The Relationship between Malnutrition and Quality of Life in Stable Chronic Obstructive Pulmonary Disease Patients at Prof. Dr. Chairuddin P. Lubis Hospital Field

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ARTICLE INFO	ABSTRACT
	Introduction: 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. It also contributes to respiratory muscle dysfunction, disease severity, and disability progression. Malnutrition is associated with disease severity, associated with more severe exacerbations, and increases the length of hospital stay. Malnutrition in COPD is described with varying prevalence rates ranging from 30-60%. The aim of this study was to analyse the relationship between malnutrition and quality of life in patients with COPD. **Method**: The research design is an observational analytic conducted 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. Manultrition assessment by measuring TB and BW of patients when they arrived and assessing quality of life with the SGRQ questionnaire, Data processing using SPSS by correlating malnutrition with quality of life, degree of shortness of breath, and spirometry. **Results**: There was a significant positive correlation between malnutrition and quality of life (p=0.001) with the degree of shortness of breath (p=0.014) and spirometry (p=0.001). **Conclusion**: We found an association between malnutrition and quality of life, degree of breathlessness and spirometry of patients with COPD, further prospective studies in other populations are needed to validate the results of this study.
Keywords	Body Mass Index, SGRQ, mMRC, Spirometry, COPD

INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is characterized by airflow limitation and lung tissue damage, primarily due to prolonged exposure to irritants such as cigarette smoke, leading to chronic inflammation. COPD manifests with symptoms ranging from cough and dyspnea to sputum production, and in severe cases, respiratory failure.[1,2] Globally, COPD is a major cause of morbidity and mortality, with 174 million cases and 3.2 million deaths in 2015.[1,3] In Indonesia, the prevalence of COPD reached 3.7% in 2018, correlating with the rise in smoking rates, particularly among adolescents.[4]

Malnutrition is a common but underdiagnosed complication in COPD, significantly impacting muscle function and respiratory endurance, leading to worsened outcomes, including prolonged hospital stays and increased disease severity. Studies have reported malnutrition prevalence in COPD ranging from 30-60%.[5] Weight loss, muscle atrophy, and cachexia are frequent complications, directly influencing prognosis.

Nutritional interventions have been shown to improve muscle strength and exercise tolerance, thus reducing morbidity and mortality.[6,7]

Recent studies suggest a strong relationship between malnutrition and worsening symptoms, such as increased dyspnea (p=0.001) [5], although data on malnutrition in Asian populations, especially in Indonesia, remain scarce. This study aims to explore the association between malnutrition and quality of life in stable COPD patients.

METHOD

This study employed an observational analytic cross-sectional design, utilizing secondary data from medical records and questionnaires collected at a single time point. The research was conducted in the Department of Pulmonology and Respiratory Medicine at Prof. Dr. Chairuddin P. Lubis Teaching Hospital, from November 2023 to March 2024, following approval from the Ethics Committee of the Faculty of Medicine, Universitas Sumatera Utara.

The study population consisted of stable COPD patients at Prof. Dr. Chairuddin P. Lubis Teaching Hospital. The required sample size was calculated using Lemeshow's formula, determining that 91 participants were needed to achieve sufficient statistical power. Consecutive sampling was employed for participant selection. Participants were selected based on specific inclusion and exclusion criteria. Inclusion criteria included: (1) a diagnosis of stable COPD and (2) willingness to undergo spirometry and anthropometric measurements during treatment. Exclusion criteria included: (1) experiencing COPD exacerbation during hospitalization, (2) incomplete data, (3) the presence of metabolic disorders such as diabetes or metabolic syndrome, systemic conditions such as HIV/AIDS or tuberculosis that could affect anthropometry, and (4) comorbidities such as asthma or pneumonia that could confound spirometry results.

Before the study, ethical clearance was obtained from the Ethics Committee of the Faculty of Medicine, Universitas Sumatera Utara. Comprehensive data collection included baseline information, subject identities, anamnesis, and clinical data. The diagnosis of stable COPD is based on the latest Global Initiative for Chronic Obstructive Lung Disease (GOLD)'s guideline. All collected data were then processed, analyzed, and subjected to hypothesis testing using SPSS version 25.

