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The Use of NIHSS as an Assessment of Acute Stroke Severity

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ABSTRACT

Stroke is a neurological emergency that is characterized by sudden neurological deficits caused by vascular injury (infarction, hemorrhage) in the brain. In Indonesia, stroke is the main cause of disability and mortality. The mortality rate of stroke patients is closely related to the severity of the stroke experienced by the patient. Therefore, a scoring system is needed to assess the severity of acute stroke. The National Institutes of Health Stroke Scale (NIHSS) is used as the gold standard for assessing stroke severity. NIHSS also helps the treatment plan of stroke patients and determine the patient's prognosis. The use of NIHSS in assessing the severity of acute stroke deserves further attention because it has a significant impact on the outcome of stroke patients during the treatment period.

INTRODUCTION

Stroke is a neurological emergency that occurs due to sudden disruption of blood flow to the brain. Stroke is classified into two based on its cause, namely ischemic stroke and hemorrhagic stroke. Ischemic stroke occurs when there is a blockage in the intracranial blood vessels resulting in disruption of blood flow to the brain.[1] In contrast, hemorrhagic stroke occurs when an intracranial blood vessel ruptures suddenly.[2] Stroke is the second highest cause of death worldwide.[3]

In Indonesia, stroke is the leading cause of disability and mortality. Along with increasing age, the incidence and prevalence of stroke continues to increase every year, especially in elderly patients.[4] The death rate of 356,183 or 21.12% due to stroke in Indonesia [5], making stroke one of the diseases that requires more attention in its management.[6]

Stroke is characterized by paralysis of the face or body on one side, slanted mouth, slurred or slurred speech, and can also be a sudden change in mental status.[7] These complaints can be assessed using a scoring system, namely the NIHSS. The National Institutes of Health Stroke Scale (NIHSS) is a scoring system used to assess the severity of acute stroke.[8] In addition to assessing severity, the NIHSS can be used to help plan stroke management and determine the patient's future prognosis. The use of NIHSS in the assessment of acute stroke severity is recommended as a valid scoring system and the most accessible worldwide.[9]

PATHOPHYSIOLOGY OF STROKE

The pathophysiology of stroke is based on the sudden disruption of blood flow to the brain. The clinical manifestations of stroke depend closely on the anatomy of the blood vessels that drain the brain. The presence

of blockage or hemorrhage in intracranial blood vessels can cause focal or global neurologic deficits on the contralateral side of the lesion.[10]

Neurological deficits that can occur in patients are cranial nerve paresis, sensory disturbances, hemiparesis, aphasia, dysarthria, and inattention.[11] These symptoms will determine the severity of the stroke based on NIHSS scoring points. NIHSS examination is performed at least periodically every hour to prevent further damage or even death.[12]

RISK FACTORS

The incidence and prevalence of stroke are closely related to an individual's risk factors. Risk factors for stroke are broadly divided into non-modifiable and modifiable risk factors. Unmodifiable risk factors are fixed risk factors that cannot be changed through lifestyle improvements or medication. Examples are age, gender, race, and genetics (family history). Modifiable risk factors are risk factors of an individual that can be changed by improving lifestyle or through medication. Examples are conditions such as hypertension, diabetes mellitus, elevated cholesterol levels (dyslipidemia), smoking, obesity and inactivity. These risk factors can increase the severity of stroke and prolong the length of stay.[13]

According to a study conducted by Razdiq et al (2020), there is a relationship between systolic blood pressure ($p=0.01$) and diastolic blood pressure ($p=0.004$) with stroke severity through NIHSS examination.[14] In the study of Ayudia et al (2023) there was a relationship between Low-Density Lipoprotein (LDL) cholesterol levels and the length of stay of acute ischemic stroke patients ($p=0.042$). High LDL levels will increase the risk of atherosclerotic plaque formation.[15] Atherosclerosis is the main pathology causing ischemic stroke which is associated with endothelial dysfunction in blood vessels. Endothelial dysfunction in these vessels is assessed by measuring carotid artery tunica intima media thickness (CIMT) using Doppler ultrasonography (ultrasound).[16] Although no single stroke severity scoring system can predict overall recovery and disability after acute stroke, the NIHSS can be used as a reliable severity assessment due to the ease with which clinicians can use it.[17]

NATIONAL INSTITUTES OF HEALTH STROKE SCALE (NIHSS)

The National Institutes of Health Stroke Scale or NIHSS is a scoring system used to determine the severity of acute stroke.[8] The use of NIHSS is not limited to severity alone, the use of NIHSS in acute stroke cases helps to plan management and determine the patient's future prognosis.

Every clinician in the field of neurology, in determining prevention, assessment management in the acute phase, recovery, requires an assessment of severity, and the NIHSS has become the gold standard in determining the severity of acute stroke.[9] There are 15 assessment items that need to be considered in the use of NIHSS to determine the severity of acute stroke. The patient's NIHSS score is calculated by adding each score in the assessment items in the NIHSS sheet.[8]

The ability of the NIHSS to predict the patient's condition after a stroke helps the clinician to provide accurate information to the patient so as to set realistic goals for therapy and discharge planning.[8] The NIHSS assesses the patient's motor as well as non-motor weakness. This assessment yields a total score from 0 - 42, with a greater total score indicating greater stroke severity.[18]

THE USE OF NIHSS IN DETERMINING THE SEVERITY OF ACUTE STROKE

Stroke can cause neurological deficits that impair the patient's motor and non-motor abilities. Due to its progressivity, there is a need for an assessment tool that provides a quantitative measure of the severity of a patient's stroke as seen from the neurological deficits experienced.[19]

NIHSS as a systematic and standardized assessment tool helps clinicians to measure the level of neurological deficits of patients, while helping to identify which patients are suitable for fibrinolytic therapy, allowing clinicians to make objective measurements of changes in patients' clinical status, and identify patients at higher risk of complications such as intracerebral hemorrhage (ICH).[20]

The NIHSS examination includes the following: (1) Level of consciousness; (2) Eye movements; (3) Integrity of visual fields; (4) Facial movements; (5) Arm and leg muscle strength; (6) Sensation; (7) Coordination; (8) Language; (9) Speech; and (10) Neglect.[21]

CONCLUSION

Stroke is a neurological emergency that occurs due to sudden disruption of blood flow to the brain. Due to its progressivity, a systematic scoring system is required to assess the severity of a patient's stroke. The NIHSS makes it easy to quantify the extent of a patient's neurological deficit, allows clinicians to objectively measure changes in a patient's clinical status, and identifies patients at higher risk of complications. The NIHSS is also used in determining patient eligibility for appropriate therapy to improve neurological outcomes.

CONSENT FOR PUBLICATION

The Authors agree to publication in Journal of Society Medicine.

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All authors significantly contribute to the work this review, approved the final version to be published, agreed on the journal to be submitted, and agreed to be accountable for all aspects of the work.

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