



## Characteristics of stroke patients: An analytical description of outpatient at the hospital in Semarang Indonesia

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### ABSTRACT

A country's population characteristic is influenced by differences in lifestyle due to changes in demographics, epidemiology and culture of each region so, the behaviour risk which is detrimental to health. The purpose of this study is to determine the characteristics of stroke patients in Semarang Districts. The method used was descriptive-analytic and samples were taken using a total sampling technique of 92 patients diagnosed with a stroke. Data obtained from patient medical records and interviews with patients or their families. The patients interviewed had an MMSE score of 24-30. The results of this study showed the characteristics of stroke patients in Semarang 57.6% aged 40-59 years, male patients by 50%, the population who had never been at school 30.4%, non-hemorrhagic stroke 83.7%, patients with left hemiparesis 51.1%, patients with risk factors for hypertension 85.9%, and 79.6% of patients had never been exposed to information about stroke. History of diabetes mellitus and smoking habits significantly influence the occurrence of non-hemorrhagic stroke. Patients with diabetes mellitus have a risk of 9.6 times and patients with smoking have a risk of 3.9 times to experience a non-hemorrhagic stroke.

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## Karakteristik pasien stroke: Deskripsi analitis pada pasien rawat jalan di rumah sakit di Semarang Indonesia

### ABSTRAK

Karakteristik penduduk suatu negara dipengaruhi oleh perbedaan gaya hidup akibat adanya perubahan demografi, epidemiologi dan juga budaya masing-masing daerah sehingga berisiko terjadinya perilaku yang merugikan kesehatan. Tujuan penelitian ini adalah untuk mengetahui karakteristik pasien stroke di Kabupaten Semarang. Metode yang digunakan adalah deskriptif analitis dan sample diambil dengan menggunakan tehnik total sampling terhadap 92 orang pasien yang di diagnosa stroke. Data diperoleh dari rekam medis pasien dan wawancara kepada pasien atau keluarganya. Pasien yang diwawancara memiliki nilai MMSE 24-30. Hasil penelitian ini menunjukkan karakteristik pasien stroke di Kabupaten Semarang 57,6% berusia 40-59 tahun, pasien jenis kelamin laki-laki sebesar 50%, penduduk yang tidak pernah sekolah 30,4%, stroke non hemoragik 83,7%, pasien dengan hemiparesis kiri 51,1%, pasien dengan faktor resiko hipertensi 85,9%, dan 79,6% pasien belum pernah terpapar informasi tentang stroke. Riwayat diabetes melitus dan kebiasaan merokok berpengaruh secara signifikan untuk terjadinya stroke non hemoragik. Pasien dengan diabetes melitus memiliki risiko 9,6 kali dan pasien dengan kebiasaan merokok memiliki risiko 3,9 kali untuk mengalami stroke non hemoragik.

#### Kata kunci:

Karakteristik Stroke  
Kabupaten Semarang  
Faktor risiko  
Pasien

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## Introduction

Stroke was a brain blood vessel vascularity disorder that can result in disability to death. The incidence of stroke reaches 40 to 300 cases per 100,000 population (Scheers et al, 2015). Death from stroke occupies the third position after heart disease and cancer (Anita et.al, 2018). The prevalence of stroke patients in Indonesia continues to increase. If in 2013 the number of stroke patients was 7%, then in 2018, it would increase to 10.9% (RISKESDAS, 2018).

Stroke patients in developing and developed countries have different characteristics. The Netherlands which was one of the developed countries has the stroke patients characteristics with aged 59-80 years (69%), male (54%), risk factors for cardiovascular disease (71%), hypertension (57%), hyperlipidemia (30%), diabetes (16%), myocardial infarction (13%), atrial fibrillation (13%), duration of stroke patients before 3 hours of initial attack by 60% of existing cases (Horsch et al., 2016). Indonesia is a developing country and has a different culture. The number of stroke patients was 48.2% for men and 51.8% for women, the age of stroke sufferers ranges from 35-44 years (22.2%), risk factors for stroke include smoking habits (35.7%), hypertension (27.1%) and diabetes mellitus (2.4%) (Ghani et al, 2016). Advances in technology in developing and developed countries have resulted in demographic and epidemiological changes that are characterized by changes in lifestyle and increased prevalence of non-communicable diseases, one of which was stroke (Yonata et al, 2016). In addition, diet and lifestyle are also influenced by the cultures of different districts/cities (Ghani et al, 2016).

