95%

Result: Respondents with right hemisphere lesion 13 people (43.3%), left hemisphere lesion 17 people (56.7%). The mean lesion area is 3.54 cm³, the minimum lesion area is 0.015 cm³, the maximum lesion area is 13.60 cm³. Neurologic deficit (NIHSS 48 hours) was obtained on mean score 10.72, minimum NIHSS score 3 and maximum NIHSS score 29.

Conclusion: There is correlation between the location of the lesion and the neurologic deficit in ischemic stroke patients in Ulin Hospital Banjarmasin ($p=0,000 \leq 0,05$). There is correlation between the extent of the lesion and the neurologic deficit in ischemic stroke patients in Ulin Hospital Banjarmasin ($r= 0,910$; $p= 0,000 \leq 0,05$).

Keywords: extent of lesion, location of Lesions, neurologic deficit.

I. INTRODUCTION

Stroke is a disease that is a major problem for humans around the world, where there is a sudden neurological deficit and the flow of blood supply to the brain stops and it can cause to brain death. Some things that can cause blood flow in the brain include blood vessels (ischemic stroke) or rupture of blood vessels (hemorrhagic stroke), both of which can cause blood supply to the brain to stop and symptoms of brain death [1].

The severity of neurological deficits due to stroke vary greatly depending on the location and extent of the damaged brain area. When blood flow is cut off only in small areas or occurs in areas of the vulnerable brain, the effects are mild and temporary. Conversely, if blood flow is lost on a large area or on the vital part of the brain will occur a severe paralysis to the death. Neurologic deficits can be seen from a wide range of cerebral infarcts, namely death of neurons, selglia and blood vessel systems due to lack of oxygen and food. This condition can be due to a blockage of blood vessels of the brain by thrombus or embolism, thus causing ischemic or infarct brain tissue [2]. The location and volume or extent of cerebral infarction determine neurologic deficits in stroke patients especially in sensorimotor, cognitive and emotional functions. The infarction in the cerebellum can affect some brain systems that can lead to complex neurological syndromes, such as apraxia, inability to notice the limb side space, and Gerstman syndrome [3].

The preliminary study which was conducted on Thursday, December 8th, 2016 until December 10th, 2016, The data obtained from space Neurology Ulin General Hospital Banjarmasin through observation of the number of patients ischemic hemisphere Right 4 people (40%), Hemisfer Left 6 people (60%), with mild neurologic impairment of 1 person (10%), moderate 6 person (60%), severe 3 person (30%), very severe 1 person (10%). Based on the background of the above problems, the researchers interested in conducting research with the title of "Factors Related of Neurological Deficit to Stroke Ischemic Patients in Ulin General Hospital Banjarmasin".

II. METHOD

This research uses analytic observational research method, with cross sectional approach. The population and sample of ischemic stroke patients in Seruni Room Ulin General Hospital Banjarmasin. The sampling with accidental sampling technique on March 13th to April 30th, 2017 amounted to 30 people. The data collection using observation sheets, and using two statistical analyzes ie Mann Whitney Test and Pearson Correlation Test with a significant level of 95%.

III. RESULT

Characteristics of respondents by age

can be seen in the following table:

Table 1. Distribution of Age Frequency of Ischemic Stroke Patients in Ulin General Hospital Banjarmasin

Age (Year)	f	%
Early adulthood (26-35)	1	3,3
Late adulthood (36-45)	4	13,3
Early elderly (46-55)	14	46,7
Late elderly (56-65)	4	13,3
Elderly (>65)	7	23,3
Total	30	100

Based on age characteristics Minister of Health Indonesian Republic (MoHIR) in 2009, the results showed that the majority of ischemic stroke patients at Ulin General Hospital Banjarmasin were at the age of the early elderly 14 people (46-55 years old) or (46.7%) followed by elderly 7 people by age (> 65 years) or (23.3 %), late adulthood as 4 people (36-45) or (13.3%), late elderly as 4 people (56-65) or (13.3%), and early adulthood as 1 person (26-35) or (3, 3%).

