Incidence Of Malnutrion Based On Body Mass Index And Subjective Global Assesment In Patients With Stable Chronic Obstructive Pulmonary Disease

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Abstract.

Background: Malnutrition is a serious problem in patients with COPD, it interferes with normal skeletal muscle function, with reduced muscle mass and decreased respiratory muscle strength and endurance. The purpose of the study was to determine the incidence of malnutrition based on BMI and SGA in patients with stable chronic obstructive pulmonary disease at the Prof. Dr. Chairuddin P. Lubis Medan Teaching Hospital. Method: The research design is an observational analytic, from November 2023 to March 2024. The study population was COPD patients who sought treatment at the Pulmonary Polyclinic at RSCPL with a total sample using the consecutive sampling method of 91 people Assessment of BMI by measuring TB and BW of patients when they came and assessment of SGA with a questionnaire Data processing using SPSS using descriptive statistics by displaying the IMT and SGA frequency distribution tables. Result: The results of this study found that most patients were categorized as underweight, namely 28 patients (30.8%). The majority of SGA classification as underweight/moderate nutrition "SGA B", namely 50 patients or (54.9%). Conclusion: We found that the Subjective Global Assessment (SGA) questionnaire is very influential in detecting patients with COPD who are malnourished to reduce respiratory muscle decline, and relapse of exacerbations.

Keywords: *Body Mass Index; Subjective Global Assessment and COPD.*

I. INTRODUCTION

According to the (Perhimpunan Dokter Paru Indonesia, 2016), Chronic Obstructive Pulmonary Disease (COPD) is a non-communicable disease that is a global public health problem, including in Indonesia. Chronic Obstructive Pulmonary Disease (COPD) is a common, preventable, and treatable disease characterized by persistent respiratory symptoms and airflow limitation caused by abnormalities in the airways and/or alveoli, typically resulting from significant exposure to harmful particles or gases and influenced by host factors, including abnormal lung development. Significant comorbidities can impact morbidity and mortality (Tramontano & Palange, 2023).Contributing factors include increased life expectancy, increased exposure to risk factors, a growing number of smokers, especially among young people, and indoor and outdoor air pollution. According to the World health organization (2016) approximately 600 million people worldwide suffer from COPD, and more than 3 million deaths occurred due to this disease in 2019. COPD is estimated to be the third leading cause of death worldwide by 2030. In the Asia-Pacific region, the prevalence of COPD reaches 6.2%, while in Indonesia it reaches 4.5%.One of the critical issues often overlooked in COPD management is malnutrition. Approximately 20% of COPD patients experience weight loss and protein and calorie malnutrition. Malnutrition in COPD contributes to respiratory muscle dysfunction, disease severity, and disability progression. Weight loss, low body weight, and malnutrition in COPD also have a negative impact on mortality rates.

COPD patients exhibit poor nutritional status due to a combination of inadequate nutritional intake, systemic inflammation, and a sedentary lifestyle. Malnutrition associated with the disease is found in 30-60% of COPD patients and is usually related to the severity of the diseasein terms of airway obstruction (Agustí A et al., 2023).For patients with stable COPD, there is an increase in metabolic rate due to abnormal respiratory dynamics, chronic systemic inflammation, and the use of drugs such as ß2-agonists that increase metabolic rate. In are COPD patients who malnourished, resting energy expenditure (REE) increases. This is exacerbated by inefficient muscle contraction during activity (Sehgal et al., 2017).Based on various studies,

Subjective Global Assessment (SGA) has better sensitivity and specificity compared to anthropometry (Djais et al., 2010). Subjective Global Assessment (SGA) is an assessment of nutritional status based on subjective calculations of several important variables, including medical history, physical examination, and current disease and condition (Rani et al., 2011). SGA provides a comprehensive assessment of the patient's nutritional status and distinguishes individuals experiencing body wasting, mainly due to malnutrition, from conditions such as cachexia and sarcopenia (Duerksen et al., 2021).Abnormal nutritional status and changes in body composition have a negative impact on prognosis, with a higher risk of COPD exacerbation, depression, and death (Agustí A et al., 2023). Nutritional interventions in COPD patients are aimed at controlling anorexia, improving lung function, and controlling weight loss. Additionally, malnutrition causes immune disorders, putting patients at high risk of pulmonary infections (Permatasari et al., 2016). Based on the aforementioned background, this study aims to describe the incidence of malnutrition in stable COPD patients based on Body Mass Index (BMI) and Subjective Global Assessment (SGA) at Prof. Dr. Chairuddin P. Lubis Teaching Hospital in Medan.

