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RESEARCH ARTICLE

Malnutrition Screening Is Better Than Body Mass Index for Predicting COVID-19 Severity

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Abstract: Several factors can influence the severity of COVID-19, including nutritional status and malnutrition conditions. This study compares malnutrition screening methods with body mass index to find better predictors of COVID-19 severity. This study is a cross-sectional analysis of medical records from all adult COVID-19 patients (total sampling) treated at Amri Tambunan Deli Serdang Hospital. The World Health Organization criteria were used to determine the severity of COVID-19. A Global Subjective Assessment (SGA) questionnaire was used to screen for malnutrition, while anthropometric measurements (Kg/m^2) were used to calculate the Body Mass Index (BMI). The Chi-Square Test was used for statistical analysis. This study included 508 COVID-19 hospitalisation patients, the majority of whom were women (55.5%), aged 18-29 years (25%) and had moderate severity (89.6%). The seriousness of COVID-19 was associated with malnutrition conditions as measured by the SGA questionnaire ($p<0.001$), with patients with moderate to severe malnutrition being 3.4 times more likely to develop robust and critical COVID-19 (95% CI 1.6 - 7.0). There is no significant relationship between Body Mass Index and the severity of COVID-19 ($p>0.05$). Malnutrition screening with SGA is more accurate than BMI in predicting the severity of COVID-19.

Keywords: IMT, a predictor of COVID-19 severity degree, malnutrition screening

INTRODUCTION

Since 2020, COVID-19 infection has been declared a pandemic. The incident began in Wuhan and quickly spread throughout the world. In Indonesia, the Committee for Handling COVID-19 and National Economic Recovery reported 4,262,720 positive confirmed cases, with

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3.3% deaths as of December 31, 2021. As of December 30, 2021, there were 106,117 confirmed cases in North Sumatra, accounting for 2.5% of all confirmed cases nationwide. COVID-19 cases are expected to peak in Indonesia between June and September 2021.[1,2]

Various parties have worked to improve public understanding of COVID-19 knowledge, nutritional aspects to boost immunity and COVID-19 prevention measures.[3,4] The results show that public awareness of COVID-19 prevention still needs to be higher.[5] As a result, patients of varying severity are admitted to hospitals. 70% of hospitalised cases are of moderate severity.[6] As a result, COVID-19 infections have a high mortality and morbidity. Age, comorbidities (diabetes mellitus, hypertension, kidney, cancer, HIV / AIDS), obesity, and nutritional status all influence the risk of COVID-19 infection, which is increasing.[7]

During the COVID-19 infection, patients will experience a variety of complaints that will cause them to reduce their intake. On the other hand, the patient suffers from severe inflammation, which results in a hypermetabolic state that increases the examiner's energy. Because of the prosecutor's high energy requirements and insufficient intake, the patient will quickly become malnourished.[8,9]

Every patient who enters the hospital will be screened for malnutrition so that the patient can be predicted to be malnourished or not at the time of admission.[10] The SGA (Subjective Global Assessment) questionnaire is a standard screening tool hospitals use. Compared to the European Society for Parenteral and Enteral Nutrition (ESPEN) malnutrition criteria, the SGA screening questionnaire had a 96% sensitivity to assess the risk of malnutrition or diagnose malnutrition.[11] Most health professionals still believe that the Body Mass Index (BMI) determines nutritional status.[12,11] The majority of doctors still believe that the Body Mass Index (BMI) determines nutritional status.[12]

METHODS

This cross-sectional study examines the relationship between malnutrition screening and Body Mass Index (BMI) with the severity of COVID-19 patients. The study used the July-August 2022 total sampling technique to analyse medical record data from all adult COVID-19 patients treated at Amri Tambunan Deli Serdang Hospital. The World Health Organization criteria were used to determine the severity of COVID-19. The SGA questionnaire was used to screen for malnutrition, while anthropometric measurements (kg/m2) were used to calculate the Body Mass Index.

RESULTS

This study included 508 COVID-19 patients from various age groups, genders, and degrees of severity who were hospitalised at RSUD H Amri Tambunan Deli Serdang. Table 1 displays the characteristics of the subject of study.

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Table 1 shows the characteristics of the study subject.

Characterisation		n	%
Sex	Male	227	44,7
	Female	281	55,3
Age (year)	18 - 29	127	25,0
	30 - 39	97	19,1
	40 - 49	104	20,5
	50 - 59	110	21,7
	>= 60	70	13,8
COVID-19 Degrees	Moderate	455	89,6
	Severe	13	2,6
	Critical	40	7,9
Total		508	100

This study aims to see if there is a link between malnutrition screening and BMI and the severity of COVID-19. All subjects underwent anthropometric examinations to determine their BMI values and malnutrition screening examinations using the SGA questionnaire, as documented in their medical records.