Semarang District is one of the regions in Central Java which classified as a mountainous area with a population of 1,027,489 people. As much as 25.26% of the Semarang District area is used as agricultural land and the rest is non-paddy land which is mostly used for the industrial sector. Semarang District residents who have never been at school (4.38), did not complete elementary school (17.32%), graduated elementary school (23.22%), graduated junior high (21.48%) (BPS, 2017). It showed that the Semarang district was originally an agrarian area which had begun to become an industrial area but was not supported by good human resource capabilities.

The existence of industrialization in agrarian societies can cause in changes in the socio-economic community one of which is a change in the health level (Mulyadi, 2015). Low levels of public education also risk behaviours that harm health (Sutrisno et al, 2014). According to the health profile of Central Java, it was known that the number of people with hypertension is 64.83% and diabetes mellitus 19.22% (Dinkes Prov. Central Java, 2017). A history of hypertension and smoking are prominent risk factors for stroke today (Scheers et al., 2015). For this reason, the authors are interested in examining the characteristics of stroke patients in Semarang District.

## Method

This research uses the descriptive-analytic method. The population in this study were stroke patients treated at outpatient polyclinics and patients who were undergoing hospitalization at the Semarang District Hospital from October to November 2019. Sampling taken was using a total sampling technique of 92 patients. The sample used was a patient diagnosed with a stroke. This is the definition according to AHA 2013, which is characterized by acute

neurological deficits in the central nervous system (CNS) due to vascular disorders, including cerebral infarction, intracerebral hemorrhagic (ICH) or subarachnoid hemorrhagic (SAH) as evidenced by neuropathological examination, neuroimaging and/or permanent clinical injury (Sacco et al., 2013). The inclusion criteria of all patients diagnosed with stroke were proven by the results of CT scan readings by radiologists. For the patient knowledge characteristics about stroke information, the researchers only used patients who had no aphasia or dysarthria and also no cognitive impairment (MMSE value 24-30). Ethical approval was obtained from the KEPK of the Medical School, University of Diponegoro under number 59 / EC / KEPK / D.Kep / VIII / 2019.

## Assesment

The researchers conducted an assessment using patient medical record data, interviews with patients or their families, also using a questionnaire containing patient demographic data (8 questions), supporting patient examination data including risk factors, physical disorders experienced by patients (4 questions), questions about the patient's medical history and behaviour that are risk factors for stroke (3 questions), as well as interviews about the patient's knowledge about stroke information and the chronology of the initial stroke until the patient gets medical treatment (2 questions).

## Data Analysis

Data analysis to determine the patients' frequency distribution was done by cross-tabulation using the Chi-Square test, the data is displayed using a frequency and percentage table. Data analysis to determine the relationship between risk factors and stroke using the Mantel Haenszel test and to determine the relationship between risk factors and the chance of occurrence of non-hemorrhagic stroke as the dominant type of stroke, the researchers used the Logistic Regression test.

## Results and Discussion

Tabel 1  
 Frequency Distribution of Respondent Characteristics (n=92)

Characteristics	SNH n (%)	SH n (%)
Gender		
Male	39 (84,8)	7 (15,2)
Female	36 (78,3)	10 (21,7)
Total	75 (81,5)	17 (18,5)
Age		
≤39 Years	1 (100)	0 (0)
40-59 Years	42 (79,2)	11 (20,8)
≥60 Years	32 (84,2)	6 (15,8)
Total	75 (81,5)	17 (18,5)

The results explained, the number of stroke patients with male and female numbers (50%), male patients who experienced a non-hemorrhagic stroke by 84.8%, while the hemorrhagic stroke by 15.2%. Female patients who experienced a non-hemorrhagic stroke of 78.3% and had a

hemorrhagic stroke of 21.7%. Stroke patients aged 40-59 years who had a non-hemorrhagic stroke by 79.2% and had a hemorrhagic stroke by 20.8%.