II. METHODS

This study an analytical is observational study with a cross-sectional design using secondary data from medical records assessed over a single period of time. The study was conducted at the Department of Pulmonology and Respiratory Medicine, Prof. Dr. Chairuddin P. Lubis Teaching Hospital, Medan, from November 2023 to March 2024, after obtaining ethical approval from the Ethics Committee of the Faculty of Medicine, University of North Sumatra.The study population consisted of stable COPD patients who met the inclusion and exclusion criteria at Prof. Dr. Chairuddin P. Lubis Teaching Hospital. The sample size was determined using the Lemeshow formula, with a total sample of 91 subjects. The sampling technique used was consecutive sampling.

Inclusion criteria included patients diagnosed with stable COPD and patients who were willing to be given a questionnaire during the interview so that their data was available. Exclusion criteria included patients experiencing exacerbation during the hospitalization period, incomplete patient data, patients with metabolic disorders (e.g., diabetes mellitus, hypertension) or systemic disorders (e.g., TB, CHF, lung cancer) that could affectpatient anthropometry, and patients with comorbidities that could obscure spirometry results (e.g., asthma, pneumonia).Baseline data, subject identity, medical history, and clinical data were collected in full. After that, all the data obtained were processed, analyzed, and tested for hypotheses using SPSS ver 25. In this study, descriptive statistical analysis was used for demographic data and the prevalence of malnutrition based on BMI and SGA with frequency distribution tables.This study has obtained ethical clearance from the Health Research Ethics Committee of the Faculty of Medicine, USU.

III. RESULT AND DISCUSSION

Based on the results of the study conducted from November 2023 to March 2024, the description of malnutrition based on body mass index found that the average BMI of COPD patients at the study site was 23.14 with a standard deviation of 5.49. The average body weight of patients was 59.42 with a standard deviation of 13.39. This study found that most patients were categorized as underweight, namely 28 patients (30.8%). This is shown in Table 1.

Table 1. BMI Profile of COPD Patients

Variable	Value
Body Weight, kg	160,66 ± 7,9
Height, cm	59,42 ± 13,39
Body Mass Index, kg/cm^2	23,14 ± 5,49
Underweight	28 (30,8%)
Normal	23 (25,3%)
Overweight	10 (11%)
Obesitas I	22 (24,2%)
Obesitas II	8 (8,8%)

A description of malnutrition based on subjective global assessment was performed on patients with nutritional status assessment using the SGA questionnaire. The majority of patientswere classified as SGA B, namely 50 patients or 54.9%, followed by SGA A and SGA C. This description can be seen in Table 2.

Table 2. SGA Profile in COPD Patients

Variable	Value
Subjective Global Assessment	
SGA A	39 (42,9%)
SGA B	50 (54,9%)
SGA C	2 (2,2%)

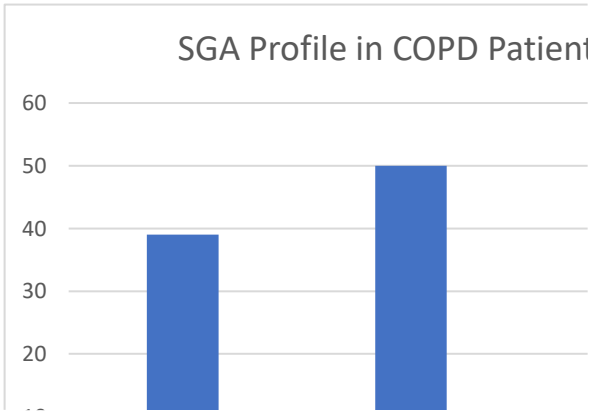

Fig 1. Bar chart showing SGA in COPD patients

This study was conducted to examine the prevalence of malnutrition and BMI in COPD patients. Disease-related malnutrition can be identified in 30-60% of COPD patients and is usually associated with the severity of the disease in terms of airway obstruction (Agustí A et al., 2023). Malnutrition and muscle mass loss have a direct impact on respiratory muscle function, exercise capacity, and lung function due to their detrimental effects on lung tissue itself. Muscle mass loss in COPD is caused by an imbalance between protein synthesis and protein breakdown. Other studies have also shown that malnutrition may be a contributing factor in the pathogenesis of emphysema, in addition to known causes such as tobacco smoke and other harmful stimuli (Sehgal et al., 2017).The most common pathologies associated with malnutrition in COPD patients are, first, cachexia, a condition in which there is a 5% weight loss in a year associated with at least three other characteristics, such as decreased muscle strength and fat-free mass index (FFMI), fatigue, anorexia, and evidence of increased inflammatory markers. Second, sarcopenia, a condition characterized by a decrease in skeletal muscle mass with a decrease in muscle strength. Third, osteoporosis (Agustí A et al., 2023). In patients with stable COPD, there is an increase in metabolic rate due to abnormal respiratory dynamics, chronic systemic inflammation, and the use of drugs such as ß2-agonists that increase metabolic rate. In COPD patients who are malnourished, resting energy expenditure (REE) increases. This is exacerbated by inefficient muscle contraction during activity. In addition, there is an increase in inflammatory cytokine levels such as tumor necrosis factor alpha (TNF) and interleukin 1 (IL1) in the circulation. TNFa and IL1 are associated with weight loss even in healthy individuals (Sehgal et al., 2017). The main causes of low muscle strength and nutritional disorders in COPD patients lie in energy imbalances caused by metabolic changes, aging, muscle loss and atrophy, tissue hypoxia, mild systemic inflammation, and medication use.

