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Study To Assess Clinical And Prognostic Implication Of Nutritional Status On Copd Exacerbations

Dr. Dharmavaram Singamsetty Moukthi ka[1*], Dr.Sushmita Vinod[2] , Dr. Gangadharan Vadivelu[3]
[1*]Postgraduate Student, Department of Respiratory Medicine, Saveetha Medical College and Hospital, Saveetha Institute of Medical and Technical Sciences, Saveetha University Chennai, Tamil Nadu, India
[2]Assistant professor, Department of Respiratory Medicine, Saveetha Medical College and Hospital, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, Tamil Nadu, India
[3]Head of the Department, Department of Respiratory Medicine, Saveetha Medical College and Hospital, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, Tamil Nadu, India

Abstract
Chronic obstructive pulmonary disease (COPD) is a condition that can lead to frequent exacerbations. Poor nutritional status is one of the most common problems in COPD patients and it may worsen the course of the disease. This study aims to investigate the prevalence of malnutrition in COPD patients hospitalized for exacerbations and evaluate how their nutritional health impacts the severity and prognosis of these episodes.
Methods: *The study includes patients admitted to the hospital with a diagnosis of moderate-to-severe COPD exacerbation. Nutritional status was assessed using various methods, including body mass index (BMI), mid arm circumference, Triceps skin fold thickness, waist circumference. Additional data was collected, including lung function tests (spirometry), results of a 6-minute walk test, markers of exacerbation severity, length of hospital stay, and rates of readmission within a specific timeframe (6 months)*
Results: *In this study, we found that malnourished COPD patients were at increased risk of severe exacerbations, longer hospitalization duration, and higher mortality compared to their well-nourished counterparts. There was no significant association between gender and severity of COPD ($p > 0.05$). The association between nutritional status and severity of COPD was significant ($p < 0.05$).*
Conclusion: *Malnutrition is associated with increased exacerbation severity, and higher mortality rates, highlighting the need for integrated nutritional assessment and management in COPD care. • Future research should focus on identifying optimal nutritional interventions to improve exacerbation outcomes and overall prognosis in COPD patients.*
Keywords: *COPD, exacerbation, malnutrition, nutritional status, prognosis*

INTRODUCTION

Chronic Obstructive Pulmonary Disease (COPD) represents a significant health challenge, characterized by progressive airflow limitation, associated with considerable morbidity and mortality [1]. COPD exacerbations are acute episodes of symptom worsening beyond normal day-to-day variations, which are pivotal events in the natural history of the disease, leading to accelerated decline in lung function, increased risk of hospitalization, and mortality [2]. Despite advancements in COPD management, exacerbations remain a major clinical concern, underscoring the need for a better understanding of their determinants and modifiers.

Nutritional status has emerged as a modifiable factor potentially influencing COPD exacerbations. Malnutrition and muscle wasting are prevalent among COPD patients, attributed to various factors including increased energy expenditure, reduced dietary intake, and systemic inflammation [3].

The clinical significance of nutritional status in COPD exacerbations extends beyond its association with disease severity and prognosis. Malnutrition is implicated in impaired respiratory muscle function, reduced exercise capacity, and compromised immune response, all of which may contribute to exacerbation susceptibility and poor outcomes [4-5]. Moreover, nutritional interventions have been proposed as potential strategies to mitigate exacerbation risk and improve outcomes in COPD patients [6].

However, the precise role of nutritional status in COPD exacerbations remains incompletely understood, necessitating further investigation. Existing studies have yielded conflicting results, with variations in study design, patient populations, and outcome measures contributing to the heterogeneity of findings. Moreover, most studies have focused on cross-sectional associations between nutritional status and exacerbation risk, precluding causal inference and limiting the generalizability of findings [7].

Therefore, there is a dire need for well-designed studies to elucidate the clinical and prognostic implications of nutritional status on COPD exacerbations. Such studies should incorporate comprehensive assessments of

nutritional status, including objective measures such as body composition analysis, biochemical markers, and dietary intake assessments [8].

