PREVALENCE COGNITIVE FUNCTION OF ACUTE ISCHEMIC STROKE PATIENTS IN GOTONG ROYONG HOSPITAL

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ABSTRACT

***Background**: Dementia disrupts the daily activities of patients and their caregivers, especially in ischemic stroke patients who are at high risk of cognitive impairment. Early detection can help prevent further cognitive impairment. **Objective** The objective of this study was to identify cognitive function in patients with acute ischemic stroke. **Methods**: The study was conducted on 27 patients who visited the Emergency Room of Gotong Royong Hospital Surabaya between August 1 and October 31, 2024. The analysis used a cross-sectional descriptive study design. **Results**: From the MoCA-Ina examination, 45% of participants had normal cognitive function, 45% had mild-moderate cognitive function impairment, and 11% had severe cognitive function impairment. The mean MoCA-Ina score was 22.37, which is included in mild-moderate cognitive impairment. The domain with the highest decline was delayed recall (35.6%), followed by visuospatial/executive (29%) and abstraction (26%). The domains with the lowest decline were orientation (10.5%) and naming (10%). The total decline across all domains was 25.4%. **Conclusion**: It can be concluded that the majority of patients with acute ischemic stroke experience cognitive impairment, especially in working memory. Early detection is important by providing early treatment to prevent further cognitive impairment.*

***Keywords**: Acute ischemic stroke; Cognitive function; Dementia; Elderly*

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INTRODUCTION

The World Health Organization (WHO) states that nearly 48 million people worldwide live with dementia. Seven point seven million new cases are reported each year, with more than half of these occurring in lower-middle-income countries. This number is predicted to continue to rise. Vascular dementia is the second most common form of dementia worldwide, after Alzheimer disease. Disruption in the brain's blood vessels (stroke) can cause vascular dementia.

Dementia disrupts the sufferer's daily activities, causing problems not only for the sufferer but also for the caregiver.[2] Treating dementia is challenging, so preventive measures are necessary. The MoCA-Ina test can be an initial screening test for cognitive impairment, including in acute ischemic stroke patients. A decreased score on this test can be an initial step in preventing dementia in acute ischemic stroke patients.[3]

METHODS

This is a cross-sectional descriptive study of inpatients at Gotong Royong Hospital Surabaya. The study was conducted from August 1, 2024, to October 31, 2024. The inclusion criteria were acute ischemic stroke patients and consent to participate as research subjects. Patients with recurrent stroke, a history of previous cognitive impairment, illiteracy, deaf-mute impairment, and blindness were included as exclusion criteria. We added patients with decreased consciousness or those unable to participate in the study to the exclusion criteria.

Twenty-seven patients participated in the study. The objective of this study was to determine the level of cognitive function in each domain. Assessments were conducted using the MoCA-Ina. Validity and reliability tests have been conducted by Husein et al., 2010. The Indonesian version of the MoCA brief cognitive screening instrument (MoCA-Ina) has been validated according to the World Health Organization (WHO) transcultural validation rules

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and has been found to be reliable, so that it can be used by both neurologists and general practitioners in Indonesia. The MoCA-Ina domains consist of naming, language, attention, abstraction, delayed recall, memory, visuospatial/executive, and orientation.[4] In this study, MoCA-Ina was administered 1–3 days after the patient was admitted to the hospital and was still in the acute ischemic stroke phase.

Potential confounding factors in this study included stroke severity, lesion location, lesion extent, and a history of dementia. Patients with cognitive impairment were excluded from this study. A history of dementia was assessed through patient or family history, or by reviewing previous medical records.

RESULT

Age

The age groups in this study were divided into two groups: <60 years and >60 years. There were 14 participants aged <60 years (51.85%) and 13 participants aged >60 years (48.15%). The average patient age was 57.4 years.

Gender

This study involved 27 participants. Fifty-five point five percent were male (15 participants). Forty-four point five percent were female (12 participants).

