



Case Report: Malnutrition in an Adult Patient with Chronic Obstructive Pulmonary Disease

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Abstract

Chronic Obstructive Pulmonary Disease (COPD) is a chronic respiratory disorder characterized by persistent airflow obstruction and is frequently accompanied by multiple comorbidities. One of the most common complications among patients with COPD is malnutrition, with approximately 20% of patients experiencing weight loss that contributes to reductions in skeletal muscle mass, respiratory function, and overall quality of life. Case Presentation: A 49-year-old male presented with complaints of dyspnea, cough, epigastric pain, fever, and decreased appetite. The patient had a medical history of COPD and pulmonary tuberculosis, for which treatment had been successfully completed in September 2024. Nutritional screening revealed that the patient appeared markedly underweight, with a body weight of 42 kg, a height of 185 cm, a body mass index (BMI) of 12.27 kg/m², and a mid-upper arm circumference (MUAC) of 18 cm, indicating severe malnutrition. Nutritional intervention was subsequently initiated, consisting of an energy intake of 1,500 kcal/day (38 kcal/kg body weight/day), protein intake of 70 g/day (1.7 g/kg body weight/day), a soft rice-based diet with finely minced high-carbohydrate, high-protein (TKTP) side dishes, supplementation with three eggs daily, and zinc tablets administered at a dosage of one tablet twice daily. Discussion: The provision of high-energy and high-protein nutritional therapy was intended to meet the patient's nutritional requirements, improve nutritional status, and facilitate the restoration of lost muscle mass. The use of a soft diet was expected to reduce postprandial dyspnea, prevent early satiety, and enhance dietary adherence.

Introduction

Chronic Obstructive Pulmonary Disease (COPD) is a noncommunicable disease that is a leading cause of morbidity and mortality in many countries. This disease is characterized by persistent and progressive airflow limitation resulting from a chronic inflammatory response of the airways to exposure to harmful particles or gases, particularly cigarette smoke, air pollution, dust, and biomass fuels. The pathological changes occurring in the airways and lung parenchyma lead to a decline in ventilatory function, causing patients to experience shortness of breath, chronic cough, and reduced capacity for daily activities (Tony & Abdelrahim, 2022; Sundar et al., 2024; Patel et al., 2022). The burden of COPD is projected to continue rising due to increasing life expectancy, high smoking prevalence, and growing exposure to environmental risk factors (Vestbo et al., 2013; Boers et al., 2023; Safiri et al., 2022; Adeloye et al., 2022; Sharma et al., 2023; Kim, 2025; Huang et al., 2025).

Globally, COPD is estimated to be the third leading cause of death worldwide and has a significant impact on patients' quality of life. This disease not only causes respiratory distress but also increases rates of hospitalization, disability, and healthcare costs. Patients with COPD often experience recurrent exacerbations that lead to a gradual decline in lung function and accelerate disease progression. Therefore, the management of COPD requires a multidisciplinary approach that focuses not only on pharmacological therapy but also on pulmonary rehabilitation, lifestyle modifications, and optimization of nutritional status (Agreta et al., 2023; De Sire et al., 2022; Kim, 2025).

In addition to respiratory system disorders, COPD also causes various systemic manifestations that can worsen the patient's condition (Kahnert et al., 2023; Celli et al., 2023; Wheeldon, 2023). Long-term chronic inflammation triggers the release of various pro-inflammatory cytokines, leading to metabolic disorders, reduced muscle mass, osteoporosis, and an increased risk of cardiovascular disease. One of the most commonly observed systemic manifestations is malnutrition, particularly in patients with moderate to severe disease. This condition leads to a decrease in muscle strength, reduced functional capacity, and a significant decline in quality of life (Widjaja et al., 2025; Petnehazy et al., 2024).

Malnutrition in COPD patients occurs through complex and interrelated mechanisms (Rakhima et al., 2025). Increased respiratory muscle work leads to higher energy requirements, while food intake often decreases due to shortness of breath, feeling full quickly, anorexia, or fatigue during meals. Additionally, chronic inflammation increases protein catabolism, resulting in progressive muscle mass loss and weight loss. Various studies report that approximately 20–40% of COPD patients experience malnutrition, which is associated with increased rates of complications, length of hospital stay, and mortality (Ouyang et al., 2025).

Deterioration in nutritional status among COPD patients has a significant impact on respiratory function. Muscle mass loss occurs not only in skeletal muscles but also in respiratory muscles such as the diaphragm and intercostal muscles. Consequently, ventilatory capacity decreases, making patients more prone to shortness of breath and fatigue even during light activities. This condition also increases the risk of recurrent acute exacerbations and worsens the disease prognosis (Tuna & Samur, 2025; Hurst et al., 2022; Bae et al., 2024).

