

# Clinical Characteristics And Nutrition Status In Acute Stroke Patients

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## Abstract

Introduction: Stroke is the first cause of death in Indonesia and leading causes of disability in the world. Severe disability in stroke increases the risk of malnutrition. Malnutrition in stroke increases morbidity and mortality.

Objective: This study aims to determine the clinical characteristics and nutritional status of stroke patients.

Methods: This was a retrospective descriptive study of stroke patients who were treated in the Neurology ward of Hasan Sadikin Hospital Bandung from 1 August 2020 to 30 September 2020. Nutritional status was assessed using Body Mass Index (BMI) and Subjective Global Assessment (SGA) scores. BMI was calculated using kg/m<sup>2</sup>, grouped into obese (BMI > 30), overweight (BMI 25.0-29.9), normal (BMI 18.5-24.9) and underweight (BMI < 18.5). SGA score < 2 is considered as good nutrition, and ≥ 2 is classified as malnutrition.

Results: There were 52 stroke patients, most of them were male (57.7%) with mean age was 57 years old, 51.9% were malnourished based on the SGA score, normal BMI and overweight were 23 (44.2%) patients, followed by obesity (5.7%) and underweight (5.7%). 71.4% aged ≥ 65 years are malnourished. The malnutrition condition was dominated by cardioembolic stroke patients (63.6%), with severe stroke (58.3%), dysphagia (59.4%), had comorbid infections (71.4%) and stress ulcers (55.6%).

Conclusion: Based on this study, it was found that elderly, moderate-severe stroke, comorbid infections and stress ulcers will have a tendency to malnutrition so that good stroke management can reduce the risk of malnutrition.

## INTRODUCTION

Stroke is the first cause of death in Indonesia<sup>1</sup> and is one of the leading causes of disability in the world.<sup>2,3</sup> The mortality rate in the first 30 days and in 1 year after stroke is 20% and 30%, respectively.<sup>4</sup> The American Heart Association (AHA) states that the incidence rate of stroke is 3 million stroke patients per year and 50,000 stroke patients with initial attacks occur annually.<sup>5</sup> 500,000 stroke cases in Indonesia, with 125,000 of them dying.<sup>1</sup> Ninety percent of stroke sufferers have a disability in their lifetime.<sup>6</sup>

Severe disability in stroke will increase the risk of malnutrition. The prevalence of malnutrition in acute phase stroke is 8-34%.<sup>4,7</sup> Malnutrition in stroke patients can be caused by neurological deficits such as decreased consciousness, brain nerve paresis, hemiparesis / hemiplegia, and the presence of dysphagia.<sup>4</sup> Malnutrition in stroke

patients increases morbidity and mortality.<sup>4,7</sup>

Malnutrition occurs due to an imbalance between increased energy requirements and inadequate energy and protein intake.<sup>4</sup> During the acute and recovery phase of stroke patients, special nutritional interventions through the efforts of a multidisciplinary team can enhance recovery of neurocognitive function. Early identification and management of malnutrition with dietary modification or specific therapeutic strategies to ensure adequate nutritional intake should receive greater attention, as poor nutritional status can exacerbate brain damage and contribute to poor prognosis.<sup>8</sup> Validated tools are needed to regularly evaluate the presence of malnutrition in malnutrition. stroke patients from initial admission to discharge planning. The condition of malnutrition can be assessed using several parameters such as: weight loss, decreased oral intake, and muscle

atrophy and degree of subcutaneous fat loss.<sup>9</sup> This study aims to determine the clinical characteristics and nutritional status of acute phase stroke patients at Hasan Sadikin Hospital Bandung.

