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Profile of Stroke Patients in John Piet Wanane General Hospital Sorong: A Descriptive Study

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Article info	ABSTRACT
	Introduction: Stroke has become the major cause of physical disability in adults and the second leading cause of death in middle- to high-income countries. Indonesia has the second-highest mortality rate and stroke burden in Southeast Asia. Furthermore, there is limited study on stroke in eastern Indonesia, especially in Papua. **Objective:** This study aimed to evaluate the clinical profile of stroke patients treated in John Piet Wanane General Hospital. **Methods:** This descriptive, hospital-based study was conducted at John Piet Wanane General Hospital, Sorong, Southwest Papua, from August 1, 2023, to January 31, 2024. Data were collected through interviews and the identification of subjects' medical records based on inclusion and exclusion criteria. **Results:** This study involved a total of 143 patients, with an average age of 58.17 ± 10.516 years. The gender distribution was nearly equal, with 52.4% women and 47.6% men. The subjects mainly had an overweight Body Mass Index (BMI) (39,2%) or a normal BMI (36.4%). Obesity and underweight were the least common with percentage of 18.9%% and 5.6% of subjects, respectively. Hypertension (75.5%), prior stroke (33.6%), and hyperlipidemia (33.6%) were the most frequently found among subjects. Diabetes mellitus was found in 29.4% of subects, followed by smoking (28.7%), a history of heart disease (21%), and alcohol consumption (14.7%). Ischemic stroke was the most prevalent type of stroke (65.7%), followed by intracerebral hemorrhage (23,8%), transient ishcemic attack (TIA) (5.6%), subarachnoid hemorrhage (2.8%), and pontine hemorrhage (2.1%). **Conclusion:** This study revealed that ischemic stroke was the predominant subtype, while pontine hemorrhage was rare. Hypertension emerged as the most common risk factor, followed by prior stroke, hyperlipidemia, and diabetes mellitus, highlighting the substantial burden of modifiable vascular risk factors.

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INTRODUCTION

Over the last decade, stroke has emerged as the primary cause of physical disability among adults and the second most common cause of death in middle- to high-income countries.[1] Over half of the global population resides in Asia, mostly in developing countries.[2] Epidemiological study on strokes has shown varying rates of mortality, incidence, and disease burden across the region. In Southeast Asia, Indonesia has the secondhighest mortality rate and stroke burden after Mongolia, with a rate of 193.3 per 100,000 person-years.[3] Data from the 2018 Basic Health Research showed that the prevalence of stroke had reached 10.9 per 1,000 population, compared to 7 per 1,000 in 2013.[4]

More than 70% of strokes occur in individuals without a prior history ofstroke; in such cases, preventive strategies are the major priority.[5] It is necessary to identify existing and recognized risk factors, especially when lifestyle-related modifiable risk factors account for 74.2%.[2] Stroke risk derives from a multitude of factors that are categorized as non-modifiable and modifiable. Non-modifiable risk factors such as advancing age, sex, ethnicity, and genetic predisposition. In contrast, modifiable risk factors include hypertension (SBP > 140 mmHg and DPB > 90 mmHg), diabetes mellitus, cardiac factors like cardioembolic infarction (primarily resulting from atrial fibrillation), smoking, hyperlipidemia, excessive alcohol consumption, obesity, sedentary behavior, and inflammation. Inflammation, for example, increases the risk of arteriosclerosis and stroke, as evidenced by conditions like Coronavirus Disease (COVID-19), which has been associated with large vessel occlusion due to a hyperinflammatory and hypercoagulable state.[1]

Stroke burden is varied like most diseases. In Indonesia, the complexity of health-related behaviors is influenced by the country's multicultural nature, with lifestyle and dietary habits strongly shaped by varied local cultures. Thus, health characteristics can differr between region.[6,7] The burden of stroke remains substantial, therefore understanding stroke patients' characteristics is crucial to developing effective healthcare strategies, particularly for primary and secondary prevention. Howeer, studies on stroke in the eastern part of Indonesia, particularly in West Papua, remain limited. As a referral center for stroke patients in Southwest Papua, therefore, we conducted this study to determine stroke prevalence and associated risk factors for stroke in this population.

OBJECTIVE

The objective of this study was to assess the clinical profile of stroke patients, especially risk factors,

following the stroke events of patients in John Piet Wanane General Hospital, Sorong, Southwest Papua, Indonesia.