Various studies have shown that a low body mass index (BMI) and a decrease in fat-free mass are factors associated with increased hospitalization rates and mortality in COPD patients. Patients with malnutrition tend to have lower immune function, making them more susceptible to respiratory tract infections. In addition, the healing process slows down and the response to medical therapy may decrease. Therefore, nutritional status is an important indicator that needs to be routinely assessed in every COPD patient (Hasanah & Mayasari, 2023; Di Raimondo et al., 2024; Rakhima et al., 2025).

Early nutritional screening is essential for identifying patients at risk of malnutrition. Several tools, such as the Malnutrition Universal Screening Tool (MUST), the Nutritional Risk Screening 2002 (NRS-2002), and the Subjective Global Assessment (SGA), can be used to assess the risk of malnutrition quickly and systematically. In addition, anthropometric measurements such as body weight, height, body mass index, upper arm circumference, and history of weight loss play a crucial role in determining a patient's nutritional status. The results of these screenings serve as the basis for developing nutritional interventions tailored to individual needs (Ferreira et al., 2005).

Nutritional interventions for COPD patients aim to meet energy needs, maintain or increase muscle mass, and improve patients' functional capacity. Guidelines from the European Society for Clinical Nutrition and Metabolism (ESPEN) recommend providing energy and protein tailored to the patient's clinical condition, particularly for patients experiencing malnutrition or muscle loss. In addition to adequate energy and protein intake, food consistency must also

be considered. Foods with a soft texture or that are easy to chew are often better tolerated because they reduce fatigue during meals, prevent early satiety, and help increase patients' daily food intake (Collins et al., 2013).

Appropriately administered nutritional interventions have been shown to provide clinical benefits for patients with COPD. Increasing energy and protein intake can help improve energy balance, promote weight gain, preserve muscle mass, and enhance respiratory muscle strength. Improved nutritional status is also associated with increased exercise tolerance, quality of life, and patients' ability to undergo pulmonary rehabilitation. Therefore, medical nutrition therapy is an essential component of comprehensive COPD patient management (Schols et al., 2014).

In addition to addressing macronutrient needs, the provision of micronutrients also plays a role in supporting the patient's recovery process. Certain micronutrients, such as zinc, vitamin D, vitamin C, and other antioxidants, are known to play a role in maintaining immune function, reducing oxidative stress, and supporting tissue repair. However, supplementation must still be tailored to each patient's clinical condition and individual needs to ensure optimal benefits (Muscaritoli et al., 2021).

The success of nutritional interventions is determined not only by the accuracy of energy and protein requirement calculations but is also influenced by regular monitoring of the patient's nutritional status. Evaluation includes changes in body weight, body mass index, upper arm circumference, food intake, and the patient's ability to consume the provided meals. Such monitoring is essential for assessing the effectiveness of the intervention and serves as the basis for adjusting nutritional therapy when necessary. A continuous approach is expected to improve clinical outcomes and reduce the risk of complications in patients with COPD (Conway et al., 2024).

Based on this discussion, it is clear that malnutrition is a common problem associated with COPD that affects both the course of the disease and patient prognosis. Early nutritional screening, comprehensive assessment of nutritional status, and the provision of appropriate nutritional interventions are essential components of COPD patient management. Therefore, this case report was prepared to describe the management of malnutrition in adult patients with COPD through a clinical nutrition care approach and to evaluate the benefits of nutritional interventions in supporting the patients' recovery process.

Methods

This study employed a descriptive method using a *case report* approach. The case report was prepared to describe in detail the patient's clinical condition, the results of the nutritional status assessment, the nutritional interventions provided, and the patient's progress during treatment. This approach aims to provide an overview of the application of clinical nutrition care for patients with Chronic Obstructive Pulmonary Disease (COPD) who are malnourished, thereby serving as a learning resource for clinical nutrition practice (Zhang, 2025).

The subject of this case report is a 49-year-old male patient who was hospitalized with a diagnosis of COPD accompanied by malnutrition. Data were obtained from the patient's medical records, interview results, direct observations, physical examinations, anthropometric measurements, and available laboratory test results during the course of treatment. Nutritional status assessment was conducted through an initial nutritional screening, measurement of body weight, height, body mass index (BMI), upper arm circumference (UAC), and evaluation of the patient's dietary history and clinical condition (Heefner et al., 2024).