**METHOD**

This research was a retrospective descriptive study and study population were all stroke patients treated in the neurology ward of Hasan Sadikin Hospital Bandung from August 1st until September 30<sup>th</sup>, 2020 who had complete medical record data, in the form of patient identity, National Institute of Health Stroke Scale (NIHSS) scores, characteristics of neurological deficits, comorbid and laboratory data including nutritional status. There were 52 stroke patients that could be included in the study. Nutritional status was assessed using Body Mass Index (BMI) and Subjective Global Assessment (SGA) scores. BMI was calculated using kg / m<sup>2</sup>, grouped into obese (BMI> 30), overweight (BMI 25.0-29.9), normal (BMI 18.5-24.9) and underweight (BMI <18.5). The SGA score <2 is categorized as good nutrition, and ≥2 is classified as malnutrition. Age is classified to be less than 65 years old, and more than 65 years based on high risk factors for stroke in AHA 2019.5 This study has been approved by the Health Research Ethics Committee team at Hasan Sadikin Central General Hospital Bandung with number LB.02.01 / X.6.5 / 314 / 2020.

**RESULTS**

a. Demographic Data and Clinical Characteristics

During the study, 52 stroke patients were treated in the neurology ward of Hasan Sadikin Hospital Bandung. Demographic data and clinical characteristics with nutritional and nutritional status are shown in table 1. The mean age of patients was 57 years, with 30 (57.7%) were male. A total of 27 (51.9%) patients experienced malnutrition, normal nutritional status and overweight as many as 23 (44.2%) patients, followed by obesity (5.7%) and underweight (5.7%). Ischemic stroke (63.5%) and lacunar stroke (66.7%) were the most frequent in this study. Based on the National Institute of Health Stroke Scale (NIHSS) score, it was found that there were 33 (63.5%) patients with moderate stroke followed by severe (23%) and mild (13.5%) stroke. Thirty (63.5%) patients had their first stroke. Hemiparesis (50%) and dysphagia (61.5%) were the most neurological deficit in this research subject. There were 2 patients without neurological deficit, and both had subarachnoid hemorrhage. Hypertension (38) was the most risk factor in stroke patient followed by dyslipidemia (34).

Stress ulcer and infection were comorbidities and had poorer clinical outcome related to malnutrition. Most of the malnutrition conditions were in the group with comorbid infections (71.4%) and pneumonia was the most infection.

Based on the SGA (Subjective Global Assessment) score, 27 (51.9%) patients had malnutrition, especially those aged ≥65 years (71.4%). Most of the malnourished patients had severe stroke (58.3%), had dysphagia (59.4%) and patients with comorbid infections (71.4%).

b. Vascular Risk Factor Laboratory

Table 2 shows the laboratory results of vascular risk factors based on nutritional status and nutritional status. The highest value of total cholesterol (268 mg / dL) was found in the group with normal nutritional status and good nutritional status. The highest values for LDL (256 mg / dL) and triglycerides (559 mg / dL) were found in the group with overweight nutritional status. In the malnutrition group, the lowest (12 mg / dL) and the highest (622 mg / dL) values were obtained for Random Blood Glucose (RBG). The highest HbA1C (11 mg / dL) was found in the group with obesity and overweight BMI, and also in normal and malnutrition group.