Characteristics of respondents by gender can be seen in the following table:

Table 2. Gender Frequency Distribution of Ischemic Stroke Patients in Ulin General Hospital Banjarmasin

Gender	f	%
Female	13	43,3
Male	17	56,7
Total	30	100

The results showed that male patients had the largest number of 17 people (56.7%) while women were 13 people (43.3%).

The description of the location of lesions of stroke patients at Ulin General Hospital Banjarmasin obtained based on the results presented in table 3.

Table 3. Frequency Distribution of Lesions of Stroke Patients in Ulin General Hospital Banjarmasin

Lesion location	F	%
Right	13	43,3
Left	17	56,7
Total	30	100

Table 3 shows that the location of the left lesion has the largest number of 17 people (56.7%), while the location of the right lesion amounted to 13 people (43.3%).

An overview of the lesions of stroke patients in Ulin Banjarmasin Hospital can be seen in the following table:

Table 4. Overview of Lesions of Ischemic Stroke Lesions in Ulin General Hospital Banjarmasin

Variabel	Mean	Median	Standart Deviation	Mini mum	Maxi mum
Lesion area (Cm ³)	3,54	2.05	3,69	0,2	13,60

Based on table 4. the average area of lesion of ischemic stroke patients is 3.54 cm³, with deviation standard 3,69, with minimum lesion area is 0,15 cm³ and maximum lesion area is 13,60 cm³ from 30 research subject.

The description of the neurological deficit score of stroke patients in Ulin General Hospital Banjarmasin can be seen in the following table:

Table 5. Description of Neurological Deficits of Ischemic Stroke Patients at Ulin General Hospital Banjarmasin

Variable	Mean	Median	Standart Deviation	Minim um	Maxim um
Neurolog ical deficit score (NIHSS)	10,7	10.50	6,8	3	29

Based on table 5. When NIHSS score was examined 48 hours after stroke, an average score of NIHSS was 10.72, with a

standard deviation of 6.58, with a minimum NIHSS score of 3 and a maximum NIHSS score of 29, out of 30 research subjects.

Bivariate analysis was performed to see a correlation between the location of the lesion and the neurologic deficit score (NIHSS 48 h) using the Mann Whitney test. The results of the study found a significant association between the location of the lesion and the neurologic deficit rate (NIHSS score 48 h) after stroke on ischemic stroke clients at Ulin General Hospital Banjarmasin. This can be seen in the table as follows:

Table 6. The relationship of Lesions with Neurological Deficit in Ischemic Stroke Patients at Ulin General Hospital Banjarmasin

Lesion Location	N	Mean	P
Right	13	8.23	0.000
Left	17	21.06	

Based on Table 6. Mann Whitney test results obtained left mean lesion value greater than the right lesion ($21.06 > 8.23$), and p value < 0.05 (0.000) indicating that there is a significant relationship between the location of the lesion with the level of neurological deficit (NIHSS score 48 hours) on ischemic stroke patients in Ulin General Hospital Banjarmasin.

Bivariate analysis was performed to see the wide association of neurologic lesions and deficits by using the Pearson Correlation test. The results of the study found a significant relationship between the area of lesions with neurological deficits in patients with ischemic stroke at Ulin General Hospital

Banjarmasin. This can be seen in the cross tabulation as follows:

Table 7. The relationship of Lesions area with Neurologic Deficit in Ischemic Stroke Patients at Ulin Banjarmasin Hospital

		Neurological deficit score (NIHSS 48 hours)
Lesion area	R	0.910
	P	0.000
	N	30

Based on table 7. Pearson Correlation test results obtained p value = 0.000 less than 0.05 indicating that between the area of lesions and neurological deficit is significant correlation as well and value $r = 0.910$ which shows a positive direction with a very strong correlation power. Based on the direction of the correlation means the wider the lesion, the greater the level of neurological deficits in patients with ischemic stroke.

IV. DISCUSSION

1. Respondent based on age (Year)

Based on the result of research, it is known that the majority of ischemic stroke patients in Ulin General Hospital Banjarmasin were at the age of the early elderly 14 people (46-55 years old) or (46.7%) followed by elderly 7 people by age (> 65 years) or (23.3 %), late adulthood as 4 people (36-45) or (13.3%), late elderly as 4 people (56-65) or (13.3%), and early adulthood as 1 person (26-35) or (3, 3%).