In this context, the present study aims to address the knowledge gap regarding the role of nutritional status in COPD exacerbations. Through a prospective observational design, we seek to evaluate the association between nutritional status and the occurrence, severity, and outcomes of exacerbations in a well-characterized cohort of COPD patients. By employing a multidimensional approach encompassing clinical, biochemical, and dietary assessments, we aim to provide an understanding of the clinical and prognostic implications of nutritional status in COPD exacerbations.

METHODS

This was a prospective cross-sectional study conducted at Saveetha Medical College and Hospital in Chennai, India, spanning from October 2023 to March 2024. The study aimed to investigate the association between nutritional status and COPD exacerbations in a well-characterized cohort of patients.

The study enrolled 80 participants diagnosed with Chronic Obstructive Pulmonary Disease (COPD) according to the GOLD 2023 criteria. Eligible participants were those experiencing a COPD exacerbation, defined as a clinically significant worsening of respiratory symptoms, such as increased dyspnea, cough, and sputum production, within a period of fewer than 14 days. These exacerbations were frequently accompanied by physiological changes, including tachypnea and tachycardia, as well as heightened systemic and local inflammation, often triggered by factors such as infections or environmental pollutants.

Inclusion Criteria:

Patients diagnosed with COPD based on the GOLD 2023 criteria.

Patients experiencing a COPD exacerbation as per the defined criteria.

Exclusion Criteria:

Patients with concurrent respiratory conditions other than COPD, such as asthma bronchiectasis, or interstitial lung disease, which could confound the study outcomes.

Individuals aged below 18 years.

Pregnant women

Patients who were unwilling or unable to provide informed consent.

Data Collection: Data collection was performed using a comprehensive and standardized proforma. Each participant underwent thorough clinical evaluation, including spirometry to assess lung function, nutritional assessment to evaluate dietary intake and anthropometric measurements, and collection of demographic data.

Statistical Analysis: Descriptive statistics were employed to summarize the data. Categorical variables were expressed as frequencies and percentages, while continuous variables were presented as mean values with corresponding standard deviations (SD). Inferential statistical tests, such as chi-square tests or t-tests, were applied where appropriate to explore associations between variables.

Ethical Considerations: Prior to their inclusion in the study, all participants provided written informed consent in accordance with the ethical principles outlined by the institution. Confidentiality of participant information was strictly maintained throughout the study duration. The study protocol received approval from the institutional review board of Saveetha Medical College and Hospital, Chennai, India.

RESULTS

Out of 80 study subjects, 68% were males, 33% were females (Figure 1). Majority of patients were in the 40-60 years age group, accounting for 40% of the total sample. The age distribution underscores the prevalence of COPD among older adults, highlighting the need for targeted interventions in this demographic.(figure 2)

For these individuals, the number of exacerbations in the last six months was recorded. 64.2% had two or more exacerbations without hospitalization, and 42% had at least one exacerbation with hospitalization. For 60% of the patients, this was their first severe exacerbation, with hospitalization.

According to GOLD criteria among males patients had 27.8% each of the patients had severe obstruction and 20% had very severe obstruction. Among females 26.9% had moderate obstruction and 11.5% had very severe obstruction. There was no significant association between gender and severity of COPD ($p > 0.05$) (figure 3)

Data on smoking habits was also collected and it was found that 52.1 % were former smokers and 48.2 % were current smokers. Only 2.6% of the study population were non-smokers.