METHODS

This descriptive, hospital-based study was conducted at John Piet Wanane General Hospital, Sorong, Southwest Papua, over a six-month period from August 1, 2023, to January 31, 2024. Patients were enrolled prospectively using a total sampling method, resulting in 143 subjects. The study population included all adult patients aged over 17 years who were diagnosed with stroke, encompassing both hemorrhagic and non-hemorrhagic types. Exclusion criteria were patients with stroke mimics (such as seizures, hypoglycemia, or complicated migraines), incomplete data, or unwillingness to participate in the study. In this study, transient ischemic attack (TIA) was diagnosed clinically based on definitions from by the World Health Organization (WHO) and American Heart Association (AHA) as MRI was unavailable at our facility during the study period, cranial CT scans were primarily used to exclude intracerebral hemorrhage and space-occupying lesions, rather than to detect small ischemic lesions. Therefore, TIA cases were defined by the following criteria: (1) acute onset of focal neurological symptoms consistent with vascular territory ischemia; (2) complete resolution of symptoms within 24 hours; and (3) absence of hemorrhage or other structural pathology on CT scan.[8]

Data were collected from multiple hospital settings, including the outpatient neurology clinic (when follow-up assessments were performed), the inpatient neurology wards (where patients admitted with acute stroke were managed), and the emergency department (where patients were initially assessed and stabilized). Demographic data (age, sex, educational attainment, and occupation) and vascular risk factors (hypertension, diabetes mellitus, hyperlipidemia, smoking, alcohol consumption, prior stroke, and heart disease) were obtained through structured face-to-face interviews with patients and caregivers.

Descriptive statistics were used to describe demographic data and variables in terms of frequency and percentage. Data analysis was conducted using SPSS (Statistical Package for the Social Sciences), version 23.

This study was approved by the Institutional Ethical Review Board of the Hang Tuah University Surabaya (No. E/170/UHT.KEPK.03/XII/2023)

RESULTS

This study included a total of 143 subjects. The

mean age of the participants was 58.17 ± 10.516 years, with 52.4% women and 47.6% men. Most subjects were junior high school graduates (23.8%) and primarily worked as housewives (32.2%), followed by self-employed individuals (18.9%), civil servants (14.7%), farmers (14%), retirees (13.3%), unemployed individuals (2.8%), fisherman (2.1%), and teachers (2.1%). It was observed that most subjects had multiple risk factors, with hypertension being the most common (75.5%), followed by a history of stroke (33.6%), and hyperlipidemia (32.9%). Diabetes mellitus was found in 29.4% of subjects, followed by smoking (28.7%), a history of heart disease (21%), and alcohol consumption (14.7%).

Regarding stroke types, ischemic stroke was the most frequent, accounting for 65.7% of all identified cases, while pontine hemorrhage was the least common, representing only 2.1%. Intracerebral hemorrhage was found in 23.8% of subjects followed by transient ischemic attack (TIA) (5.6%) and subarachnoid hemorrhage (2.8%). Eighteen patients did not undergo neuroimaging during the study period due to financial reasons. Motor deficit, especially hemiparesis, was found to be the most prevalent clinical symptom, accouting for 84.6%, followed by dysarthria (38.5%), and gait disturbance (28%), while visual disturbance accounted for just 4.2%. According to the National Institutes of Health Stroke Scale (NIHSS) score, minor stroke was the most observed (37.8%), as shown in Table 1.

Table 1. Characteristics of subjects

Characteristics	n	%
Age		
- < 50 years	32	22.4
- ≥ 50 years	111	77.6
Gender		
- Male	68	47.6
- Female	75	52.4
Ethnicity		
- Locals	37	25.9
- Non-locals	106	47.1
Education level		
- No education	14	9.8
- Elementary school	32	22.4
- Junior high school	34	23.8
- Senior high school	26	18.2
- Diploma	16	11.2
- Bachelor	21	14.7
Occupation		
- Unemployed	4	2.8
- Housewife	46	32.2
- Civil servant	21	14.7
- Self-employed	27	18.9
- Farmer	20	14
- Fisherman	3	2.1
- Teacher	3	2.1
- Retired	19	13.3
BMI		
- Underweight	8	5.6
- Normal	52	36.4
- Overweight	56	39.2
- Obesity	27	18.9
Stroke type		
- Ischemic stroke	94	65.7
- Subarachnoid hemorrhage	4	2.8
- Intracerebral hemorrhage	34	23.8
- Pontine hemorrhage	3	2.1
- TIA	8	5.6
NIHSS		
- Minor stroke	54	37.8
- Moderate stroke	50	35
- Moderate-severe stroke	26	18.2
- Severe stroke	13	9.1