Table 2  
 Frequency distribution of education level and duration of stroke initial handling (n=92)

Characteristic	n	%
Last Education		
No School Education	28	30,4
Elementary	17	18,5
Middle School	23	25,0
High School	15	16,3
College	9	9,8
The duration of stroke initial handling		
<4,5 hours	51	55,4
>4,5 hours	41	44,6

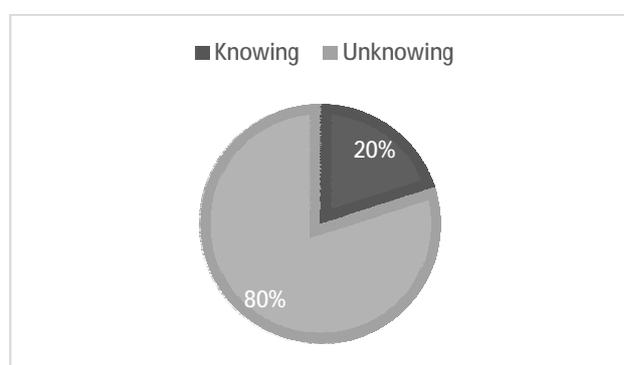


Figure 1  
 Diagram of respondents' knowledge level about stroke information (n=49)

The results of this study were 30.4% of stroke patients who had never at school and the number of patients who had obtained information about stroke before the attack was

Table 4  
 Risk factor analysis stroke (n=92)

Risk Factor	SNH	SH	P	OR	P	95,0%CI
	n (%)	n (%)				
Age						
≤39	1 (100)	0 (0)	0,744 <sup>a</sup>			
40-59	42 (79,2)	11 (20,8)				
≥60	32 (84,2)	6 (15,8)				
Gender						
Male	39 (84,8)	7 (15,2)	0,420 <sup>a</sup>	0,646 <sup>a</sup>		
Female	36 (78,3)	10 (21,7)				
Hypertension						
Yes	62 (80,5)	15 (19,5)	0,503 <sup>b</sup>	2,977 <sup>c</sup>	0,163 <sup>c</sup>	0,642-13,809
No	11 (73,3)	4 (26,7)				
Diabetes Mellitus						
Yes	21 (95,5)	1 (4,5)	0,036 <sup>b</sup>	9,609 <sup>c</sup>	0,040 <sup>c</sup>	1,104-83,666
No	52 (74,3)	18 (25,7)				
Hyperlipidemic						
Yes	45 (83,3)	9 (16,7)	0,260 <sup>a</sup>	1,255 <sup>c</sup>	0,712 <sup>c</sup>	0,376-4,187
No	28 (73,7)	10 (26,3)				
Smoke						
Ya	38 (88,4)	5 (11,6)	0,045 <sup>a</sup>	3,904 <sup>c</sup>	0,049 <sup>c</sup>	1,003-15,193
No	35 (71,4)	14 (28,6)				

only 20%. The *golden period* for treating stroke patients is ideally less than 4.5 hours (Kim et al., 2017). The number of patients who received medical treatment before 4.5 hours was counted since the onset of a stroke by 55.4% (Table 2). The results in table 3 explain that the strokes type that was often experienced by the people of Semarang District are non-hemorrhagic strokes (83.7%), patients who have left hemiparesis (51.1%), communication disorders (dysarthria or aphasia) as many as 46.7 % and decreased awareness (12%).

Table 3  
 Frequency distribution of stroke types and clinical manifestations (n=92)

Characteristic	n	%
Stroke Types		
Hemorhagic Stroke	15	16,3
Non-Hemorhagic Stroke	77	83,7
Clinical Manifestations		
1. Motor Disorders		
Right Hemiparesis	45	48,9
Left Hemiparesis	47	51,1
2. Communication Disorders		
Yes	43	46,7
No	49	53,3
3. Decreased Awareness		
Yes	11	12
No	81	88

Table 4 explains that age has no significant relationship with stroke ( $p = 0.744$ ) as well as gender ( $p = 0.420$ ). Hypertension did not have a significant relationship with stroke ( $p = 0.503$ ). However, hypertensive patients have a risk of becoming a non-hemorrhagic stroke by 2.97 times compared to those without hypertension. According to this study results, Diabetes Mellitus has a relationship that causes stroke, especially non-hemorrhagic stroke ( $p = 0.040$ ). Patients who have risk factors for diabetes mellitus risk having a stroke 9.6 times.