The primary data collected were analyzed using SPSS statistical software. The analysis process involved several steps: (1) editing to ensure the accuracy and completeness of data from observation sheets; (2) coding to assign relevant codes and numbers; (3) entry to input data into the computer; (4) cleaning to check for and correct any errors in the data; and (5) saving to securely store the data. Descriptive statistics were applied to demographic data, while normality was assessed using the Kolmogorov-Smirnov test. For evaluating stable COPD patient conditions, bivariate analysis with ANOVA was used. Statistical analyses were performed with SPSS version 24.0, considering differences significant if p<0.05. Categorical data were analyzed using the Chi-square test.

RESULTS

In this study, 91 COPD patients who met the inclusion and exclusion criteria were included. The demographic and baseline characteristics of the participants, including gender, age, comorbidities, BMI, mMRC score, spirometry results (FEV1/FVC), SGRQ score, and GOLD classification are shown in Table 1.

Most of the patients were male (85.7%) and aged 40-59 years (78%). Among the patients with comorbidities, 24.1% had CHF, and another 24.1% had diabetes, with 6.5% having no comorbidities. Regarding body mass index (BMI), 31% of the patients were categorized as underweight according to WHO standards. In terms of breathlessness, 7.69% had an mMRC score of 0, 21.98% had a score of 1, 42.86% had a score of 2, 20.88% had a score of 3, and 6.59% had a score of 4. Spirometry results showed that 51.6% of patients had values greater than 75%, while 48.4% had values less than 75%. The majority of patients (42.8%) had a quality of life score indicating they were "healthy" according to the SGRQ. Additionally, 50% of patients were classified as GOLD II based on their FEV1/FVC ratio of less than 75%.

Table 1. Demographic Characteristics

Characteristics	Frequency (n)	Percentage (%)
Gender	91	100
Male	78	85.7
Female	13	14.3
Age	91	100
40-59 years	71	78
>60 years	20	22
Comorbidity	91	100
Diabetes mellitus	20	22.4
Hypertension	18	19.7
Tuberculosis	10	10.9
Congestive heart failure	22	24.1
Cancer	15	16.4
None	6	6.5
BMI	91	100
Underweight (>18.5)	28	31
Normal (18.5-22.9)	23	25
Overweight (23-25)	10	11
Obesity I (25.1-29.9)	22	24
Obesity II (>30)	8	9
mMRC	91	100
0	6	6.6
1	21	23.1
2	39	42.9
3	19	20.9
4	6	6.6
FEV1/FVC	91	100
>75%	47	51.65
≤75%	44	48.4
SGRQ	91	100
Q1 very healthy (>32)	15	16.4
Q2 healthy (32-46)	39	42.8
Q3 poor (47-59)	37	40.8
GOLD	44	100
I	3	6.5
II	22	50
III	17	39
IV	2	4.5

The study assessed the relationship between BMI and quality of life using the SGRQ (Table 2). A significant association was found with a p-value < 0.001, as determined by Chi-square analysis. Specifically, among underweight patients, 3.6% had an SGRQ score of Q1, 21.4% had Q2, and 75% had Q3. This indicates a significant impact of BMI on quality of life in COPD patients.

Table 2. Analysis on the relationship between BMI and quality of life (SGRQ)

BMI	SGRQ						p-value
	Q1		Q2		Q3		
	n	%	n	%	n	%	
Underweight	1	3.6	6	21.4	21	75	
Normal	14	60.9	4	17.4	5	21.7	
Overweight	-	-	7	70.0	3	30.0	<0.001*
Obesity I	-	-	15	68.2	7	31.8	
Obesity II	-	-	7	87.5	1	12.5	

*Statistically significant at *p*<0.05

The relationship between BMI and FEV1/FVC was evaluated using one-way ANOVA, while the relationship between BMI and mMRC was analyzed with Chi-square testing (Table 3). The results showed a

nonsignificant correlation between BMI and mMRC (p=0.014) and a significant correlation between BMI and spirometry results (p<0.001). Patients with normal and overweight categories generally exhibited better spirometry results, mMRC scores, and SGRQ results.