Table 1 continued. Characteristics of subjects

Characteristics	n	%
Symptoms		
- Loss of consciousness	35	24.5
- Headache	37	25.9
- Vertigo	13	9.1
- Hemiparesis	121	84.6
- Sensory deficit	36	25.2
- Facial paresis	37	25.9
- Gait disturbance	40	28
- Aphasia	10	7
- Dysarthria	55	38.5
- Dysphagia	18	12.6
- Seizure	15	10.5
- Visual impairment	6	4.2

Table 2. Risk factors associated with stroke

Characteristics	n	%
Hypertension		
- Yes	32	75.5
- No	111	24.5
Diabetes Mellitus		
- Yes	68	29.4
- No	75	70.6
Smoking		
- Yes	37	28.7
- No	106	71.3
Alcohol consumption		
- Yes	14	14.7
- No	32	85.3
History of stroke		
- Yes	4	33.6
- No	46	66.4
Hystory of cardiac abnormalities		
- Yes	8	21
- No	52	79
Dyslipidemia		
- Yes	94	33.6
- No	4	66.4

DISCUSSION

This study offers important insights into the burden of stroke and its associated risk factors among patients treated at the only referral center in Sorong, Southwest Papua. Since the CT scan facility is only available at our center in Southwest Papua, we included only imaging-confirmed stroke cases;, this is also the first study to provide information about stroke patients in the region. This study showed that the most prevalent type was ischemic stroke (65.7%), followed by intracerebral hemorrhage (23.8%), TIA (5.6%), subarachnoid hemorrhage (2.8%),and pontine hemorrhage (2.1%). The predominance of ischemic stroke (65.7%) aligns with findings from studies in Nigeria, Ethiopia, and Qatar, where it constitutes over half of all stroke events. Intracerebral hemorrhage accounted for nearly one-quarter of cases, while TIA, subarachnoid hemorrhage, and pontine hemorrhage were less frequent.[9,10,11]

Hypertension is widely recognized as a major risk factor for stroke in the general population.[12] According to the INTERSTROKE study, hypertension stands out as the most potent risk factor, with a greater impact on intracerebral hemorrhagic stroke than ischemic stroke.[13] This study also found that 75.5% of patients had hypertension. This figure is higher than the studies in Ethiopia (63.1%)[12] and India (60.8%),[14] but lower than Saudi Arabia (86.6%),[15] Bandung (85.9%),[16] and Nigeria (89.6%).[10] These findings emphasize the importance of routine blood pressure monitoring, including 24-hour ambulatory measurements, to

mitigate the stroke-related mortality.[17,18]

Diabetes mellitus is a significant risk factor for the development of atherosclerosis, contributing to an increased risk of stroke.[9] In this study, it was observed in nearly one-third of subjets (29.4%),which is close to the findings of a local study in Yogyakarta.[19] This aligns with the well-established association between diabetes, accelerated atherosclerosis, and increased risk of ischemic stroke.[19] Alemaheyu *et al.* also stated that infarction is the predominant type of stroke among diabetic individuals (57.7%).[20]

In this study, we found a slight dominance of female (52.4%) than male patients (47.6%,). Among young adults, defined as those under the age of 50,[21] was higher among women (62.5%) than men (49.5%). Meanwhile, stroke risk in younger women is generally similar risk to that in men, mainly due to women related to pregnancy, the postpartum state, and hormonal influences, including the use of hormonal contraceptives.[1] After menopause, the burden of vascular risk factors increases, and it is estimated that 1 in 5 women, compared to 1 in 6 men, will experience a stroke after the age of 55. The higher proportion of female subjects in our study may be explained by the fact that most subjects were over 55 years old, and many of the women were in the menopausal or postmenopausal period, which is associated with an increased risk of stroke events.[22]

The mean age of subjects in this study was 58.17 ± 10.516 years, with 77.6% of patients were older adults. This finding aligns with previous studies conducted in developing countries such as Ethiopia,[9,12] Nigeria,[10] and India.[14] Boehme *et al.* stated that the incidence of stroke rises with age, doubling with each decade after the age of 55.[23] However, recent studies have shown a gradual decrease in the mean age of stroke occurrence due to the increased incidence and prevalence of stroke among individuals aged 20–54 years.[18,24,25]

Excess weight was highly prevalent in this study, with 39.2% of subjects classified as overweight and 18.9% as obese. Rayaz *et al.* noted that as BMI increases, so does the risk of having a stroke. The majority of stroke cases (57.89%) had a BMI exceeding 25kg/m2.[26] Fekadu *et al.* similarly found that stroke tends to develop in obese and overweight subjects than in those of normalweight. Prior research has established a clear association between higher BMI and increased stroke risk, which is mediated by pro-inflammatory, pro-thrombotic, and metabolic mechanisms. These include insulin resistance, a pro-thrombotic state, over-secretion of free fatty acids, release of excitatory amino acids, and activation of the sympathetic nervous system. These mechanisms, directly or indirectly, contribute to thrombosis and coagulation abnormalities that increase the likelihood of cerebrovascular events.[9]