Risk Factor	SNH	SH	P	OR	P	95.0%CI
	n (%)	n (%)				
Drinking Alcohol Habit						
Yes	3 (60)	2 (40)	0,274 <sup>b</sup>	0,133 <sup>c</sup>	0,104 <sup>c</sup>	0,012-1,512
No	70 (80,5)	17 (19,5)				
Use of contraceptive pills						
Yes	15 (75)	5 (25)	0,550 <sup>b</sup>	0,750 <sup>c</sup>	0,701 <sup>c</sup>	0,173-3,260
No	58 (80,6)	14 (19,4)				

<sup>a</sup>Chi-square, <sup>b</sup>Fisher exact, <sup>c</sup>Regresi Logistic

The risk factor for hyperlipidemia did not have a significant relationship with stroke ( $p = 0.260$ ). Patients with hyperlipidemic 1.25 times the risk of having a non-hemorrhagic stroke. Smoking habit has a significant relationship to stroke ( $p = 0.045$ ), especially non-hemorrhagic stroke ( $p = 0.049$ ). Patients who have smoking habits are at risk of having a stroke by 3.9 times compared to patients who did not have smoking habits. Drinking alcohol habits were not related to stroke ( $p = 0.274$ ). Patients with consuming alcohol history have a 0.13 times chance of having a stroke compared to people who never drink alcohol. The use of contraceptive pills also has a less significant relationship ( $p = 0.550$ ). Patients who had using contraceptive pills history have a 0.8 times risk of having a stroke compared to others who did not use contraceptive pills.

The results of this study explain that gender did not have a significant relationship ( $p > 0.005$ ). Male or female stroke patients have the same amount, which is 50%. In accordance with previous research which explains that gender did not affect the incidence of stroke (Wayunah & Saefulloh, 2017). In contrast, the results of other studies showed that most stroke patients were male (52%), whereas in women the incidence of stroke increased at a certain age, namely after menopause because after menopause a woman experienced a decrease in the hormone estrogen. Estrogen was a hormone that contributes as a vasodilator of blood vessels (Patricia et al, 2015). Research results in Serbia explain that men have a risk of having a stroke by 25%, but 60% of deaths due to stroke are experienced by women (Arsić et al, 2016). Another research state that stroke is often experienced by patients with male sex due to smoking habits and high-stress levels in men at a young age (Alchuriyah & Wahjuni, 2016).

The results of this study explained that the majority of stroke patients ranged between 40-59 years by 57.6%. The age factor did not have a significant relationship with the type of stroke ( $p > 0.005$ ). In accordance with the results of previous studies that the risk of non-hemorrhagic stroke increases after the age of 45 years, and will increase by 11-20% for each additional age of 3 years (Salim, 2015). The increasing age of a person results in the degenerative process of several organs of the body, especially the blood vessels of the brain. Meanwhile stroke attacks at a young age tend to be influenced by lifestyle or temperament that triggers a stroke (Alchuriyah & Wahjuni, 2016).

The stroke incidence in the age range was influenced by risk factors that cause it. Patients with smoking habit have a risk of having a stroke at a younger age and the prevalence will decrease at an older age ( $> 75$  years). Likewise with risk factors for diabetes mellitus and hyperlipidemia more often at the age of 65-75 years. Hypertension often causes non-hemorrhagic strokes at age  $< 55$  years and causes hemorrhagic strokes in all age groups for up to 75 years, after which the prevalence has decreased (Hauer et al., 2017). Age factors also cause in the emergence of various blood vessel disorders and increase severity in stroke patients. In the degenerative age elasticity of the aortic blood

vessels will decrease and cause an increase in systolic pressure (Sun, 2015). In addition, older stroke patients were also at risk of developing aphasia compared to younger sufferers (Ellis & Urban, 2016).