The stroke risk factors appear after a person entering the age of prone after the age of 50 years where 6 times greater stroke. This happens because people at this age are less active, weight will increase and muscle mass

will decrease as well as due to aging process resulting in progressive shrinkage of beta cells⁽⁴⁾.

2. Respondent based on gender

Based on the results of the study showed that male patients had the largest number of 17 people (56.7%), while women were 13 people (43.3%).

A Male have a higher risk of stroke because men have testosterone, which can increase LDL levels, if high levels of LDL can increase blood cholesterol levels, which is a risk factor for degenerative diseases such as stroke. In addition men become more at risk due to having the habit of stroke triggers such as smoking [5].

3. Ischemic Stroke Patient Location in Ulin General Hospital Banjarmasin

Based on the result of the research, it is known that the left side lesion has the biggest number which is 17 people (56,7%), while the location of right lesion is 13 people (43,3%). Lateralization is important in the rehabilitation of stroke patients due to functional differences between the hemispheres. The left hemisphere is more commonly infarcted than the right hemisphere, this is due to differences in the intima media complex and the velocity of blood flow in the left carotid artery, causing atherosclerotic changes leading to more severe left hemisphere ischemic events. Ischemic and cardioembolic events are more common in the left hemisphere. The left carotid artery is a direct branch of the aorta

and cardiogenic embolism probably tends towards it [6].

The general interoretation function of the Wernicke area and the angular gyrus, as well as the function of the speech area and the area of motor settings, is usually much more developed in one cerebral hemispherium than the other. Hence the hemisphere is called the dominant hemisphere. Generally, in 95% humans are more dominant with left hemisphere. Even at birth more than half the number of neonates has a cortex area in the left hemisphere 50% larger than the right. Therefore it can be concluded that the left side area of the brain is more dominant than on the right side [7].

The damage to the left and right hemispheres gives different symptoms because there has been a process of lateralization of certain functions in one hemisphere (cerebral dominance) [8].

4. Lesions area of Ischemic Stroke Patients Ulin General Hospital Banjarmasin

Based on the research result, it is found that the average of Lescers lesion area is 3.54 cm³, with defiation standard 3,69 with minimum lesion area is 0,15 cm³ and maximum lesion area is 13,60 cm³ from 30 research subject. The area of cerebral infarct determines neurological deficits in stroke patients primarily in sensorimotor, cognitive and emotional functions. Infarction in the cerebellum can affect several brain systems that can lead to complex neurological syndromes, such as apraxia, inability to notice

the limb side space, and Gerstman syndrome [3].

Patients with ischemic stroke with 0-25.7 cm infarct volume showed good quality of life, while 25.7-156.9 cm³ had unfavorable quality of life⁽⁹⁾. Patients with acute ischemic stroke with a small lesion volume (50 cc) of 67 people and still seen 4 people who have a normal barthel index degree. In moderate lesion volume (50-299 cc), 19 patients with acute ischemic stroke become mild dependence, on large lesion volume (201-400 cc) where as many as 5 people, 1 person has a medium dependency barthel index and 4 person degree a severe dependency barthel index, and an acute ischemic stroke patient with a massive (> 400 cc) mass of 9 people, all of which showed a severe degree of dependence. So it can be concluded that the greater the volume or area of the lesion, the higher the level of dependence of stroke patients. The more extensive the infarction, the more often the motor function and mental function disorder occurs [3].

5. Neurological Deficit / NIHSS Score (National Institute of Health Of Stroke Scale) 48 hours Patient Ischemic Stroke Ulin General Hospital Banjarmasin

Based on the results of the study at the NIHSS score of 48 hours after the stroke, the mean score of NIHSS was 10.72, with a standard deviation of 6.58, with a minimum NIHSS score of 3 and a maximum NIHSS score of 29, out of 30 subjects.