Education Level

The majority of participants in this study (51.85%) had a high school education. The remaining participants had an elementary school education (18.5%), a bachelor's degree (14.8%), a junior high school education (11.1%), and a diploma (3.7%).

Risk Factors

The most significant risk factor in this study was hypertension, with 19 participants (70.37%) reporting it. Dyslipidemia was another common risk factor, with 16 participants (59.23%). Nine participants had diabetes mellitus.

Cognitive Function

The MoCA-Ina assessment found that 45% of participants had normal cognitive function (MoCA-Ina score 26–30) and 45% had mild to moderate cognitive impairment (MoCA-Ina score 20–25).

Table 1. Basic Characteristics of the Cognitive Function Research Sample (Moca-Ina)

Variable	Cognitive Function (Moca-Ina)							
	Normal		Mild Moderate		Severe		Total	
	N	%	N	%	N	%	N	%
Age								
<60 years	7	25.93	6	22.22	1	3.7	14	51.85
>60 years	5	18.51	6	22.22	2	7.4	13	48.15
Gender								
Man	4	14.81	9	33.33	2	7.4	15	55.56
Woman	8	29.63	3	11.11	1	3.7	12	44.44
Level of Education								
Elementary	0	0	2	7.4	3	11.11	5	18.51
Junior	1	3.7	2	7,4	0	0	3	11.11
High	9	33.33	5	18.51	0	0	14	51.85
Diploma	1	3.7	0	0	0	0	1	3.7
Bachelor	1	3.7	3	11.11	0	0	4	14.81
Risk Factor								
Hypertension	8	29.63	9	33.33	2	7.4	19	70.37
Diabetes	4	14.81	3	11.11	2	7.4	9	33.33
Dyslipidemia	10	37.04	5	18.51	1	3.7	16	59.26
Others	3	11.11	3	11.11	0	0	6	22.22

Three participants (11%) had severe cognitive impairment (MoCA-Ina score <20).

Table 2. Moca-Ina scores for each domain

Domain	Mean	Normal Value	Decrement
Visuospatial/ executive	3.55	5	29%
Naming	2.7	3	10%
Attention	4.96	6	17.3%
Language	2.56	3	14.7%
Abstraction	1.48	2	26%
Delayed recall	2.15	5	35.6%
Orientation	5.37	6	10.5%
Total	22.37	30	25.4%

Table 2 shows that the domain with the highest decline was delayed recall (35.6%), followed by visuospatial/executive (29%) and abstraction (26%). The domains with the lowest decline were orientation (10.5%) and naming (10%). The overall decline across all domains was 25.4%.

DISCUSSION

Dementia is a set of symptoms of progressive cognitive decline that causes cognitive and functional impairment, leading to deterioration in social, occupational, and daily activities.[1] Vascular dementia is the second most common form of dementia. Disorders of the cerebral blood vessels can cause this type of dementia, often occurring after a stroke.[2]

Disorders of the brain's blood vessels can cause dementia, often occurring after a stroke. Vascular disorders can manifest as hemorrhage or ischemia (hypoxemia). Clinical symptoms are more pronounced with involvement of large blood vessels. This type of dementia is more common in men, especially those with risk factors such as hypertension or other cardiovascular diseases.[2]

According to the WHO, stroke is a sudden, focal, or global impairment of brain function lasting more than 24 hours or leading to death, caused by a disorder of the blood vessels. Stroke is the second most common cause of death and the leading cause of disability worldwide.[4] Symptoms of stroke can include motor, sensory, language, behavioral, and memory impairments. If memory impairment is not detected early, it can lead to long-term deficits, making daily activities difficult for patients and their families. Cognitive function testing in the early stages of a stroke can serve as an early detection tool for preventing dementia.[5]