The education level in this study, patients who never at school were 30.4%. Patients who had been exposed to information about stroke before acute attacks by 20%, the rest had never been exposed to information about stroke. Education influences health status, knowledge level, and healthy living behaviour (Ariastuti, 2015). As with previous studies conducted in the Semarang city as many as 100% of stroke sufferers have poor knowledge about stroke (Handayani, 2019).

The education level and knowledge about stroke also affects the time length which takes for a patient to get help when first experiencing an attack by making the best use of the *golden period*. Help is given to stroke patients before 4.5 hours was more effective in reducing the risk of disability or death due to stroke (Kim et al., 2017). From this research was known that the number of patients who get help immediately before 4.5 hours as much as 55.4%.

The study results describe stroke patients who have hypertension history was 85.9%. However, in terms of influence on stroke, hypertension did not appear to have a significant effect on both types of stroke ( $p = 0.503$ ). According to previous research, it was because hypertension was an important factor in hemorrhagic stroke, but hypertension also plays an important role in the development of atherosclerosis which was one of the causes of non-hemorrhagic stroke (Boehme et al, 2017).

The study results explain that patients with hypertension have a risk of experiencing a non-hemorrhagic stroke as much as 2.9 times compared to those without hypertension. Whereas previous research states that someone with hypertension history has a risk of 7.5 times having a hemorrhagic stroke than a non-hemorrhagic stroke compared to others who have no history of hypertension (Wayunah & Saefulloh, 2017). Research results in Japan explain that a person with hypertension history was 7.6% at risk of having a non-hemorrhagic stroke, and 1.3% was at risk of experiencing intracerebral haemorrhage compared to others who have normal blood pressure (Turin et al., 2016). According to other studies, risk factors that often cause stroke were hypertension (Sofyan et al, 2015). Hypertension treatment can reduce the risk of stroke by 36-42% (Arsić et al., 2016).

Hypertension was a major cause of heart failure in Africa and accounts for half of the stroke deaths globally (Lackland & Weber, 2015). Increased blood pressure can continuously cause damage to the endothelial lining of blood vessels and trigger the formation of blood clots or aneurysms that cause strokes (Budi & Bahar, 2017). The causes of hypertension include age, heredity, smoking habits, excessive intake of sodium and fat and lack of physical activity (Guzik & Bushnell, 2017). People's habit of consuming foods that contain high sodium, for example, salted fish and fatty foods, such as fried food was a cause of hypertension (Saputra & Khairul Anam, 2016).

The results of this study, 23.9% of stroke patients have a diabetes mellitus history. The study result indicates a significant relationship between DM and stroke, especially non-hemorrhagic stroke ( $p = 0.040$ ). Patients suffering from DM have a 9.6 times the risk of having a non-hemorrhagic stroke compared to patients without DM. In contrast to research conducted by Ghani (2016) patients with diabetes have a 2.96 times risk of stroke compared to others who did not suffer from the disease (Ghani et al, 2016).

Diabetes mellitus causes disorders of the endothelial lining in blood vessels, arterial stiffness, and systemic infections that cause atherosclerosis to cause strokes. Patients with uncontrolled diabetes were more at risk of causing a stroke. Strokes that occur in patients with diabetes more often are non-hemorrhagic strokes. Disorders that arise are usually limb weakness and dysarthria caused by cerebral lacunar infarction (Chen et al, 2016). Stroke patients with diabetes mellitus have a 60% risk of recurrent stroke. Type 2 DM has a higher risk of causing stroke than type 1 DM (Tun et al, 2017). Inappropriate management of diabetes in stroke patients significantly increases the risk of recurrent stroke by 60% (Guzik & Bushnell, 2017).

This study result showed that stroke patients who had hyperlipidemia history were 58.7%. In accordance with previous studies that 41.3% of patients have high cholesterol levels above 200 mg/dl and that is a risk factor for stroke (Patricia et al, 2015). According to this study between hyperlipidemia and stroke did not have a significant relationship ( $p = 0.712$ ). According to previous research, this was because hyperlipidemia is not the sole cause of stroke. Hyperlipidemia was able to cause stroke because it had previously caused cardiovascular disorders (Lisak et al, 2015).

