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CLINICAL PROFILE AND RISK FACTORS OF STROKE: A COMPARATIVE ANALYTICAL STUDY BETWEEN YOUNG AND OLD ONSET

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ABSTRACT

Background: With ever-increasing incidence, young-onset stroke is responsible for significant psychosocial and economic burden, primarily due to post-stroke disability in the productive population.
Objective: The aim of our study is to assess the profile and risk factors in young-onset stroke compared to those in older patients.
Methods: This was a retrospective cross-sectional study. We included all patients with acute stroke, or transient ischemic attack (TIA) treated at Siloam Lippo Village Hospital between October 2021 and February 2022. An independent t-test was conducted for continuous variables with normal distribution and a Mann-Whitney U test for ordinal or continuous variables with non-normal distribution. Pearson's chi-square test was performed for categorical variables.
Results: 153 patients with acute stroke and TIA were included. On univariate analysis comparing young and old-onset strokes, significant differences were found in diagnosis ($p=0.039$), Bamford classification ($p=0.022$), NIHSS ($p=0.014$), history of smoking ($p=0.012$), previous stroke ($p=0.045$), history of coronary artery disease ($p=0.026$), and routine antiplatelet use ($p=0.018$).
Conclusion: We found a predominance of hemorrhagic stroke and TIA in the young-onset group, with more common involvement of the anterior circulation. Older onset was associated with a higher NIHSS score. Modifiable risk factors are more common in young-onset stroke, while non-modifiable risk factors are more common in the older population. However, hypertension remains an equally important risk factor in both groups. Our study provides an overview of the profile and risk factors for young-onset stroke. The information obtained can be useful as educational material for the community to prevent young-onset stroke.

Keywords: stroke, transient ischemic attack, young onset, risk factor, prevention

Introduction

The prevalence of stroke in Indonesia is increasing. Data from Basic Health Research (Riset Kesehatan Dasar/Riskesdas) in 2018 found that the prevalence of stroke had reached 10.9 per 1,000 population, compared to 7 per 1,000 in 2013.[1,2] Stroke is also the highest cause of mortality in hospitals, resulting in 15.4% of all hospital deaths in the population over the age of 5 years.[3] The sequelae of stroke cause high morbidity among stroke survivors. About 80% of all stroke cases are ischemic strokes, and about 10% occur in people under 50 years, or what is known as "young-onset stroke".[4] Several studies have shown a change in the trend of stroke onset at a young age. Globally, more than 2 million young adults experience ischemic stroke each year with an increase of 40% in the last few decades.[5] Several explanations for the change are the development of imaging techniques such as MRI which are also more widely available and changes in patient risk factors. Research shows an increase in modifiable risk factors in the younger generation such as hypertension, hypercholesterolemia, diabetes mellitus, smoking habits, sedentary lifestyle, diet, and obesity.[4-8]

However, at this time, there is no universal definition and age limitation for stroke at a young age, but most frequently used limit is 50 years with variations in age from 45 years to 60 years.[5-7,9] Young-onset stroke has a major psychosocial and economic burden, especially due to post-stroke disability in the productive population. These do not only have impact on people with stroke but also on the family unit, community, and country.[10] The purpose of our study was to assess the profile and risk factors of stroke in young-onset versus stroke in old-onset. We hope our information can be used to provide educational materials to the community and prevent stroke in early age.

Methods

Sample population

The sample population of this study was all patients with the diagnosis of stroke (ischemic or hemorrhagic) or transient ischemic attack (TIA), who underwent treatment in the

inpatient department (general ward, stroke unit, intensive care unit) in Siloam Lippo Village Hospital, during the five months period between October 2021 and February 2022. We included all patients aged over 18 years. Patients with incomplete information and patients with a final diagnosis who excluded stroke (such as stroke-mimic) were excluded from the sample.

Research design

This study was a retrospective cross-sectional study that assessed the differences in characteristics and risk factors of young and old-onset stroke. The definition of young-onset stroke is the onset of stroke in patients less than 50 years old.[5,7] Data were collected retrospectively through medical records. Recorded data included demographic parameters, diagnosis, stroke symptoms, National Institutes of Health Stroke Scale (NIHSS) scores, Bamford stroke classification, risk factors, past medical history, and medication history.

Data analysis

Data were analyzed using IBM SPSS 26.0. Categorical variables are presented in frequency and percentage, numeric variables are presented in terms of the average value with standard deviation, or median value with interquartile range. Patients were categorized into young group (age <50 years) and old group (age 50 years). To determine significance, independent t-test was performed for continuous variables with normal distribution, and Mann–Whitney U test for ordinal or continuous variables with non-normal distribution. The Kolmogorov–Smirnov test for normality was carried out previously to determine the normality of data distribution. Pearson's chi-square test was performed for categorical or nominal variables.