This study involved 27 patients with acute ischemic stroke who presented to the emergency department (ER). The most prominent symptoms in these patients were motor and sensory impairments. In this study, 15 (56%) of the ischemic stroke patients were under 60 years old, and 12 (44%) were over 60 years old. The average age in this study was 57.48 years. Research by Ji Yeon Chung showed that the average age of stroke patients was 67.9 years.[6] According to a 2020 Australian study by Diji Kuriakose and Zhicheng Xiao, the incidence of stroke increases after 55 years of age.[7] The incidence of stroke doubles after 55 years of age. However, over time, the average age of stroke onset has decreased. This is influenced by many factors, such as smoking habits, low physical fitness, increasing obesity, and others.[8] Stroke risk increases with age. With aging, structural and functional changes occur in cerebral blood vessels, including endothelial dysfunction and impaired cerebral autoregulation, which increase the risk of stroke.[9]

Patients in the study were predominantly male. Research by Hussen Abdu and Girma Seyoum indicates that stroke occurs more often in men than in women. Women have the hormone estrogen, which helps maintain vascular endothelium integrity and increases blood flow. Men have higher levels of testosterone than women. Testosterone has an endothelial constricting effect and reduces blood flow.[10]

A study conducted in Korea found that the most common risk factor for stroke was hypertension, followed by dyslipidemia. Previous research is consistent with this finding. Hypertension can increase the incidence of stroke by triggering atherosclerosis, small blood vessel problems, inflammation, and oxidative stress.[11,12] Most stroke patients had a history of hypertension and/or uncontrolled hypertension. When blood pressure becomes high, the risk of stroke increases.[13]

Dyslipidemia can increase the incidence of stroke because it can cause atherosclerosis and small blood vessel problems, thereby increasing the

likelihood of stroke.[14,15] Dyslipidemia and stroke have a complex relationship influenced by multiple factors. Increased cholesterol levels can increase stroke risk, whereas high levels of high-density lipoprotein cholesterol can reduce it.13 According to research by Pierre A. et al. (2009), every decrease in low-density lipoprotein cholesterol by 1 mmol/L can reduce the risk of stroke by 21.1%.[4,8]

In addition to hypertension and dyslipidemia, diabetes is another risk factor that increases the likelihood of stroke. This aligns with research by Raja Sheraz U.K. et al. (2022), which identified the leading risk factors for stroke as hypertension, dyslipidemia, and diabetes.[16] Diabetes can cause atherosclerosis, microvascular problems, and embolism.[17]

The data obtained indicated that the group of acute ischemic stroke patients most frequently experienced problems with delayed recall, followed by visuospatial/executive skills and abstraction. Research by Reinaldi O. Boletemi et al. (2021) stated that the most frequently impaired cognitive domains were visuospatial skills, memory, language, abstraction, and attention.[18] In ischemic stroke, neurological and cognitive decline is influenced by the location, area, and extent of the lesion.[19] Lesions in brain regions responsible for cognitive function can cause cognitive impairment. Language, verbal processing, logic, and calculation are predominantly handled by the left hemisphere. Meanwhile, visuospatial functions, creativity, emotion, intuition, and comprehension are predominantly handled by the right hemisphere. Although each hemisphere has its areas of strength, the right and left hemispheres can work together and communicate effectively via the corpus callosum.[20]

Beyond the right and left hemispheres, cognitive function can be associated with the brain's lobes, each of which has distinct functions. The frontal lobe is responsible for decision-making, concentration, orientation, and judgment. The temporal lobe is responsible for memory and language. The parietal lobe is responsible for perception, writing, and calculation.[21]

LIMITATION

One limitation of the study is the small sample size. The study's timeframe was limited, resulting in a sample of 27 patients. The study did not include head CT or MRI scans, so the location and extent of lesions could not be determined.

CONCLUSION

Early detection of cognitive impairment is crucial, especially in at-risk elderly patients. In this study, over 50% of acute ischemic stroke patients exhibited cognitive impairment. Early preventive efforts can help avoid further cognitive decline.

We recommend that hospitals perform cognitive assessments as soon as possible after a stroke to detect early cognitive impairment. If cognitive impairment is identified early, treatment can also focus on cognitive aspects, such as family support, familiar terminology, and structured routines. Specific medications, such as neuroprotectants, may also be prescribed to prevent further decline.

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