Patients who experience hyperlipidemia have a risk of having a stroke by 1.3 times compared to patients without hyperlipidemia. In 2008, around 25% of the population of low-income countries, 33% of the population of middle-income countries and 50% of high-income countries had high cholesterol levels (Peters et al, 2016). The factors that influence an increase in cholesterol in the blood include eating and smoking patterns (Susilawati & SK, 2018). High cholesterol levels cause plaque formation in blood vessels and will lead to atherosclerosis which can be blocked at any time due to thromboembolism. If the blockage was in the blood vessels of the brain will cause a stroke (Hauer et al., 2017). Someone who has hyperlipidemia history has a risk of stroke by 2.856 times compared to other people who did not experience hyperlipidemia (Susilawati & SK, 2018).

This study result explained that 46.7% of stroke patients have smoking habits. There was a significant relationship between smoking and stroke, especially non-hemorrhagic stroke ( $p = 0.049$ ). A patient who owns smoking history has a risk of having a stroke 3.9 times compared to nonsmokers. Meanwhile, according to Guzik (2017), someone who owns smoking habit has a 2-fold chance of stroke compared to non-smokers. Besides, passive smoking also increases risk factors for stroke by 30% among smokers (Guzik & Bushnell, 2017).

Smoking was more common in younger patients and tends to cause sub-arachnoid hemorrhagic strokes (Hauer et al., 2017). Smoking was a direct or indirect cause of stroke because smoking can cause hypertension or COPD if not handled properly will cause a stroke (Portegies et al., 2016). Smoking increases the fibrinogen production, which was a blood clotting factor and will increase the formation of atherosclerosis in the blood vessels of the brain. Nicotine contained in cigarettes can also increase adrenaline

production and cause increased blood pressure (Saputra & Khairul Anam, 2016).

This study result explained as many as 5.4% of stroke sufferers have consuming alcohol history. Alcohol consumption history had no relationship with the type of stroke ( $p = 0.274$ ). Patients with consuming alcohol history have a risk of having a stroke by 0.13 times compared to others who have never consumed alcohol. In accordance with the results of other studies, patients who own consuming alcohol habit have a risk of having a stroke by 0.992 times which means there was no significant relationship between alcohol consumption with stroke (Patricia et al., 2015).

Consuming alcohol behaviour and smoking is known to increase hematocrit and blood viscosity, this event triggers a stroke at a young age, either in the form of a thrombotic stroke or subarachnoid haemorrhage (Misbach, 2011). The stroke risk caused by alcohol depends on how much alcohol was consumed and the type of alcohol (Kadlecová et al, 2015). According to some experts, alcohol consumption of 1-2 drinks per day was believed to be able to increase HDL levels in the blood (Larsson et al, 2016). The more alcohol consumed, the higher the risk of hemorrhagic stroke because alcohol triggers an increase in blood pressure (Patricia et al., 2015).

The results of this study explain that 21.7% of stroke patients have used pill contraception. The use of contraceptive pills had no significant relationship with stroke ( $p = 0.550$ ). Pill contraception users have a risk of stroke by 0.75 times compared to other people who did not use contraceptive pills. The use of contraceptive pills did not directly cause a stroke. Pill contraception allegedly can cause stroke because it can induce hypertension which is one of the risk factors for stroke (Sari et al, 2018). Septya's research results (2014) stated that women using pill contraceptives had a risk of 3.458 times affected by hypertension compared to other women who did not use oral contraceptives (Pangaribuan et al, 2015). In young women who have had a stroke, if it cannot be proven the role of other causative factors, it can be suspected that the cause was pill contraception. The suspected stroke was caused by the use of birth control pills by no more than 10% (Misbach, 2011).