Nutritional interventions are formulated based on the results of the nutritional assessment, taking into account the patient's clinical condition, energy and protein requirements, ability to consume food, and nutritional therapy guidelines for patients with COPD. Patients were provided a High-Calorie, High-Protein (HCP) diet in the form of soft foods, such as steamed

rice and minced side dishes, with a target energy requirement of approximately 1,500 kcal per day (± 38 kcal/kg body weight) and 70 grams of protein per day (± 1.7 g/kg body weight). In addition, patients received three eggs daily as a source of high-quality protein, as well as zinc supplementation twice daily, as recommended by the attending physician (Savino-Lloreda et al., 2025).

Evaluations were conducted periodically to assess the patients' response to the nutritional intervention provided. The parameters observed included the ability to consume food, changes in body weight, tolerance to the diet, clinical progress, and monitoring results recorded in the medical records during the course of treatment. All patient identities were kept confidential by removing personal information in accordance with ethical principles in case report preparation and patient data confidentiality regulations.

Result and Discussion

A 49-year-old male patient presented to the hospital with complaints of shortness of breath, cough, epigastric pain, fever, and decreased appetite. The patient had a history of Chronic Obstructive Pulmonary Disease (COPD) and pulmonary tuberculosis, for which he had completed treatment in September 2024. Based on the initial nutritional screening results, the patient appeared emaciated with a weight of 42 kg, height of 185 cm, body mass index (BMI) of 12.27 kg/m², upper arm circumference (UAC) of 18 cm, and a *Malnutrition Screening Tool* (MST) score of 4, indicating that the patient was at high risk for malnutrition.

Based on the nutritional assessment results, the patient was provided with a nutritional intervention in the form of a High-Calorie, High-Protein (HCHP) diet with a target energy requirement of 1,500 kcal per day (38 kcal/kg body weight/day) and 70 grams of protein per day (1.7 g/kg body weight/day). The diet was provided in the form of soft foods consisting of steamed rice with minced side dishes, accompanied by three eggs daily as a source of high-quality protein, as well as zinc supplementation (2×1 tablets) in accordance with therapeutic recommendations.

Meals were provided in three main meals and two snacks daily. However, during the first two days of treatment, the patient was only able to consume about half of the provided portions due to a decreased appetite and a clinical condition that was still deteriorating. These conditions meant that the patient's energy and protein requirements could not yet be optimally met.

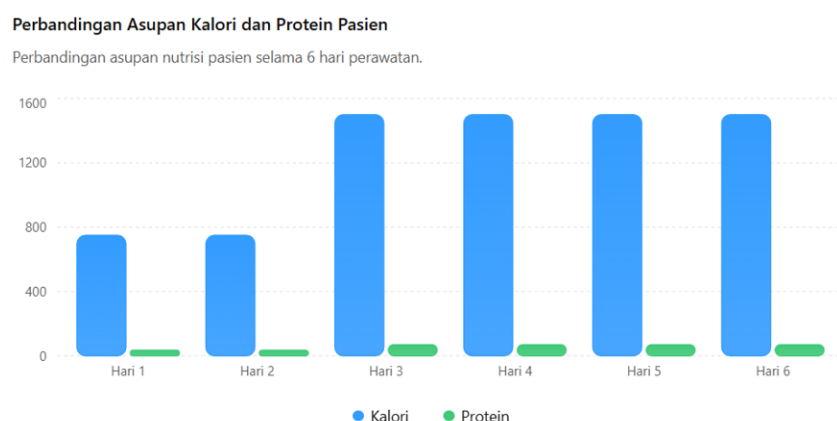


Figure 1. Comparison of the Patient's Calorie and Protein Intake

Given the patient's low oral intake, a *nasogastric tube* (NGT) was inserted on the third day of treatment to meet the patient's nutritional needs. Enteral nutrition was provided in the form of a liquid diet administered six times daily, each dose consisting of 250 cc, with a total energy intake of approximately 1,500 kcal per day, a protein content of 1.7 g/kg body weight per day, and a fat content of 35% of total energy requirements. In addition, the patient was also given bone marrow porridge as a supplementary food that was easily tolerated. Enteral nutrition is

expected to meet the patient's energy and protein needs, thereby optimizing the process of restoring nutritional status.

Malnutrition is a common complication in COPD patients and serves as an important prognostic factor for clinical outcomes (Hao & Bu, 2025). Deterioration of nutritional status in COPD results from an imbalance between increased energy requirements and low food intake. Hypermetabolism due to increased respiratory muscle work, chronic systemic inflammation, anorexia, and reduced physical activity causes patients to experience progressive weight loss and loss of muscle mass (Huang et al., 2022; Nguyen et al., 2020).