Table 3. Analysis on the relationship between BMI with Dyspnea Scale (mMRC) and Spirometry Results (FEV1/FVC)

Variables	BMI										p-value
	Underweight		Normal		Overweight		Obesity I		Obesity II		
	n	%	n	%	n	%	n	%	n	%	
mMRC											
1	4	14.3	1	4.3	-	-	-	-	1	12.5	
2	3	10.7	12	52.2	2	20	4	18.2	-	-	
3	10	35.7	8	34.8	5	50	14	63.6	2	25	0.014[a]
4	7	25	2	8.7	2	20	4	18.2	4	50	
5	4	14.3	-	-	1	10	-	-	1	12.5	
FEV1/FVC	62.79 ± 9.3		81.8 ± 10.49		$74.9 \pm 1\ 1.8$		75.85 ± 13.01		64.29 ± 15.49		<0.001[b]*
>75%	-	-	22	95.7	6	60	14	63.6	2	25	
≤75%	28	100	1	4.3	4	40	8	36.4	6	75	

[a] Analyzed using One-way ANOVA test; [b] Analyzed using Chi-square test; *Statistically significant at $p<0.05$

The study evaluated the relationship between the Subjective Global Assessment (SGA) and the SGRQ (Table 4). The association was found with a p-value < 0.025, as shown by Chi-square analysis. Specifically, among patients categorized as having moderate malnutrition (SGA "B"), 13% had an SGRQ score of Q1, 11% had Q2, and 31% had Q3. This resulted in a total of 50 patients in the SGA "B" category. The findings indicate a significant relationship between SGA and quality of life in COPD patients.

Table 4. Analysis on the relationship between SGA and quality of life (SGRQ)

SGA	SGRQ						p-value
	Q1		Q2		Q3		
	n	%	n	%	n	%	
Well-nourished	19	21	9	10	11	12	
Moderate malnutrition	12	13	10	11	28	31	<0.025
Severe malnutrition	1	1	-	-	1	1	

DISCUSSION

The study conducted at the Department of Pulmonology and Respiratory Medicine at Prof. Dr. Chairuddin P. Lubis Teaching Hospital explored the relationship between malnutrition and quality of life in patients. According to the WHO, quality of life is a broad and complex concept encompassing physical health, mental well-being, social relationships, and personal beliefs within one's environmental context. It involves multidimensional measures focusing on physical, psychological, and social domains. Consequently, research often uses these dimensions to assess clinical or alternative therapies' effectiveness and to identify factors impacting quality of life, thereby enhancing healthcare services.

The study conducted at the Department of Pulmonology and Respiratory Medicine, Prof. Dr. Chairuddin P. Lubis Teaching Hospital, examined the relationship between malnutrition and quality of life in patients. Malnutrition, defined as an imbalance between nutritional needs and intake, can significantly impact quality of life, especially in individuals with chronic conditions [8,9]. It affects various bodily systems, leading to decreased muscle mass and strength, reduced mobility, and increased fatigue [8,10]. In Chronic Obstructive Pulmonary Disease (COPD) patients, malnutrition often results from heightened energy needs due to increased respiratory effort, reduced food intake, and altered metabolism [11].

Improving quality of life is crucial for COPD patients as the disease is incurable. Management primarily involves controlling symptoms through smoking cessation, pharmacotherapy, and non-pharmacological therapies. Assessing quality of life can guide appropriate interventions and mitigate risk factors [12]. COPD patients frequently experience weight loss and muscle wasting, known as pulmonary cachexia, which affects physical function, muscle strength, and infection risk [13]. Malnutrition correlates with decreased functional status and work capacity, worsening COPD symptoms such as breathlessness and fatigue, and impairing daily activities [14].

Research indicates that malnutrition is associated with poorer outcomes in COPD patients, including reduced performance on the six-minute walk test (6MWT) and increased susceptibility to infections, which can exacerbate the disease and lead to more frequent hospitalizations. Studies have shown that malnutrition and body composition impact lung function and quality of life, with malnourished patients displaying worse results compared to those with normal weight [11]. Other studies highlight that quality of life in COPD patients is significantly influenced by disease severity, gender differences, and comorbid conditions [15-22].