Results

In our study, 153 patients with stroke or TIA were found. The majority of the patients were male (60.8%) with a mean age of 60.55 (STDEV ±13.54). 82.4% of patients had a diagnosis of ischemic stroke, 9.8% with hemorrhagic stroke, and 7.8% with TIA. Based on the Bamford stroke classification, 46.4% of patients had lacunar circulation syndrome (LACS), 22.9% had partial anterior circulation (PACS), 20.3% had posterior circulation (POCS), and 10.5% had total anterior circulation (TACS). The median NIHSS score was 5 (IQR 2.00–9.00) and most patients had moderate stroke severity (47.1%). The most common stroke symptoms were motor deficit (77.8%), dysarthria (54.2%), facial paresis (50.3%), gait disturbance (42.5%), and sensory deficit (35,9%). The most common risk factors found were hypertension (77.8%), diabetes mellitus (36.6%), dyslipidemia (31.4%), history of previous stroke (28.1%), and smoking (25.5%).

58.8% of patients had routinely taken antihypertensive drugs, 30.1% had routinely taken cholesterol-lowering drugs, and 25.5% had routinely taken anti-diabetic drugs. However, 32.7% of patients had not taken any routine medication.

In univariate analysis between young and old age groups, significant differences were found in age (p<0.001), diagnosis (p=0.039), Bamford classification (p=0.022), NIHSS (p=0.014), smoking history (p=0.012), history of previous stroke (p=0.045), history of coronary heart disease (p=0.026), and routine antiplatelet consumption (p=0.018). No significant differences were found in other variables.

Table 1. Comparison of demographic data, stroke profile, risk factors, and routine therapy of stroke and TIA patients between young and old age groups.

Variable	All patients	<50 years old	≥50 years old	p (univariate)
Patient (n)	153 (100)	30 (19.61)	123 (80.39)	
Age	60.55 (±13.54)	40.50 (±7.75)	65.44 (±9.54)	**<0.001**
Sex				0.249
Male	93 (60.8)	21 (70.0)	72 (58.5)	
Female	60 (39.2)	9 (30.0)	51 (41.5)	
Diagnosis				**0.039**
Ischemic stroke	126 (82.4)	20 (66.7)	106 (86.2)	
Hemorrhagic stroke	15 (9.8)	6 (20.0)	9 (7.3)	
Transient ischemic attack	12 (7.8)	4 (13.3)	8 (6.5)	
Bamford stroke classification				**0.022**
TACS	16 (10.5)	2 (6.7)	14 (11.4)	
PACS	35 (22.9)	13 (43.3)	22 (17.9)	
LACS	71 (46.4)	12 (40.0)	59 (48.0)	
POCS	31 (20.3)	3 (10.0)	28 (22.8)	
NIHSS				**0.014**
Total score	5 (2.00-9.00)	4 (1.75-5.25)	6 (2.00-9.00)	
No stroke symptoms	9 (5.9)	2 (6.7)	7 (5.7)	0.415
Minor stroke	60 (39.2)	16 (53.3)	44 (35.8)	
Moderate stroke	72 (47.1)	11 (36.7)	61 (49.6)	
Moderate to severe stroke	9 (5.9)	1 (3.3)	8 (6.5)	
Severe stroke	3 (2.0)	0 (0.0)	3 (2.4)	
Symptoms				
Loss of consciousness	34 (22.2)	7 (23.3)	27 (22.0)	0.870
Gait disturbance	65 (42.5)	10 (33.3)	55 (44.7)	0.258
Aphasia	26 (17.0)	5 (16.7)	21 (17.1)	0.958
Visual impairment	28 (18.3)	4 (13.3)	24 (19.5)	0.433
Nausea/vomiting	27 (17.6)	6 (20.0)	21 (17.1)	0.706
Headache	23 (15.0)	6 (20.0)	17 (13.8)	0.396
Motor deficit	119 (77.8)	23 (76.7)	96 (78.6)	0.870
Sensory deficit	55 (35.9)	14 (46.7)	41 (33.3)	0.172
Facial paresis	77 (50.3)	14 (46.7)	63 (51.2)	0.655

Dysarthria	83 (54.2)	14 (46.7)	69 (56.1)	0.353
Dysphagia	23 (15.0)	2 (6.7)	21 (17.1)	0.153
Vertigo	18 (11.8)	3 (10.0)	15 (12.2)	0.738
Dizziness	21 (13.7)	7 (23.3)	14 (11.4)	0.088
Seizure	2 (1.3)	1 (3.3)	1 (0.8)	0.276
Risk factor				
Hypertension	119 (77.8)	21 (70.0)	98 (79.7)	0.253
Smoking	39 (25.5)	13 (43.3)	26 (21.1)	**0.012**
Obesity	30 (19.6)	8 (26.7)	22 (17.9)	0.277
Dyslipidemia	48 (31.4)	10 (33.3)	38 (30.9)	0.796
Atrial fibrillation	14 (9.2)	1 (3.3)	13 (10.6)	0.218
Diabetes mellitus	56 (36.6)	8 (26.7)	48 (39.0)	0.208
Previous stroke history	43 (28.1)	4 (13.3)	39 (31.7)	**0.045**
Coronary heart disease	26 (17.0)	1 (3.3)	25 (20.3)	**0.026**
Family stroke history	41 (26.8)	9 (30.0)	32 (26.0)	0.659
Others	8 (5.2)	2 (6.7)	6 (4.9)	0.693
Unknown	6 (3.9)	2 (6.7)	4 (3.3)	0.388
Medication history				
Antihypertensive	90 (58.8)	13 (43.3)	77 (62.6)	0.055
Antiplatelet	28 (18.3)	1 (3.3)	27 (22.0)	**0.018**
Cholesterol-lowering drugs	46 (30.1)	6 (20.0)	40 (32.5)	0.180
Oral antidiabetic	39 (25.5)	6 (20.0)	33 (26.8)	0.442
Anticoagulant	9 (5.9)	1 (3.3)	8 (6.5)	0.508
None	50 (32.7)	14 (46.7)	36 (29.3)	0.069