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Association of nutritional status and COPD severity: The results reveal that the proportion of very severe obstruction was high among patients with undernutrition (29.6%) when compared to normal and overweight patients and this association was statistically significant ($p< 0.05$) as in(figure 4)
The classification of the patients according to the established nutritional criteria (anthropometric measurements) was calculated by ANOVA test which showed that the mid arm circumference, triceps skin fold thickness and waist circumference significantly reduced with increasing severity of COPD. We thus found that malnourished COPD patients were at increased risk of severe exacerbations, longer hospitalization duration, and higher mortality compared to their well-nourished counterparts. (Figure 5)

FIGURE 1

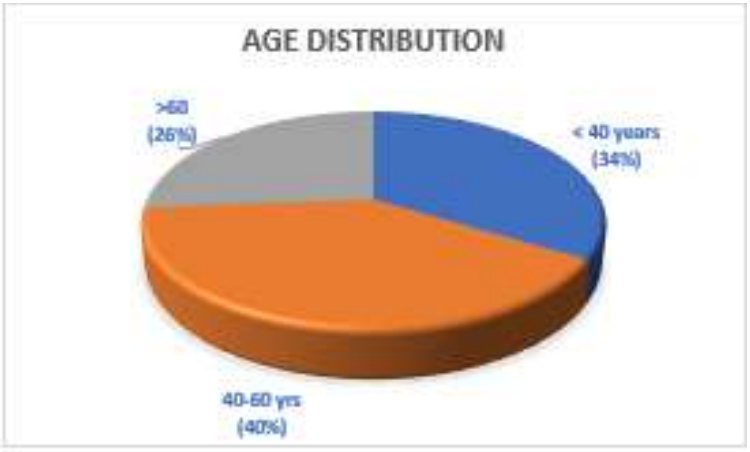

FIGURE 2

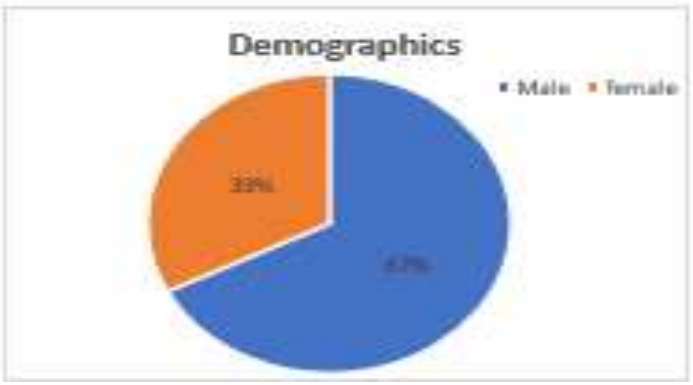

FIGURE 3

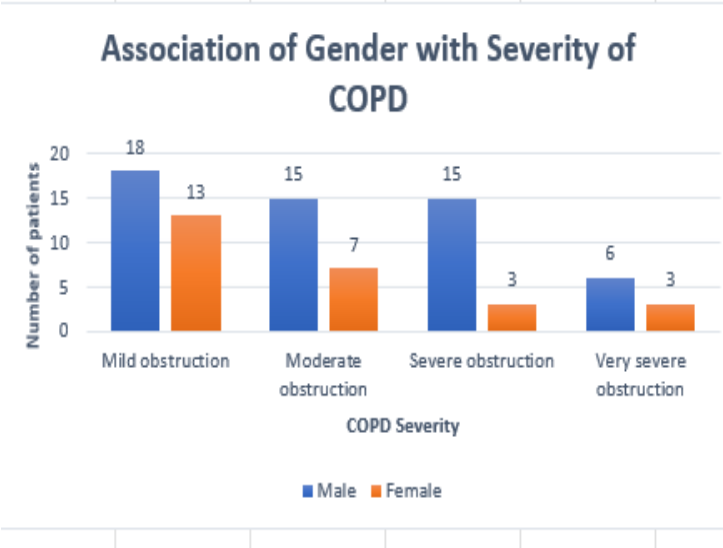

FIGURE 4

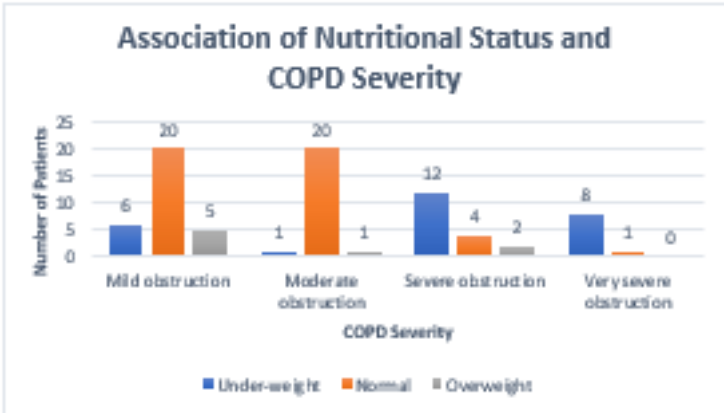

FIGURE 5

Table 1: Association between Anthropometric measurement and COPD severity

Parameter	Mild obstruction	Moderate obstruction	Severe obstruction	Very severe obstruction	p-value
Mid arm circumference	26.39±2.9	22.1±2.1	18.5±1.6	16.8±1.5	P<0.05
Triceps skin fold thickness	1.08±0.44	1.02±0.35	0.65±0.21	0.57±0.25	P<0.05
Waist circumference	44.4±2.3	42.1±1.7	38.5±2.7	35.6±1.9	P<0.05

➢ANOVA test showed that the mid arm circumference, triceps skin fold thickness and waist circumference significantly reduced with increasing severity of COPD

DISCUSSION

Assessing malnutrition and acting to promote an adequate nutritional status is crucial to the management of patients with COPD [9]. There is no gold standard method to assess the nutritional status of patients with COPD. BMI is the simple method for assessing nutritional status and a low BMI may is associated with worse prognosis not accurately reflect the nutritional status of copd patients (10)

Malnourished COPD patients are at increased risk of exacerbations, longer hospital stays, and higher mortality rates. Poor nutritional status is linked to worse health outcomes, stressing the need to address malnutrition in COPD management. A significant association was found between malnutrition and the severity of COPD exacerbations, with malnourished patients showing worse clinical outcomes, consistent with prior research.

