



The Nutritional Status of Acute Ischemic Stroke Patients Treated in the Stroke Corner of General Hospital Haji Adam Malik in 2021

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Abstract. Background: Stroke may result in the decline of a patient's nutritional status, which has a detrimental impact on functional recovery and mortality rate. Studies showed that 6–31% of nutritional deficiency is found before stroke, and tends to worsen during hospital admission. The objective of this study is to describe the nutritional characteristics of acute ischemic stroke patients in the Stroke Corner of General Hospital Haji Adam Malik in 2021.

Method: This descriptive study with a cross-sectional approach is carried out using secondary data collected from the medical records of acute ischemic stroke patients at the General Hospital Haji Adam Malik Stroke Corner in 2021. In this study, characteristic data are analyzed along with the nutritional status using the MUST score, malnutrition risk factors, the NIHSS score severity, and the stroke outcome using mRS score.

Results: It is discovered that out of the 40 participants, men were more common than women, with a mean age of 59.38 ± 12.29 . Based on the MUST score, 37.5% had a moderate risk of malnutrition. The most common risk factors for malnutrition included hypertension and diabetes mellitus, followed by older age, cardiac disease, hyperlipidemia, and infectious disease. Based on the NIHSS score, 57.5% had moderate severity. Furthermore, based on the mRS score, 52.5% of subjects were predicted to have a poor outcome.

Conclusion: It is concluded that the majority of the participants in this study are male patients with normal body mass index, a moderate risk of malnutrition, a moderate NIHSS score, a poor outcome, as well as a risk of hypertension, diabetes mellitus and cardiovascular disease.

Keywords: Stroke · malnutrition · outcome

1 Introduction

Ischemic stroke is a neurological dysfunction episode caused by focal cerebral, spinal, or retinal infarction [1]. Globally and annually, stroke affects 33 million people, half of which occurs in developing countries [2]. According to the Global Burden of Disease (GBD), stroke is the second most common cause of death and disability worldwide after

coronary heart disease. The World Health Organization (WHO) in 2012 reported that 6.7 people have died from stroke [3].

Stroke could also deteriorate nutritional status. Declining nutritional status following a stroke event may negatively impact functional recovery and increases mortality rate. Nutritional deficits are found in 6–31% before a stroke and tend to worsen during hospital admission [4].

Various methods have been used to screen for malnutrition, including the Malnutrition Universal Screening Tool (MUST) score. Nutritional status evaluation with MUST is an instrument to determine the risk of malnutrition based on objective measures of 3 variables: the body mass index (BMI), a history of weight loss in the last 3–6 months and acute disease in the last 3–5 days [5].

Based on the review above, we are interested in studying the nutritional status of acute ischemic stroke patients treated in the Stroke Corner of General Hospital Haji Adam Malik in order to decrease the incidence of declining nutritional status, thus improving functional recovery and decrease mortality rate, as well as, describing the nutritional status of acute ischemic stroke patients in North Sumatera.

2 Method

This descriptive study was conducted with a cross-sectional design and used secondary data from medical records. The study sample included acute ischemic stroke patients in the Stroke Corner of General Hospital Haji Adam Malik Medan in 2021.

The inclusion criteria were medical records of acute ischemic stroke based on history, physical examination, neurological examination, laboratory and head CT scans in patients admitted to the Stroke Corner of General Hospital Haji Adam Malik Medan and those aged 18 years or above. The exclusion criteria were incomplete medical records.

Analyzed variables include characteristics data (age, gender, ethnicity, occupation), nutritional status assessment with MUST score (Malnutrition Universal Screening Tool), body mass index (BMI), malnutrition risk factors including chronic diseases (hypertension, hyperlipidemia, diabetes mellitus, kidney failure, liver failure, cardiac diseases including heart failure, coronary heart disease, infectious diseases), neurological deficits (decreased of consciousness, dysphagia, olfactory disorder, aphasia, cognitive impairment, and depression). Stroke severity is evaluated based on the NIHSS score in admission, and the stroke outcome is evaluated based on mRS score in discharge. Data analysis was conducted with univariate analysis using SPSS version 22.0 program.

3 Results

The demographic characteristics of the subjects are shown in Table 1. Of 40 subjects, men were more common than women, with a mean age of 59.38 ± 12.29 . The youngest subject was 37 years old, while the oldest was 90 years old. Most subjects were housewives (27.5%), followed by retirees (20%). More than half of the subject was Batak ethnic.

Based on the body mass index (BMI), 11 subjects (27.5%) were underweight, 7 (17.5%) obesity, and 3 (7.5%) overweight. After calculating the risk of malnutrition from MUST, 15 subjects had a moderate risk of malnutrition, while 12 and 13 had low

Table 1. Demographic Characteristics of the Subjects

Characteristic	N (%) / Mean \pm Standard Deviation (N = 40)
Gender	
Men	25 (62.5)
Women	15 (37.5)
Age	59.38 \pm 12.29
Occupation	
Housewife	11 (27.5)
Private employee	3 (7.5)
Retiree	8 (20.0)
Civil servant	7 (17.5)
Farmer	2 (5.0)
Police/Army	3 (7.5)
Entrepreneur	6 (15.0)
Ethnicity	
Aceh	1 (2.5)
Batak	22 (55.0)
Java	10 (25.0)
Melayu	4 (10.0)
Minang	1 (2.5)
Nias	2 (5.0)

and high risks, respectively. The most common risk factors for malnutrition included hypertension and diabetes mellitus, followed by older age, cardiac disease, hyperlipidemia, and infectious disease. The most common cardiac disease was congestive heart failure, with 8 subjects, with coronary heart disease in 3, and one with atrial fibrillation. Pneumonia was the most common infectious disease, occurring in 7 of 9 subjects with infectious diseases. 22.5% had a neurological deficit that might affect nutritional status, which was decreased consciousness, followed by dysphagia and aphasia, with 15% of each. Based on the NIHSS score for the stroke severity, 57.5% was moderate, 20% was severe, and the rest was mild. For the outcome of stroke using the modified Rankin Scale, 52.5% were predicted to have a poor outcome, while 19 subjects or 42.5% good outcome.