Discussion

Our study demonstrated differences between profiles and risk factors for stroke in young and old onset. In 153 cases, early onset stroke was found in 19.61%. Hypertension is the highest risk factor in both the young group (70.0%) and the old group (79.7%). In addition, we also found a predominance of the male population with stroke in both age groups. Both of these are appropriate with previous research by Ekker et al. and Kawle et al. who also found risk factors predominance for hypertension and male. Ekker et al. stated that modifiable risk factors such as hypertension, diabetes mellitus, smoking habits, and excessive alcohol consumption were more common in males.[5,11]

In addition, risk factors that were significantly associated with differences in age groups in this study were smoking history (p=0.012), previous stroke history (p=0.045), and coronary heart disease history (p=0.026). Smoking habits were found to be more common in young people (43.4%) compared to older people(21.2%). The authors postulate that most cases of stroke in young-onset have a higher role for modifiable risk factors, such as smoking, when compared to the older population. Meanwhile, previous stroke history (p=0.045) and coronary heart disease history (p=0.026) were more often found in the older group, indicating that the incidence of stroke was associated with comorbidities that could occur with age. This result is also supported by the significance of routine antiplatelet consumption history (p=0.018) which is more often found in older to control comorbid diseases such as stroke and coronary heart disease. Other medication histories such as anti-hypertensives, cholesterol-lowering drugs, oral antidiabetics, and other risk factors profiles such as hypertension, obesity, dyslipidemia, atrial fibrillation, and diabetes mellitus did not show significant differences in the two age groups. These findings can illustrate poor health conditions of Indonesia's young generation.

In addition, we also found a significant gap between risk factors possessed and drugs used, such as hypertension (77.8%) with routine anti-hypertensives use (58.8%), diabetes mellitus (36.6%) with oral antidiabetics use (25.5%), atrial fibrillation (9.2%) with anticoagulants (5.9%), and previous stroke history (28.1%) and coronary heart disease (17.0%) with antiplatelet consumption (18.3%). Although the rate of routine cholesterol-lowering drugs use (30.1%) nearly equals the number of patients with dyslipidemia (31.4%), statins are used routinely for several conditions other than dyslipidemia, such as in patients who have a history of or are at high risk for cerebrovascular and cardiac disease. Therefore, the number of possible statin use is also much less than it should be.

Overall, our study showed a significant difference in diagnosis (p=0.039), where hemorrhagic stroke (20.0%) and TIA (13.3%) were more common in young people, and ischemic stroke (86.2%) was more often found in older. According to the results of research by Zhang et al., found that the incidence of ischemic stroke in men over 55 years and women over 65 years was 2.122 times higher than hemorrhagic stroke. This shows that age plays an important role in ischemic stroke cases.[12]

Our study also showed a significant relationship between age and Bamford stroke classification (p=0.022) where anterior circulation strokes (TACS and PACS) were more common in young people (50.0%) when compared to older people (29.3%). While posterior circulation (POCS) is more common in older (22.8%) than in younger age group (10.0%). The role of age concerning the location of anterior and posterior stroke circulation is not known certainty. Several studies have also shown that posterior circulation stroke is more common in younger patients[13], but this association was not found in other studies.[14,15]

NIHSS is a systematic assessment tool that provides quantitative measurement of neurological deficits in stroke patients. This measuring tool assess the severity of the patient, help determine the appropriate therapy, and determine the patient's prognosis.[16] We found the significance of NIHSS (p=0.014) for the age group of patients where a higher severity with NIHSS was shown in older group (6 [2.00-9.00]), whereas in the younger group the NIHSS score was 4 [1.75-5.25].

Conclusion

Regarding stroke onset trends changing which is increasingly early, it is very important to know stroke profile and risk factors at a young age so, this information can be used to design preventive efforts in the future. Our study shows a predominance of hemorrhagic stroke and TIA in young people. In addition, stroke in young age more often involves the anterior circulation. The reason for the circulation location still needs to be investigated further. The severity of stroke as reflected by the NIHSS indicates more severe conditions in older. Modifiable risk factors play a greater role in young-onset stroke, while non-modifiable risk factors are more common in the elderly. However, hypertension was an equally important risk factor in both age groups.

Research Ethics

Acknowledgement

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