

RESEARCH ARTICLE

Hypertension: Dominant Risk Factor on Stroke Occurrence

Analytical Observational Study in Sultan Agung Islamic Hospital Semarang during January 1, 2012 - August 31, 2013

Desia Laila Dian Saputri^{1,*}, Ika Rosdiana², Endang Lestari³

¹ Medical Faculty of Sultan Agung Islamic University (UNISSULA) Semarang

² Rehabilitation Medicine Department of Sultan Agung Islamic Hospital Semarang

³ Lecture on Medical Faculty of Sultan Agung Islamic University (UNISSULA) Semarang

Desia Laila Dian Saputri, Desa Kragan RT 03/II Kec. Kragan Kab. Rembang, E-mail: desia.dian@yahoo.com

ABSTRAK

Pendahuluan: Stroke merupakan penyebab kecacatan nomor satu dan penyebab kematian nomor tiga di dunia. Terdapat banyak faktor risiko yang mempengaruhi kejadian stroke. **Tujuan:** untuk mengetahui berbagai faktor risiko yang paling dominan terhadap kejadian stroke. **Metode:** penelitian analitik observasional dengan *cross sectional*. Sampel sebanyak 263 catatan medis pasien yang pernah dirawat di bangsal saraf RSI Sultan Agung Semarang periode 1 Januari 2012–31 Agustus 2013. Sampel terdiri dari 97 pasien stroke hemoragik dan 166 pasien stroke non hemoragik diperoleh dengan teknik *simple random sampling*. Penelitian dilakukan dengan menganalisis lima variabel meliputi jenis kelamin, usia, hipertensi, diabetes mellitus dan kadar kolesterol total. Analisis statistik menggunakan *Chi square* dilanjutkan dengan *Logistic regression*. **Hasil:** Hasil uji *logistic regression* menggunakan SPSS menunjukkan bahwa hipertensi merupakan faktor paling dominan yang berpengaruh terhadap kejadian stroke ($p=0,001$; $RP=1,707$; $IK=1,249-2,433$). **Kesimpulan:** Hasil penelitian ini menyimpulkan bahwa hipertensi merupakan faktor risiko yang paling dominan terhadap kejadian stroke.

Kata kunci: Faktor risiko, stroke, stroke hemoragik, stroke non hemoragik.

ABSTRACT

Introduction: Stroke ranks as the first cause of disabilities and the third cause of death in the world. Many factors associated with stroke. **Objective:** this study aimed at evaluating the factors associated with stroke. **Study Design:** This study was an analytical observational study using cross sectional design. Samples were obtained from medical records of 263 patients who were admitted in neurology's ward of Sultan Agung Islamic hospital during 1 January 2012-31 August 2013. Samples categorized in 2 groups: 97 hemorrhagic's stroke patients and 166 non hemorrhagic's stroke patients with simple random sampling technique. This study were conducted by analyzing 5 variables such as gender, age, hypertension, diabetes mellitus and total cholesterol levels. **Results:** Logistic regression test using SPSS showed that hypertension was the most dominant factor associated with stroke ($p=0.001$; $PR=1.707$; $CI=1.249-2.433$). **Conclusion:** Hypertension was the most dominant risk factor for stroke.

Keywords: Risk factors, stroke, hemorrhagic stroke, non-hemorrhagic stroke

INTRODUCTION

According to PERDOSSI (2011) stroke is clinical symptoms on brain functions which happen focally or globally. Stroke can cause death within 24 hours or more without any clear evidence other than the vascular causes. Stroke is the first cause of disabilities and the third cause of death in the world (Dewanto *et al*, 2009). According to Indonesian Stroke Foundation/ Yayasan Stroke Indonesia (Yastroki) on 2012, there are inclining incident of stroke in Indonesia, which correlate with many risk factors. Whereas further research of which dominant risk factors is needed.

Indonesian Ministry of Health (2012) stated

stroke is one of unctagious disease which cause the most death in Indonesia. Some stroke's complication according to Heart and Stroke Foundation (2005) are paralysis, visual impairments, speech problems, perceptual impairments, fatigue, urinary incontinence, depression, emotional problems, memory impairments and personality changes.

The most common cause of stroke is arterial degenerative diseases in blood vessels. Several risk factors can increase the disease such as age, family history of vascular diseases, hypertension, diabetes mellitus, smoking, hypercholesterolaemia, alcohol consumption, oral contraception, and plasmic fibrinogen (Ginsberg,

2008).