Neurologic symptoms arising from cerebral circulatory disturbances depend on the severity of the disorder and location. The main symptom of non-hemorrhagic stroke is the sudden onset of neurologic deficits, preceded by prodromal symptoms, resting or waking hours and consciousness usually not decreased [10]. In the severity of acute stroke, the inflammatory response may affect the severity of the stroke. A stroke causes various neurologic deficits, depending on the location of the lesion (which of the blood vessels is blocked), the location of the inadequate perfusion and the amount of coleteral blood flow (secondary or accessory). Brain condition is a condition that triggers various cellular processes that can either be self-contained or interconnected, but they can all end in neuron death and persistent brain tissue damage, which manifests as a permanent neurological deficit. In acute stroke, there is a change in cerebral blood flow (ADO), where a decrease in ADO at some level leads to different tissue responses. In areas that are ischemic, blood flow decreases significantly [11].

From the results of the study in Indonesia, it was found that the average stroke was aged between 45 years and over with symptoms and the biggest clinical signs are motor disorders, then headache, disatria, sensory disturbances and dysphagia [12].

Increased and decreased NIHSS scores are thought to be related to several factors including a history of the patient's health

condition, the role of physiotherapy, drugs, the ability of the brain to cope with reperfusion injury, where rapid handling also plays a role in the process. This is in line with a study conducted by Napitupulu (2011), where there was a change in NIHSS score from 48 hours from onset to 7th day of onset depicting NIHSS score reduction⁽¹⁴⁾. Similarly, research conducted by Ora Adja (2015), that there is an increase in NIHSS score of ischemic stroke patients at the beginning of the attack until the seventh day of hospitalization⁽¹⁴⁾. Research conducted by Bill et.al. (2012) said that the NIHSS score at the time of admission is a predictor of outcomes of patient care. Patients with severe ischemic stroke may experience focal edema complications with the risk of brain herniation, pneumonia, acute heart failure, and even death, thus affecting the deterioration of neurological deficits [15].

6. The Relationship of Lesions Location with Neurological Deficits of Ischemic Stroke Patients Ulin Banjarmasin Hospital

Based on the results of the Mann Whitney test analysis, the mean left lesion value is greater than the right lesion (21.06 > 8.23), the test value Z (-3.983) and the p value <0.05 (0.000) indicating that there is a significant relationship between the location lesions with a neurologic deficit rate (NIHSS score 48 h) on ischemic stroke clients at Ulin Banjarmasin hospital.

The location of the lesion becomes one of the predictors of a stroke's neurologic

deterioration. Differences in neurologic deficit rates between ischemic stroke left and right hemisphere lesions are due to differences in the intima media tunica layer and the velocity of blood flow in the left cerebral hemisphere artery so that there is often a difference in outcome between the two hemispheres although this needs further validation. In some studies that have shown that very high cardioembolic rates occur in ischemic stroke of left hemisphere lesions, prospective validation has been made that the embolic bubbles more frequently enter the left hemisphere hemisphere bleeding circulation than the right hemisphere [10].

Among the factors that contribute to the incidence and severity of post-stroke neurologic deficits are the location of the lesions in the brain, the presence of a family history of depression, and pre-stroke social conditions. Stroke sufferers with severe neurological deficits are often less responsive to rehabilitation efforts, irritable, and show behavioral or personality changes. But depression is a disorder that must be seen separately from stroke, and should be treated as early as possible even when the patient is undergoing a rehabilitation process [17].

The damage that occurs in the brain due to ischemic conditions on the right hemisphere side will give effect to the left side of the body. Conversely, if the left hemisphere is affected then the right body will experience paralysis and motor weakness. The response of serotonin

receptors to the cortex during brain injury shows different results for two cerebral hemispheres. The serotonin receptor bond in the right healthy part of the hemispheroid tends to increase during a stroke. Left hemispheric lesions cause amine-biogenic decreases in the absence of compensatory elevations of serotonin regulation resulting in the appearance of depressive symptoms, whereas right hemisphere lesions show different states of elevation of serotonin regulation due to a protective compensatory mechanism against depression. The mechanism of neurological impairment in right hemispheres is unlike the left hemisphere because the left frontal hemisphere lesion is the center of the natural regulation of the feeling. So if there is a disorder of serotonin regulation in the left hemisphere, it will lead to a worse neurological deficit [17]. Most ischemic stroke patients have lesions in the hemisphere of the sinusra, which is about 66.7% because most people are predominantly using the left brain [18]. Similarly, Nasution's (2016) study stated that left hemisphere lesions have a significant correlation with the severity of depressed ischemic stroke patients [19].