**Table 1**  
Clinical characteristic of research subjects

Category	Total (N=52) (%)	Body Mass Index (BMI)				SGA score	
		Obesity (N=3) (%)	Overweight (N=23) (%)	Normal (N=23) (%)	Underweight (N=3) (%)	< 2 (N=25) (%)	≥ 2 (N=27) (%)
Age, mean (year)	57 (38-86)						
<65	38 (73.1)	2 (5.3)	16 (42.1)	19 (50)	1 (2.6)	21 (55.3)	17 (44.7)
≥65	14 (26.9)	1 (7.1)	7 (50)	4 (28.6)	2 (14.3)	4 (28.6)	10 (71.4)
Gender							
Male	30 (57.7)	3 (10)	12 (40)	13 (43.3)	2 (6.7)	13 (43.3)	17 (56.7)
Female	22 (42.3)	0	11 (50)	10 (45.5)	1 (4.5)	12 (54.5)	10 (45.5)
Stroke type							
Ischemic	33 (63.5)	1 (3)	15 (45.5)	15 (45.5)	2 (6)	16 (48.5)	17 (51.5)
Lacunar	22 (66.7)	1 (4.5)	9 (40.9)	11 (50)	1 (4.5)	12 (54.5)	10 (45.5)
Cardioembolic	11 (33.3)	0	6 (54.5)	4 (36.5)	1 (9)	4 (36.4)	7 (63.6)
Haemorrhage	19 (36.5)	2 (10.5)	8 (42.1)	8 (42.1)	1 (5.3)	9 (47.4)	10 (52.6)
Stroke event							
First event	33 (63.5)	1 (3)	13 (39.4)	17 (51.5)	2 (6)	15 (45.5)	18 (54.5)
Recurrent	19 (36.5)	1 (5.3)	10 (52.6)	7 (36.8)	1 (5.3)	11 (57.9)	8 (42.1)
NIHSS							
Mild	7 (13.5)	0	3 (42.9)	3 (42.9)	1 (14.3)	4 (57.1)	3 (42.9)
Moderate	33 (63.5)	3 (9.1)	12 (36.4)	18 (54.5)	0	18 (54.5)	15 (45.5)
Severe	12 (23)	0	7 (58.3)	3 (25)	2 (16.6)	5 (41.7)	7 (58.3)
Very severe	0	0	0	0	0	0	0
Neurological deficit							
Hemiparesis	26 (50)	2 (7.7)	6 (23.1)	17 (65.4)	1 (3.8)	11 (42.3)	15 (57.7)
Hemiplegia	15 (28.8)	0	10 (66.7)	5 (33.3)	0	9 (60)	6 (40)
Tetraparesis	9 (17.3)	1 (11.1)	6 (66.7)	1 (11.1)	1 (11.1)	5 (55.6)	4 (44.4)
No paresis	2 (3.8)	0	1 (50)	0	1 (50)	0	2 (100)
Dysphagia	32 (61.5)	1 (3.1)	14 (43.8)	14 (43.8)	3 (9.3)	13 (40.6)	19 (59.4)
Risk Factor*							
Hypertension	38	2 (5.3)	18 (47.4)	17 (44.7)	1 (2.6)	21 (55.3)	17 (44.7)
Diabetes Mellitus	8	1 (12.5)	5 (62.5)	1 (12.5)	1 (12.5)	4 (50)	4 (50)
Dyslipidemia	34	3 (8.8)	18 (52.9)	13 (38.3)	0	20 (58.8)	14 (41.2)
Smoking	3	0	1 (33.3)	2 (66.7)	0	1 (33.3)	2 (66.7)
Cardiac problem	11	0	6 (54.5)	4 (36.4)	1 (9.1)	4 (36.4)	7 (63.6)
Comorbidity*							
CKD	2	0	2 (100)	0	0	1 (50)	1 (50)
AKI	7	1 (14.2)	3 (42.9)	3 (42.9)	0	4 (57.1)	3 (42.9)
Infection	7	0	2 (28.6)	2 (28.6)	3 (42.9)	2 (28.6)	5 (71.4)
Stress Ulcer	9	0	4 (44.4)	5 (55.6)	0	4 (44.4)	5 (55.6)
Others**	8	1 (12.5)	5 (62.5)	2 (25)	0	3 (37.5)	5 (62.5)

Note : SGA: Subjective Global Assessment; CKD: Chronic Kidney Disease; AKI: Acute Kidney Injury; NIHSS: National Institute Health Stroke Scale  
\*one subject maybe had multiple risk factor and comorbidities  
\*\* Others: pregnancy, dehydration, hypoglycemia and asthma bronchiale