Research by Mete et al., (2018) found that 17% of COPD patients were malnourished, with 8.6% having a BMI <18.5 kg/m2. As the patient's mMRC score worsened, the frequency of malnutrition also increased. This also applied to spirometry results, where patients with low BMI had lower results than those with normal BMI. These results indicate that the incidence of malnutrition increases as the patient's disease worsens. The amount of non-fat tissue was also found to be lower in patients with normal and low BMI compared to those who were underweight or obese. Sarcopenia and cachexia were found in 8.3% of patientszaid. COPD patients often also experience varying degrees of malnutrition, which can lead to

treatment failure and is associated with poor prognosis and high mortality rates. Therefore, it is crucial to adopt accurate, appropriate, and reasonable identification methods to identify COPD patients with respiratory failure who are at risk of malnutrition in a timely manner, as well as to provide appropriate nutritional support to prevent poor clinical prognosis. Albumin levels and BMI are found to be predictors of mortality in COPD patients with respiratory failure. These patients also have a faster rate of protein consumption. Research by Chen et al., (2018) found that albumin levels < 30.5 g/L at hospital admission are associated with a higher risk of mortality.For COPD patients, there is something called the obesity paradox, where obese or overweight COPD patients have lower mortality rates than those with normal or low body weight (Hancu, 2019). This could be due to the "protective" effect of high muscle mass in obese patients, not just BMI. There is no consensus explaining the role of obesity in dyspnea, but obesity is associated with relatively less pulmonary hyperinflation.

A study conducted by Wu et al. in 2018 showed that the single proportion (median BMI) of patients with underweight, normal weight, overweight, and obese patients was 7.80% (17.54), 45.97% (22.12), 27.96% (27.00), and 18.28% (31.25), respectively. This means, thatCOPD patients in China are still predominantly normal weight. This is not much different from this study, where normal weight patients also dominate the patient distribution (Gupta et al., 2010). This study also assessed that the majority of patients were classified as SGA B, namely 50 patients or 54.9%, followed by SGA A and SGA C. This means that most patients experienced moderate malnutrition. These results are consistent with the 2010 study by Gupta et al. Of the 106 patients, 83% were malnourished (BMI < 20 kg/m2(2)). Based on SGA scores, 17.0% were well-nourished, 59.5% were moderately malnourished, and 23.5% were severely malnourished. The SGA score was pasitively correlated with lung function parameters and negatively correlated with anthropometric parameters. However, there was no correlation with biochemical parameters (Wu et al., 2018). The results of this study are also consistent with the study conducted by Ulubayet al. in 2007. Of all patients, 46% were malnourished (BMI < 20 kg/m²) according to BMI; 71% of patients were well-nourished, 20% were considered to be well-nourished to moderately nourished, and 9% of patients were severely malnourished according to SGA.SGA was negatively correlated with serum prealbumin, FEV1, and DLCO, indicating that SGA may be a useful method for assessing nutritional status and disease severity non-invasively (Ulubay et al., 2006).The results of this study also indicate that patients who visit the pulmonary clinic at Prof. Dr. Chairuddin P. Lubis Teaching Hospital in Medan rarely return for follow-up visits after receiving therapy (inhaler). It is recommended that patients return for follow-up visits every month to monitor the progression of their disease; however, patients only visit the clinic when they feel sick.

IV. CONCLUSION

Based on the analysis of the data obtained in this study, it can be concluded that most patients were categorized as underweight, namely 28 patients or 30.8%. Additionally, the majority of patients were classified as having SGA "B" malnutrition, which is 50 patients or 54.9%, followed by SGA "A" and SGA "C". These findings indicate that Subjective Global Assessment (SGA) can be used as an initial screening tool to detect malnutrition in COPD patients.Immediate screening is needed to detect COPD patients who are already malnourished. Furthermore, further research is needed to analyze malnutrition in COPD patients, especially in terms of patient nutrition. This is important because malnutrition is one of the factors that must be considered in COPD management.

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