Table 2. Relationship of Malnutrition screening to the severity of COVID-19

		COVID-19 Degrees					
		Severe-Critical		Moderate		p	OR (95% CI)
		n	%	n	%		
Screening Malnutrition with SGA	Moderate-Severe malnutrition	43	81.1	255	55.6	< 0.001	3.4 (1.6 - 7.0)
	Well-Nourish	10	18.9	202	44.4		
Total		53	100	455	100		

Chi-Square test

Table 3. Relationship between BMI and severity of COVID-19

		COVID-19 Degrees					
		Severe - critical		Moderate		p	OR (95% CI)
		n	%	n	%		
BMI	overweight - obesity	43	81.8	319	69.9	0.08	1.85 (0.9 - 3.7)
	underweight - Normoweight	10	18.9	137	30.1		
Total		53	100	455	100		

Chi-Square test

Table 2 demonstrates a significant (p=0.001) relationship between malnutrition screening outcomes as measured by the SGA questionnaire and the severity of COVID-19. Patients suffering from moderate to severe malnutrition are 3,4 times more likely to develop severe and life-threatening COVID-19 (95% CI 1.6 - 7.0). This demonstrates that malnutrition has a significant impact on the severity of COVID-19. Table 2 also indicates that the SGA questionnaire can be a helpful measuring tool or screening method for determining malnutrition and predicting the severity of COVID-19.

Table 3 shows no significant relationship between BMI and COVID-19 severity (p>0.05). These findings indicate that malnutrition conditions measured by SGA predict severity better than body mass index in COVID-19 patients.

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DISCUSSION

Several factors can influence the severity of COVID-19. Cardiovascular disease, diabetes, impaired kidney function, old age, and nutritional status have all been shown to affect the severity and the outcome of COVID-19.[13] Malnutrition is known to increase the severity and mortality rate of COVID-19. Shortness of breath, taste disorders, loss of smell, decreased appetite, nausea, vomiting, and diarrhoea are all COVID-19 symptoms that will cause a decrease in food and fluid intake. At the same time, a highly inflammatory state causes hypermetabolism, which increases the expenditure's energy. The process imbalance in intake and energy causes malnutrition in the victim [14]

This malnutrition and inflammatory state will result in a negative protein balance, leading to hypoalbuminemia in the patient. This hypoalbuminemia is associated with a worsening of the severity of COVID-19 associated with the patient's transfer to the ICU.[9] The ICU treatment period for COVID-19 patients will be longer than five days if their nutritional status is poor.[15] Malnutrition is prevalent in 40-80% of COVID-19 patients.[11] According to Bedock et al., 66.7% of COVID-19 patients admitted to the ICU were malnourished, with 38.9% severely malnourished. 9 COVID-19 is present in 52.7% of malnourished Wuhan residents.[16] Malnutrition in COVID-19 patients should not be considered typical if it is discovered. Malnutrition screening should be regarded as necessary at the time of initial admission to determine whether these patients are at risk of malnutrition or have become malnourished. If there is a risk of malnutrition or malnutrition, adequate intervention is required so that these comorbidities do not contribute to the severity of the disease.[17]

Several steps must be taken to determine nutritional status. The first step is to evaluate the malnutrition screening stage. The purpose of this stage is to assess the risk of malnutrition. The following stage is an assessment, which includes anamnesis, physical examination, and supporting analysis. Furthermore, the stage of nutrition diagnosis or nutritional status is followed.[18]

Currently, nutritional status in Indonesia is generally assessed using body mass index parameters.[19,20] Unfortunately, BMI only considers the patient's weight and does not account for the loss of muscle mass and changes in functional status in people with COVID-19. As a result, a method of measuring malnutrition that can better predict the severity of COVID-19 is required.

Several questionnaires, including the Subjective Global Assessment (SGA), can be used to screen for malnutrition. SGA is a simple, validated, and reliable nutritional status assessment tool that takes only a few minutes to assess changes in body weight, dietary intake, gastrointestinal symptoms, functional status, and physical examination. This questionnaire covers the malnutrition criteria of ASPEN (American Society for Parenteral and Enteral Nutrition) and ESPEN (European Society for Parenteral and Enteral Nutrition).[11]

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This study found a significant relationship between malnutrition conditions measured by the SGA questionnaire and COVID-19 severity (p=0.001). Patients suffering from moderate to severe malnutrition are 3.4 times more likely to develop severe and life-threatening COVID-19 (95% CI 1.6 - 7.0). Statistical analysis, however, reveals no significant relationship between the Body Mass Index and the severity of COVID-19 (p>0.05). This finding demonstrates that malnutrition conditions measured by SGA predict severity better than BMI in COVID-19 patients.

Nutritional status and BMI should be assessed, and diet influences patients' susceptibility to COVID-19 infection. A high-carbohydrate, high-fat diet disrupts the balance of the gut microbiota, reducing the immune response in the GI tract and having a systemic impact, as is the case with COVID-19. This subject requires additional investigation. [21,22]

CONCLUSIONS

There was a significant relationship between COVID-19 severity and malnutrition conditions as measured by the SGA questionnaire. Patients suffering from moderate to severe malnutrition are three times more likely to develop severe and critical illnesses. There is no significant relationship between Body Mass Index and COVID-19 severity. Malnutrition screening with SGA is more accurate than BMI in predicting the severity of COVID-19.

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