**Table 2**

Laboratory results and nutritional status of research subjects

Laboratory	Total (N=52)	Mean (maks-min)				Nutritional status	
		Body mass index (BMI)				Good	Malnutrition
		Obesity	Overweight	Normal	Underweight		
<b>Total cholesterol</b>	206.5 (115-268)	222 (215-229)	191.6 (115-234)	206.7 (148-268)	182.3 (153-200)	200.6 (115-260)	199.9 (126-260)
<b>HDL</b>	40 (20-74)	42 (38-48)	41 (20-74)	43 (25-61)	39 (37-41)	41 (22-65)	42 (20-74)
<b>LDL</b>	131 (59-256)	132 (101-165)	121 (59-256)	131 (73-191)	125 (99-140)	128 (59-256)	127 (73-174)
<b>Triglyceride</b>	116 (27-559)	134 (80-195)	141 (27-559)	142 (38-419)	87 (83-95)	161 (38-559)	114 (27-212)
<b>Uric acid</b>	5.4 (1.7-12.5)	7 (5.4-9.5)	5.4 (2.1-12.5)	5.8 (2.2-9.6)	3.2 (1.7-5.3)	5.7 (2.2-9.6)	5.4 (1.7-12.5)
<b>RBG</b>	131 (12-611)	215 (99-310)	164 (12-358)	137 (85-358)	297 (144-611)	158 (85-358)	165 (12-611)
<b>HbA1C</b>	7.7 (5-11)	8.5 (6-11)	8 (7-11)	7 (6-10)	5 (5)	8 (6-11)	8 (5-11)

Note : HDL : High Density Lipoprotein, LDL : Low Density Lipoprotein, RBG : Random Blood Glucose, HbA1C : Hemoglobin A1 C.

**DISCUSSION**

The results of this study provide information on the nutritional status and nutritional status of stroke patients treated in the neurology ward of Hasan Sadikin Hospital. There were 52 patients in this study, each with overweight and normal nutritional status. Forty-four percent patients, followed by obesity and underweight in 5.7% patients. Fifty seven percent patients were malnourished according to SGA score. The condition of malnutrition is dominated in elderly (71.4%), male gender (56.7%), first event stroke (54.5%), severity of stroke (58.3%), stroke symptoms with dysphagia (59.4%), with smoking risk factors. (66.7%) and had heart defects (63.6%), as well as with comorbid infections (71.4) followed by other conditions (62.5%) and stress ulcers (55.6%).

In this study, it was found in the age group ≥ 65 years, dominated by malnutrition conditions (71.4%), this is because in old age, stroke symptoms can be more severe and have a worse prognosis for the onset of malnutrition.<sup>4,10,11</sup>

This This is in line with the results of the study where malnutrition was dominated by severe stroke (58.3%) based on the NIHSS score. In the elderly population, there are several risk factors for malnutrition, namely in terms of medical factors (gastrointestinal, endocrine disorders, infection, disability, cancer, dysphagia, decreased appetite, loss of taste and smell), social factors (lack of knowledge about nutrition, isolation and disability. to be independent) and psychological factors (dementia, depression, and anxiety).<sup>10</sup>

The incidence of malnutrition by stroke type was dominated by the cardioembolic stroke group (63.6%), in line with the high rate of malnutrition in patients with risk factors for heart defects (63.6%). This is in accordance with the study of Sung-he yoo et al. that cardioembolic infarction stroke has

a significant relationship with the emergence of malnutrition in the acute phase

Sabouh et al. said that recurrent strokes increased the risk of malnutrition incidence by 58-71%<sup>11</sup>, but in this study the condition of malnutrition in recurrent stroke attacks (42.1%) was smaller than that of the first stroke (54.5%).

Dysphagia can contribute to the emergence of malnutrition in acute phase stroke patients, dysphagia occurs in 30-50% of acute stroke patients and increases 12-times the incidence of aspiration pneumonia and malnutrition<sup>11</sup>, whereas in this study 61.5% of patients had dysphagia. However, it also depends on the location of the stroke, motor impairment, visuospatial perception disorder, depression and cognitive impairment in the patient. So the role of dysphagia in the emergence of malnutrition is still unknown. It was thought that a dysphagia patient with a motor deficit in the right limb and dependence on daily activities was a better predictor of malnutrition.