The results of this study showed that 83.7% of patients had a non-hemorrhagic stroke. According to previous research that the risk of non-hemorrhagic stroke has increased since the age of 45 years, and will continue to increase with age (Salim, 2015). Hypertension is a risk factor for hemorrhagic stroke, but long-term hypertension also causes atherosclerosis. Besides, smoking and hyperlipidemia are also important factors in the formation of atherosclerosis (Boehme et al, 2017). People habits who were mostly smokers and often consume fatty foods further increase the risk of atherosclerosis and it triggers non-hemorrhagic strokes (Saputra & Anam, 2016).

The results of this study explained that of 92 stroke patients, all had hemiparesis. 51.1% had left hemiparesis and 48.9% had right hemiparesis. In line with Naibaho's research (2015) which states that the number of patients experiencing left hemiparesis is 54.8% (Naibaho et al, 2015). Stroke causes impaired motor function that arises due to lesions in the right or left hemisphere cortex (Arsic et al, 2016). Left hemiparesis disorder frequently is caused by damage to the right brain because the right brain is rarely used for activities compared to the left hemisphere and it causes metabolic disorders more often in the right hemisphere.

Nearly 70-80% of stroke patients experience hemiparesis (Prasetyo, 2017). Patients who experience hemiparesis will usually have difficulty doing daily activities (ADL). A study in Korea explained that 25-74% of the 50 million stroke patients in the world are unable to do ADL independently (Jeong et al, 2018). The inability of stroke patients to work independently can lead to psychological disorders in the form of *post stroke depression* (PSD) (Handayani et al., 2019).

In addition to motor disorders, stroke can also cause verbal communication disorders and decreased awareness. Communication problems due to stroke include aphasia, dysarthria and lisp (PPNI, 2017). Aphasia was a condition that causes a variety of communication disorders, namely comprehensive language disorders, language expression, reading, writing, attention, memory and other cognitive domains (Ellis & Urban, 2016). The results of this study showed that 46.7% of patients had aphasia. In accordance with previous studies which explained that aphasia occurs in 20-40% in acute stroke patients (Watila & Balarabe, 2015). Aphasia was more common in non-hemorrhagic strokes than hemorrhagic strokes (Lazar & Boehme, 2017). According to research in the United States it was known that Broca's aphasia usually occurs in younger patients (51 years), whereas Wernicke's aphasia occurs in older patients (62 years) (Ellis & Urban, 2016). As lesions result in the left hemisphere of the brain causing speech disorders in the form of pronunciation of morphemes by using phonemes that were not appropriate (Johan & Susanto, 2018).

The results of this study explain that as many as 12% of stroke patients have decreased consciousness. Decreased awareness in stroke patients was more often due to lesions in the thalamus that cause damage to the rostral ARAS system (Ayu Susilawati, 2016). Decreased awareness in stroke patients was more often due to the volume of extensive bleeding that results in increased ICP or direct compression of the thalamus and brain stem (Hanifah, 2015).

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Stroke was a burden for sufferers and their families because it reduces productivity and life quality (Bariroh et al, 2016). The efforts that can be carried out by local governments include, among others, forming policies in the handling and prevention of stroke patients, increasing public awareness about the effects and dangers of stroke through increasing education and knowledge about stroke, developing promotive, preventive, curative and rehabilitative efforts that are carried out holistically through service to the community in every health facility (Karim & Lubis, 2017).

## Conclusions and Recommendations

The results of this study explain that non-hemorrhagic stroke was the dominant type of stroke in Semarang District. Diabetes Mellitus history and smoking habits significantly influence the occurrence of non-hemorrhagic stroke. Patients with diabetes mellitus have a risk of 9.6 times and patients with smoking have a risk of 3.9 times to experience a non-hemorrhagic stroke. Some analysis results of the risk factors relationships with stroke indicate no meaningful relationship, this was because a stroke is not only caused by one factor, stroke can be a complication due to the reaction of several risk factors experienced by patients.

Changes in demographics and epidemiology cause differences in community characteristics. The industrialization process that occurred in Semarang District caused the different characteristics in stroke patients. It needs attention from the local government and health workers in Semarang District area to improve health services through promotive, preventive, curative and rehabilitative efforts that are carried out holistically through health facilities according to community characteristics.

Further research is needed on the relationship between lifestyle and stroke characteristics that exist in the community with a wider sample size and coverage.

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