Based on the hemisphere of the brain in the left hemisphere (54%) were more frequent in patients with ischemic stroke, from the Stroke right hemispheres (46%; $p = 0.0073$), and stroke in the left hemisphere has a score of NIHSS higher ($p = 0.011$) [6].

7. Extensive Relationships Lesions with Neurological Deficits of Ischemic Stroke Patients Ulin General Hospital Banjarmasin

In this study there is a relationship between the extent of lesions with neurological deficits in patients with ischemic stroke in hospitals in Banjarmasin. Based on the result of Pearson Correlation correlation analysis, $p = 0.000$ value less than 0.05 indicating that between the area of lesion and neurological deficit is significant correlation and correlation coefficient value (0.910) shows positive direction with very strong correlation strength. Based on the direction of the correlation means the wider the lesion, the greater the level of neurological deficits in patients with ischemic stroke.

The severity of neurologic deficits due to stroke varies greatly depending on the location and extent of the damaged brain area. When blood flow is cut off only in small areas or occurs in areas of the vulnerable brain, the effects are mild and temporary [20]. Conversely, if blood flow is lost on a large area or in the vital part of the brain will occur a severe paralysis to death. Neurologic deficits can be seen from a wide range of cerebral infarcts, ie deaths of neurons, glial cells and blood vessel systems due to lack of oxygen and food. This condition can be due to a blockage of blood vessels of the brain by thrombus or embolism, thus causing ischemic or infarct brain tissue [2]. The location and volume or extent of cerebral infarction

determine neurologic deficits in stroke patients especially in sensorimotor, cognitive and emotional functions. Infarction in the cerebellum can affect several brain systems that can lead to complex neurological syndromes, such as apraxia, inability to pay attention to the limb side space, and Gerstman syndrome. Similarly, lateralization of the stroke portion, the volume or extent of infarct lesions has a significant correlation to neurologic deficit rates based on NIHSS scores, infarction and infarction enlargement into predictors that exacerbate stroke severity, with extent or infarction volume > 11 ml identified to be the largest limit in predicted stroke worsening ischemic [3].

The limitations of this study were conducted by observation using NIHSS performed only once at the time the client was treated for 48 hours and not done in the acute phase when the respondent entered the treatment so it can't be known the difference between the initial and post-treatment NIHSS score. To facilitate the investigators to see the optimal neurologic development in stroke patients should be observed using NIHSS performed at 24, 48, 72 hours after stroke.

This research is only designed to examine and analyze two independent variables that are likely to cause the degree of neurological deficits in stroke patients in the Seruni Room Ulin Banjarmasin, should other factors such as leukocyte levels, blood glucose levels, HDL-LDL levels, drug therapy and physiotherapy given, other

conditions such as blood pressure, body temperature, and other histories affecting the patient's condition are also assessed to minimize the bias level in the study.

This study has not fully involved specific sites based on the anatomy of the part of the brain that can affect the rate of neurological deficits in patients with ischemic stroke. Preferably the research is done more specifically based on the anatomy of the brain for example based on the location of nerves and blood vessels what lesions, or based on the depth of the lesion (subdural, epidural), especially in stroke patients with bleeding.

V. CONCLUSION

Most of the location of lesions in ischemic stroke patients in Ulin General Hospital Banjarmasin was in the left or 56.7% while the location of the right lesion was 43.3%.

The average lesion area in patients with ischemic stroke at Ulin General Hospital Banjarmasin is 3.54 cm³ which is included in the broad category and becomes a predictor of neurological deficits.

The average neurologic deficit score (NIHSS 48 h) in ischemic stroke patients in Ulin Banjarmasin hospital was (10,7) medium neurological deficits. There is a relationship between the location of lesions with neurological deficits in patients with ischemic stroke at Ulin General Hospital Banjarmasin.

There is a relationship between the extent of lesions with neurologic deficits in

patients with ischemic stroke at Ulin General Hospital Banjarmasin.

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