In this case, the patient presented with severe malnutrition, as indicated by a BMI of 12.27 kg/m², a mid-upper arm circumference (MUAC) of 18 cm, and an MST score of 4. These findings indicate a high risk of malnutrition, necessitating immediate nutritional intervention. According to the *Global Initiative for Chronic Obstructive Lung Disease* (GOLD), weight and muscle mass loss in COPD patients is associated with reduced exercise capacity, worsening respiratory function, increased frequency of exacerbations, and a high risk of mortality (Simanjuntak & Serepina, 2020).

Nutritional intervention for these patients was provided with an energy target of 38 kcal/kg body weight/day and a protein target of 1.7 g/kg body weight/day. These amounts align with nutritional therapy recommendations for malnourished COPD patients, which specify energy requirements of approximately 30–45 kcal/kg body weight/day and protein of 1.2–1.7 g/kg body weight/day to restore energy balance, increase body weight, and maintain muscle mass (Utama et al., 2026). The addition of eggs as a source of high biological value protein is also expected to support protein synthesis and tissue repair. Food is provided in soft form in small, more frequent portions, as this strategy is better tolerated by COPD patients. Consuming large amounts of food can increase intra-abdominal pressure, thereby worsening shortness of breath and causing *postprandial dyspnea*. Therefore, providing soft foods in small portions aims to improve comfort during meals, reduce the feeling of fullness, and help increase patients' daily energy intake (Agreta et al., 2023).

Although the patient was placed on a soft diet, during the first two days he was only able to consume about 50% of the food provided, meaning his nutritional needs were not being met. This situation led to the insertion of a *nasogastric tube* (NGT) on the third day of treatment. Enteral nutrition via an NGT is the recommended option for COPD patients with malnutrition who are unable to meet their nutritional needs through the oral route. Enteral nutrition can help meet the increased energy and protein requirements resulting from hypermetabolism and high respiratory muscle work, thereby improving the patient's nutritional status and supporting the healing process (Hasanah & Mayasari, 2023; Heefner et al., 2024; Vestbo et al., 2013).

In addition to meeting macronutrient needs, patients also receive zinc supplementation as part of their nutritional therapy. Zinc plays a role in maintaining immune system function, supporting protein synthesis, accelerating tissue healing, and helping to reduce the effects of oxidative stress commonly found in chronic diseases (Savino-Lloreda et al., 2025). Throughout the course of therapy, patients require regular monitoring of changes in body weight, ability to consume food, tolerance to enteral nutrition, and clinical progress to evaluate the success of the nutritional intervention provided.

This case demonstrates that malnutrition is a common complication associated with Chronic Obstructive Pulmonary Disease (COPD) and can worsen a patient's clinical condition if not optimally managed. Nutritional screening results for the patient indicated severe malnutrition, characterized by a body mass index (BMI) of 12.27 kg/m², an upper arm circumference (UAC) of 18 cm, and a *Malnutrition Screening Tool* (MST) score of 4. These findings served as the basis for early nutritional intervention through a high-calorie, high-protein (HCHP) diet, zinc supplementation, and enteral nutrition via a *nasogastric tube* (NGT) when oral intake was

insufficient to meet the patient's energy and protein needs. This approach aims to improve nutritional status, maintain muscle mass, and support the patient's recovery process.

The management of COPD patients with malnutrition requires a multidisciplinary approach involving physicians, dietitians, nurses, and other healthcare professionals to ensure the patient's nutritional needs are optimally met. Regular monitoring of changes in body weight, food intake, tolerance to nutritional therapy, and clinical progress is essential to evaluate the success of the intervention and determine subsequent therapy adjustments. With early nutritional screening and appropriate, continuous nutritional interventions, it is hoped that the nutritional status, functional capacity, quality of life, and clinical outcomes of COPD patients can improve, thereby reducing the risk of complications and mortality.

Conclusion

This case demonstrates that malnutrition is a common complication associated with Chronic Obstructive Pulmonary Disease (COPD) and can worsen patients' clinical condition and outcomes if not optimally managed. Nutritional screening results indicating severe malnutrition serve as a critical basis for determining nutritional therapy. Nutritional interventions, such as a high-calorie, high-protein (HCHP) diet, zinc supplementation, and enteral nutrition via a *nasogastric tube* (NGT) when oral intake is insufficient, are appropriate measures to meet patients' energy and protein needs, improve nutritional status, and help maintain muscle mass and respiratory function.

Successful management of COPD patients with malnutrition requires early nutritional screening, adequate nutritional interventions, and continuous monitoring of food intake, changes in body weight, and the progression of the patient's clinical condition. A multidisciplinary approach involving medical staff, dietitians, and nurses is expected to optimize the nutritional rehabilitation process, improve patients' quality of life, reduce the risk of complications, and support the achievement of better clinical outcomes in patients with COPD.

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