Lifestyle-related risk factors were also prominent in this study. Smoking was reported by 28.7% of subjects and alcohol consumption by 14.7%, both of which are exceed those documented in other populations.[9,10,12] Susanto *et al.* showed a significant association between smoking and stroke, while alcohol consumption was not significantly associated with stroke.[6] In contrast, Rayaz *et al.* stated that both smooking and alcohol status were significantly associated with stroke risk.[26] Smoking promotes thrombosis and endothelial dysfunction, while excessive alcohol intake has been linked to an elevated stroke risk.[9,13,26]

The proportion of dyslipidemia in this study (33.6%) was higher than in certain countries like Nigeria and China.[10,24] The relationship between dyslipidemia and stroke risk is intricate. Elevated total cholesterol levels have been associated with an increased risk of ischemic stroke, while higher levels of high-density lipoprotein (HDL) cholesterol are linked to a decreased risk.[24]

Consistent with previous studies in Indonesia and other settings, motor deficits such as hemiparesis and dysarthria were the most common presenting symptoms.[27,28] Although the majority of subjects experienced mild deficits according to NIHSS criteria (37.8%), delays in seeking care remain an important concern, especially in rural areas where geographical barriers and limited transportation options are common.[28] Consequently, subjects with mild stroke symptoms may underestimate the urgency of seeking medical attention and may prefer to wait for their symptoms to resolve on spontaneously. However, for those with moderate to severe symptoms such as hemiplegia/hemiparesis, or altered mental status, the decision to seek medical care is often further complicated by the geographical challenges encountered in many villages. Patients living far from main roads must first be transported across difficult terrain before secure transportation to reach a hospital. This barrier contribute to the delays in stroke management, reducing the likelihood of timely medical intervention.

Several limitations in this study should be addressed in future research. First, this was hospital-based rather than population-based study. As a result, our findings may not fully represent the general population and may be influenced by selection biases inherent in hospital-based studies. However, it is important to note that our center serves as the sole referral hospital in the region, which may offer a reasonable reflection of the actual stroke burden in the area. Despite this, future study should aim to include population-based studies to provide a more comprehensive understanding of stroke epidemiology in the region. Second, access to our CT imaging was imited due to a lack of insurance coverage, which potentially leading to underdiagnosis of stroke among

patients unable to afford the procedure. Third, there waas inconsistency in the documetation of certain risk factors in the patient's medical records, such as smoking, alcohol consumption, history of stroke, and cardiac disease, as well as body weight and height. Therefore, we relied on patient self-reports for some of this information, which may have introduced recall bias into our analysis. Future research should aim to ensure more comprehensive and standardized documentation of relevant patient information to mitigate such biases.

Reducing the burden of stroke primarily requires two main strategies: (1) effectively treating acute stroke patients to minimize morbidity and mortality, and (2) preventing both first-time strokes and reccuring strokes. Optimal stroke prevention requires an integrated approach that includes education on stroke risk factors, simple screening, and management protocols to identify and address modifiable risk factors and promote healthy lifestyle behaviors.[29] In the era of universal health coverage in Indonesia, it is essential to prioritize health promotion and prevention, especially for hypertension prevention strategies as blood pressure measurement is cheap, simple, and non-invasive. Unfortunately, regular blood pressure measurement is not widely available, resulting in low awareness of hypertension.

CONCLUSION

This study revealed that ischemic stroke was the predominant subtype, affecting nearly two-thirds of the population, while pontine hemorrhage was rare. The majority of patients were in their late fifties, with a slight predominance of females. Hypertension emerged as the most common risk factor, followed by prior stroke, hyperlipidemia, and diabetes mellitus, highlighting the substantial burden of modifiable vascular risk factors. Clinically, motor deficits, particularly hemiparesis, were the most frequent presenting symptomh. Despite limited access to neuroimaging for some subjects, most strokes were classified as minor based on NIHSS scores. These findings underscore the importance of early detection and effective management of vascular risk factors to reduce the incidence and severity of stroke in this population.

Conflict of Interest
The authors have no conflicts of interest.

Ethic Consideration
This study was approved by the Institutional Ethical Review Board of the Hang Tuah University Surabaya, with ethical number E/170/UHT.KEPK.03/XII/2023.

Author Contributions
DA contributed to the conceptualization, supervision, formal analysis, and validation. AR contributed to the conceptualization, supervision, formal analysis, validation, and resources. LJL contributed to the conceptualization, data investigation and analysis, manusctipt writing, and editing.

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