Referring to the facts as described, a research is needed to figure which is the most dominant risk factors of stroke including gender, age, hypertension, diabetes mellitus and total cholesterol level. This research is conducted in Sultan Agung Islamic Hospital during 1 January 2012-31 August 2013.

METHOD

This research was observational analytic study with cross sectional design. Variables for this research consist of independent variables such as gender, age, hypertension, diabetes mellitus, and total cholesterol level, while the dependent variable is stroke.

Stroke definition is based on medical records of the patients and categorized between haemorrhagic stroke and non haemorrhagic. Gender consists of male and female. Age category is divided into: >65 years old, 40-65 years old, and <40 years old. Hypertension classification according to JNC VII blood pressure as follows : level 2 hypertension (sistolic ≥ 160 mmHg or diastolic ≥ 100 mmHg), level 1 hypertension (sistolic 140-159 mmHg or diastolic 90-99 mmHg), prehypertension (sistolic 120-139 mmHg or diastolic 80-89 mmHg), normal (sistolic <120 mmHg and diastolic <80 mmHg). Diabetes mellitus is defined as patients with high level of blood glucose of fasting glucose ≥ 126 and post prandial glucose ≥ 200 according to Perkeni. Total

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cholesterol level is categorized as high (total cholesterol level ≥ 240 mg/dl), moderate risk (total cholesterol level 200-239 mg/dl), low risk (total cholesterol level <200 mg/dl).

Population of the study are all inpatients stroke of neurology's ward of Sultan Agung Islamic Hospital during 1 January 2012-31 August 2013 recorded in their medical records. Samples of the study are 263 stroke patients consisted of 97 haemorrhagic stroke's patients and 166 non haemorrhagic stroke's patients. Inclusion criteria of the study were: patient with complete medical records including identity (name, gender, age), health status (blood pressure, total cholesterol laboratory result). Exclusion criteria of the study were patients with medical history such as tumor, trauma, and central nervous system infection.

Statistical analysis used for this study is Chi Square and followed by logistic regression to determine which independent variable is the most dominant risk factors of the dependent variable.

RESULT

This study was conducted in Sultan Agung Islamic Hospital from 27 September 2013 to 3 January 2014 by collecting data from the period of 1 January 2012 to 31 August 2013. The result of descriptive analysis and chi square test are presented on table 1.

Table 1. Descriptive and Chi Square test for independent variables towards stroke

No	Variable	Haemorrhagic Stroke		Non Haemorrhagic Stroke		Total	p
		n = 97	(36,9%)	n = 166	(63,1%)		
1.	Gender						
	▪ Male	50	37,0%	85	63,0%	135	0,957
	▪ Female	47	36,7%	81	63,3%	128	
2.	Age						
	▪ >65 years old	13	27,1%	35	72,9%	48	0,203
	▪ 40-65 years old	77	38,3%	124	61,7%	201	
	▪ <40 years old	7	50,0%	7	50,0%	48	
3.	Blood pressure						
	▪ Hypertension level 2	73	45,3%	88	54,7%	161	0,003
	▪ Hypertension level 1	15	27,3%	40	72,7%	55	
	▪ Prehypertension	4	16,7%	20	83,3%	24	
	▪ Normal	5	21,7%	18	78,3%	23	
4.	Diabetes Mellitus						
	▪ Yes	18	25,4%	53	74,6%	71	0,018
	▪ No	79	41,1%	113	58,9%	192	
5.	Total Cholesterol Level						
	▪ High	23	30,3%	53	69,7%	76	0,201
	▪ Moderate	32	44,4%	40	55,6%	72	
	▪ Low	42	36,5%	73	63,5%	115	

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Table 2. Distribution of hypertension, Diabetes Mellitus, and High Cholesterol Level on Haemorrhagic Stroke and Non Haemorrhagic Stroke

	Haemorrhagic Stroke	Non Haemorrhagic Stroke	Total
Normal	1	12	13
DM*	1	6	7
Kol	2	0	2
HT*	63	65	128
DM and HT	9	30	39
DM and Col	0	0	0
HT and Col	13	36	49
DM, HT, and Col	8	17	25
Total	97	166	263