Overall, assessing quality of life in COPD patients is essential due to their dependence on healthcare services. Malnutrition has a profound effect on various aspects of quality of life, including physical, mental, social, and emotional well-being. Instruments such as EQ-5D and EORTC QLQ-C30 are commonly used to evaluate these impacts [8,9].

The SGRQ, developed in 1992, evaluates quality of life across three domains: Symptoms, Activity, and Impact, with higher scores indicating poorer quality of life. Studies have shown a strong correlation between malnutrition and higher SGRQ scores, reflecting worsened quality of life due to increased symptom severity and reduced daily activity capability. For instance, Fekete et al. (2021) found that malnourished COPD patients had significantly higher SGRQ scores compared to those with adequate nutritional status, highlighting the adverse effects of malnutrition on muscle strength and physical activity [11].

Furthermore, Mullerova et al. (2017) demonstrated that initial SGRQ scores predict exacerbation risk, hospital admissions, and overall mortality in COPD patients, independent of baseline demographic factors and severity markers like FEV1. A higher SGRQ score correlates with increased risks of exacerbation, hospitalization, and mortality, with those scoring ≥ 60 facing a 40% higher risk of exacerbations and a 2.3-fold increase in mortality compared to patients with lower scores.23 This aligns with findings by Yende (2023) and Kushwaha et al. (2022), which indicate that underweight patients experience notably worse quality of life across all SGRQ domains, reinforcing the detrimental effect of malnutrition on COPD outcomes [24,25].

The Modified Medical Research Council Scale (mMRC) is employed to assess the severity of dyspnea in COPD patients, with higher scores indicating more severe breathlessness. Research demonstrates that malnutrition significantly impacts mMRC scores, as malnourished COPD patients report more severe dyspnea compared to those with adequate nutritional status. Dardouri et al. (2020) found that malnourished patients had higher mMRC scores, reflecting increased breathlessness [13]. Similarly, Vermeeren et al. (2019) observed that malnutrition impairs the body's ability to meet energy demands during physical activities, including breathing, thereby exacerbating fatigue and dyspnea [26]. This underscores the importance of addressing nutritional status in COPD management to alleviate symptoms and enhance patient quality of life. Our findings also reveal a significant correlation between BMI and mMRC scores, aligning with Shin et al. (2023), who noted that patients with lower BMI experienced more frequent exacerbations [27].

Spirometry measures lung function, specifically assessing how effectively air can be inhaled and exhaled, with key parameters including Forced Expiratory Volume in one second (FEV1) and Forced Vital Capacity (FVC). Malnutrition negatively impacts spirometry outcomes, as evidenced by Ferreira et al. (2019), who found that malnourished COPD patients had significantly lower FEV1 and FVC values compared to those with adequate nutrition [28]. This is due to malnutrition-induced muscle loss, including respiratory muscles, which diminishes respiratory efficiency and lung capacity. Our study also identified a significant correlation between BMI and the FEV1/FVC ratio, consistent with Colak et al. (2014), who reported that overweight

individuals had reduced FEV1/FVC values [29]. Additionally, Tang et al. (2022) found that both underweight and obesity negatively affect the FEV1/FVC ratio compared to normal or overweight patients [30].

CONCLUSION

This study concluded that there are significant correlations between BMI and both quality of life (SGRQ) and spirometry results (FEV1/FVC), with underweight and obese patients experiencing worse outcomes. Additionally, a significant relationship was observed between SGA and SGRQ, highlighting poor quality of life in those with moderate malnutrition.

DECLARATIONS

This study was approved by Ethical Committee Universitas Sumatera Utara and Haji Adam Malik Hospital Medan.

CONSENT FOR PUBLICATION

The Authors agree to publication in Journal of Society Medicine.

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COMPETING INTERESTS

The authors declare that there is no conflict of interest in this report.

AUTHORS' CONTRIBUTIONS

All authors are responsible for conceptualization, manuscript preparation, manuscript editing, and manuscript assurance.

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