The results indicate a significant association between nutritional status and COPD severity, with a notable proportion of very severe obstructive airway disease observed among undernourished patients (29.6%).

The findings are consistent with those of Tramontana et al(11), which also identified that early identification and targeted nutritional support for malnourished patients can mitigate adverse effects on exacerbation outcomes. This consistency supports the validity of the current study's conclusions. Other studies have similarly noted the detrimental effects of malnutrition on COPD outcomes. For instance, Ruiz AJ ,Buitrago (12)reported that nutritional interventions in malnourished COPD patients improved respiratory muscle strength and overall functional status. This body of evidence underscores the importance of addressing nutritional deficiencies in COPD management.

Regular monitoring of nutritional status should be integrated into the clinical management of COPD to identify patients at risk and implement timely interventions.

A multidisciplinary approach, involving pulmonologists, dietitians, and respiratory therapists, is essential to address the multifaceted needs of COPD patients.

LIMITATIONS

The study was conducted at a single center with a relatively small sample size (80 patients), which may limit the generalizability of the findings. Larger, multicenter studies are needed to confirm these results.

CONCLUSION:

Regular assessment of nutritional status is integral to COPD management. Identifying and addressing malnutrition early can significantly improve patient outcomes, reducing exacerbations and enhancing overall health.

Healthcare providers should focus on implementing comprehensive nutritional interventions that are tailored to COPD patients' needs, including dietary modifications, nutritional supplementation, and regular monitoring.

High-risk groups, such as those with severe dyspnea and female patients, should receive special attention with customized nutritional strategies.

Further research is needed to explore the mechanisms linking malnutrition to COPD exacerbations and evaluate long-term benefits of nutritional interventions. Large-scale studies could provide more robust data for clinical practice and policy-making.

Addressing nutritional deficiencies is essential for holistic management of COPD. Incorporating nutritional assessments and interventions into standard care can improve clinical outcomes, enhance quality of life, and potentially reduce healthcare costs associated with COPD exacerbations.

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