*** Regression Logistic analysis table**

	P	RP	IK
Age	0,029	0,518	0,287 – 0,936
Hypertension	0,001	1,707	1,249 – 2,433
Diabetes Mellitus	0,024	0,486	0,260 – 0,908

Normal : Non hypertension, DM and high level of total cholesterol

DM : Diabetes mellitus

HT : Hypertension (pre hypertension, hypertension, hypertension type/ level I, hypertension type/ level II)

Col : High level of total cholesterol

The chi square resulted that blood pressure has effect on stroke with significance level of $p < 0,01$. Furthermore, variables included into multivariate analysis were age, blood pressure, diabetes mellitus and total cholesterol level because the significance levels were $p < 0,25$. Those four variables can be analyzed by logistic regression. Hypertension, diabetes mellitus, and total cholesterol level and all of the combinations can be distributed and presented on table 2.

Based on variable distribution from table 2, it is clear that hypertension is solely the main cause of stroke, followed by hypertension combined with high level of total cholesterol. Based on Regression Logistic analysis table, the logistic regression analysis was using backward conditional and resulted that hypertension is the most dominant factor affecting the stroke with p value of $p = 0,001$ with $RP = 1,707$ berarti $RP > 1$ and because the interval confidence not include score 1, we can conclude that hypertension is a risk factor for stroke. On the other side, both age and diabetes mellitus variables were scored as decreasing factors of stroke and becoming protective factors because the $RP < 1$ and the confidence interval not include score 1.

DISCUSSION

This research showed that hypertension is the most dominant factor affecting stroke. Meanwhile age, gender, and high level of total cholesterol are not affecting stroke. Based on the data collected from medical records, hypertension type II were found in

most patients, which cause non haemorrhagic stroke up to 54,7%. Hypertension can trigger the development of atherosclerotic plaque in large blood vessel which can cause constriction of blood vessels' diameter. Unstable plaque is easily ruptured and parted. A parted plaque increase the risk of clogging in the blood vessel of the brain (Pinzon and Asanti, 2010).

Data analysis of risk factor, gender on stroke showed that gender is not a risk factor for stroke. It is the evidence that between male and female who has stroke has the same risk. Other study also explained the similar condition. (Misbach, 2011; Pinzon dan Asanti, 2010). Pre menopause women has lower risk of stroke than man. Furthermore, after menopause risk factor for women are similar to men (Martono dan Kusumawardani, 2009). It is clear than men are more prone to atherosclerosis than women. Atherosclerosis are rare to be found in pre menopausal women unless they have DM, hyperlipidymia and hypertension. After menopause, atherosclerosis on women will increase because the decreasing of estrogen (Kumar dkk, 2007).

In this study there was no effect on age for stroke, stroke occurred during the age of 40-65 years old (76,4%). Other research stated that for 51-65 years old are more prone to stroke (Nastiti, 2012). Stroke can occur in any ages, but for older ages the risks of impairments and deaths are higher (Wahyu, 2009). This study describes that age alone is not the risk factor, but when it co-occurs with hypertension and other risk factors, stroke is likely

to happen. Furthermore, a high risk factor of stroke are old people with hypertension, hypercholesterolaemia, diabetes or heart diseases (Corwin, 2009).

Data analysis resulted that there is no effect of diabetes for stroke. Same result also reported by Nastiti (2012). From 152 stroke patients, 113 of the patients (74,0%) have no history of DM. Thus, because DM as risk factor for stroke can occur if there are other factors affecting such as ethnicity and hypertension.

This research also showed that total level of high cholesterol has no effect on stroke. Low level of cholesterol weaken intracerebral arterial endothelium and can cause bleeding if patients experience hypertension (Misbach, 2011). Other study reported that total cholesterol has no effect on repeated stroke (Siswanto, 2004). Based on this study, it is known that patients who have hypertension and high level of total cholesterol is higher than high level of total cholesterol alone. Hyperlipidemic and other factors such as hypertension can cause endotel lesions. Endothelium lesions trigger chronic inflammation in arterial walls and cause atherosclerosis. Total serum of cholesterol component that cause increasing of the risk is LDL cholesterol (Kumar et al, 2007).

CONCLUSION

Result of the study conclude that hypertension is the most dominant factor of stroke in Sultan Agung Islamic Hospital during 1 January 2012-31 August 2013.

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