Comorbid conditions in acute stroke patients can be a risk factor for the onset of malnutrition, especially in patients with infections, which can include pneumonia, acute diarrhea or pressure ulcers. The causal factors between comorbid infections and malnutrition still need further research. The study of Davalos et al. states that malnutrition causes acute phase stroke patients to be susceptible to infection.<sup>3,14</sup>

The laboratory results of vascular risk factors in this study did not show differences in the numbers for each group of nutritional status and nutritional status. Each group had almost the same range of dyslipidemia incidence rates.

**CONCLUSION**

Based on this study, malnutrition disorders in acute phase stroke were dominated by patients aged ≥ 65 years, moderate-severe stroke, cardioembolic infarction based on NIHSS score, accompanied by comorbidities, especially infections and stress ulcers. Thus, the more severe the degree of stroke accompanied by comorbidities, especially in the elderly, requires more attention for stroke management with good nutritional monitoring and evaluation. Previous stroke history was not a risk factor for developing malnutrition in this study. Further studies are needed to evaluate those factors that most influence nutritional deficiencies in acute phase stroke patients.

### References

1. Penelitian B, Pengembangan dan Riset Kesehatan Dasar. 2014.
2. Feigin VL, Lawes CM, Bennett DA, Barker-Collo SL, Parag V. Worldwide stroke incidence and early case fatality reported in 56 population-based studies: a systematic review. *Lancet Neurol.* 2009;8(4):355–369.
3. Mozaffarian D, Benjamin EJ, Go AS, Arnett DK, Blaha MJ, Cushman M, et al. Heart disease and stroke statistics-2016 update: a report from the American Heart Association. *Circulation.* 2016;133(4):e38–360.
4. Bouziana, S. D., & Tziomalos, K. Malnutrition in Patients with Acute Stroke. *Journal of Nutrition and Metabolism*, 2011, 1-7. doi:10.1155/2011/167898
5. Goldstein L. Guideline for the Primary Prevention of Stroke. A Guideline for Health care Professionals from the American Heart Association. American Stroke Association. 2014.
6. Young J, Forster A. Review of stroke rehabilitation. *BMJ.* 2007;334:86–90.
7. Gomes F, Emery PW, Weekes CE. Risk of Malnutrition Is an Independent Predictor of Mortality, Length of Hospital Stay, and Hospitalization Costs in Stroke Patients. *Journal of Stroke and Cerebrovascular Diseases.* 2016;25(4):799-806.
8. Lisda Amalia, Fadila Arsanti, Ginna Megawati. Hubungan Luaran Subjective Global Assessment (SGA) dengan Derajat Keparahan Stroke. *Neurona* 2019.vol 36 no.3.
9. Obara, H., Ito, N., & Doi, M. Nutrition and Critical Care in Very Elderly Stroke Patients. *Diet and Nutrition in Critical Care*, 2015;753-766. doi:10.1007/978-1-4614-7836-2\_31
10. Sabbouh, T., & Torbey, M. Malnutrition in Stroke Patients: Risk Factors, Assessment, and Management. *Neurocritical Care.* 29(3),2017; 374-384. doi:10.1007/s12028-017-0436-1
11. Yoo, S., Kim, J. S., Kwon, S. U., Yun, S., Koh, J., & Kang, D. Undernutrition as a Predictor of Poor Clinical Outcomes in Acute Ischemic Stroke Patients. *Archives of Neurology*, 2008;65(1). doi:10.1001/archneurol.2007.12
12. Norine, F. C., Ruth, M. E., Katherine, S. L., & Robert, T. W. A Review Of The Relationship Between Dysphagia And Malnutrition Following Stroke. A Review Of The Relationship Between Dysphagia And Malnutrition Following Stroke, 41(*J Rehabil Med*), 2009;707-713.
13. Dávalos, A., Ricart, W., Gonzalez-Huix, F., Soler, S., Marrugat, J., Molins, A., Genís, D. Effect of Malnutrition After Acute Stroke on Clinical Outcome. *Stroke*, 27(6), 1996:1028-1032. doi:10.1161/01.str.27.6.1028

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