Table 2. Stroke Characteristics of the Subjects

Characteristic	N (%) / Mean \pm Standard Deviation (N = 40)
Risk Factors	
Older age	12 (30.0)
Hypertension	16 (40.0)
Diabetes mellitus	16 (40.0)
Cardiac disease	12 (30.0)
Liver disease	1 (2.5)
Renal disease	6 (15.0)
Infectious disease	9 (22.5)
Hyperlipidemia	11 (27.5)
Decreased of consciousness	9 (22.5)
Dysphagia	6 (15.0)
Aphasia	6 (15.0)
Nasogastric tube insertion	15 (37.5)
Gastrointestinal bleeding	2 (5.0)
Anemia	
No anemia	24 (60.0)
Mild	8 (20.0)
Moderate	5 (12.5)
Severe	3 (7.5)
Body Mass Index	
Normal	19 (47.5)
Underweight	11 (27.5)
Overweight	3 (7.5)
Obesity	7 (17.5)
Malnutrition Category (MUST)	
Low Risk	12 (30.0)
Moderate Risk	15 (37.5)
High Risk	13 (32.5)
Stroke Severity (NIHSS)	
Mild	9 (22.5)
Moderate	23 (57.5)
Severe	8 (20.0)

(continued)

Table 2. (continued)

Characteristic	N (%) / Mean \pm Standard Deviation (N = 40)
Stroke Outcome (mRS)	
Good	19 (42.5)
Poor	21 (52.5)

MUST: Malnutrition Universal Screening Tools

NIHSS: National Institutes of Health Stroke Scale

mRS: modified Rankin Scale

4 Discussion

Based on age and gender, most subjects in our study were men (62.5%) with a mean age of 59.38 ± 12.29 . The men distribution in our study, which was more dominant, is not in line with previous studies. Other study cited by Wang et al. reported that women have a higher stroke incidence at 85 years old or above and a lower incidence at other ages. However, our result is in line with their study, in which the stroke incidence was higher in men compared to women [6].

Based on body mass index, most subjects had a normal body mass index (47.5%) followed by underweight (27.5%). Body mass index is known to be related to future stroke incidence. Prospective studies showed that mortality due to stroke is increased in patients with a BMI of above 25 kg/m^2 and obesity [7]. Another study in Japan also reported a two-fold higher risk of cardioembolic stroke in women with a mean BMI of obesity compared to normal [8].

Based on the malnutrition category from the *Malnutrition Universal Screening Tools* (MUST), most subjects were moderate (37.5%) and high (32.5%). A previous study by Gomes et al. reported that 64% of subjects had low risk, 7% moderate, and 29% high risk [9].

Based on the risk factors, most subjects in this study had hypertension (40%), diabetes mellitus (40%), and cardiac disease (30%). A study by Gomes et al. also reported that 71% of patients had hypertension, 22% diabetes mellitus, 13% ischemic heart disease, 22% heart failure, and 21% atrial fibrillation. There is a significant relationship between malnutrition and 6-months post-stroke mortality, and 40% of subjects who passed away were patients with a high risk. A study by Coban et al. also stated that the presence of chronic diseases in admission due to stroke is associated with an increased risk of malnutrition [9, 10]. Diabetes mellitus in admission is associated with an increased risk of malnutrition by 58%. Furthermore, diabetes mellitus is also associated with dysphagia, leading to impaired nutritional intake [10].

Decreased consciousness, dysphagia, and food intake via NGT are also associated with malnutrition after a stroke. A meta-analysis by Chen et al. reported a significant relationship between decreased consciousness after a stroke and a risk for malnutrition. An association between the use of feeding tubes and post-stroke. Malnutrition was also reported with a significant result ($p < 0.00001$). Dysphagia affects dietary intake leading to nutritional and fluid inefficiency and reduced quality of life. Chen et al. also

reported that dysphagia is associated with a higher risk of malnutrition [11]. In our study, dysphagia was found in 15% of the subjects, NGT in 17.5%, and decreased consciousness in 22.5%. Our result showed that most subjects have risk factors associated with post-stroke malnutrition. In addition, 15% of our study subjects had aphasia, one of the most common conditions after an acute stroke. Another study by Flowers et al. also reported an aphasia incidence of 30% in acute ischemic stroke patients [12]. Aphasia is also known as a risk factor for malnutrition besides decreased consciousness, swallowing apraxia and cranial nerve palsies of the Glossopharyngeal, Vagal and Hypoglossus nerves [13].

Based on the stroke severity from the NIHSS score, most subjects were moderate (57.5%). Our result is in line with a study by Ambresh et al., in which most distribution was moderate (78.5%). Furthermore, based on the outcome, most subjects in our study had a poor outcome (52.5%). The poor outcome based on the mRS score is associated with malnutrition. This is shown in a study by Aliasghari et al., in which a significant negative correlation was found between mRS score and malnutrition. On the other hand, malnutrition might strengthen neuroinflammatory responses and disturb the recovery of ischemic brain injury by inhibiting the expression of axon terminal protein, leading to a worse stroke outcome [14–16].

5 Conclusion

Based on the characteristics of nutritional status in stroke patients in our study, most subjects were men, had a normal body mass index, moderate malnutrition risk, had risk factors of hypertension, diabetes mellitus, cardiac disease, and had a moderate NIHSS score and a poor stroke outcome.

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