REVIEW ARTICLE

The role of malnutrition in chronic obstructive pulmonary disease (COPD) progression and understanding its underlying mechanism in western Uganda: A narrative review

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ABSTRACT

Globally, chronic obstructive pulmonary disease (COPD) is a major cause of disease and death, and it is especially common in Uganda. A significant issue in this country is still malnutrition. This narrative review explores the association between COPD and malnutrition in Uganda. It integrates information on nutritional status and indicators of malnutrition with findings on the prevalence, risk factors, and connection of COPD severity in Uganda. Additionally, it looks into the possible mechanisms underlying the connection between COPD exacerbations and malnutrition. The difficulties in identifying and treating malnutrition in patients with COPD in Uganda are also examined, along with potential paths for further study, treatment, and legislative changes to alleviate this dual burden.

Keywords: COPD, MNA-SF, GOLD, FEV1 /FVC.

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INTRODUCTION

COPD is a prevalent chronic respiratory disorder characterized by steadily worsening symptoms. Even though it is preventable, once identified, there is no curative. However, good self-management approaches can minimize the burden of the illness and improve quality of life [1]. Understanding the relationship between malnutrition and COPD is critical to establishing clinical treatment options and public health measures in Uganda.

The lungs are the primary organs affected by chronic obstructive pulmonary disease (COPD), while its symptoms can have a variety of extrapulmonary effects. These include significant changes in the body and metabolism caused on by a reduced ability to exercise, malnourishment, changed metabolic processes, and insufficient intake of food. Nutritional depletion in COPD is very complex and can include energy imbalances (weight loss), periods of markedly increased inflammation (pulmonary cachexia), and protein imbalances (sarcopenia). Additionally, both fat mass (FM) and fat-free mass (FFM) may be lost as a result [2].

According to Collins et al. [3], disease-related malnutrition affects 30 to 60 percent of COPD patients. Malnutrition in COPD has substantial implications, including increased mortality, higher risk of exacerbation, and longer hospital stays [4].

Epidemiological Context

Globally, 391.9 million persons aged 30-79 years had COPD in 2019, with 86% of them living in LMICs. Uganda, like many countries with middle and low incomes, bears a combined burden of communicable and noncommunicable diseases such as COPD. However, the prevalence of COPD in Uganda was 25% [1]. However, thorough epidemiological data on the prevalence of malnutrition in COPD and its burden in Uganda are scarce, posing obstacles to efficient disease management and resource allocation. Malnutrition, which includes both undernutrition and overnutrition, is widespread in Uganda, with serious consequences for child and mother health, as well as overall community well-being. Poverty, food insecurity, and poor access to health care all contribute to Uganda's high malnutrition rate.

Malnutrition prevalence in patients with chronic obstructive pulmonary disease, 17% of COPD patients experienced weight loss and malnutrition in terms of calories and protein, according to a cross-sectional study done on 105 inpatients at the Turgut Ozal Medical Center in Malatya, Turkey [5]. A NICE community-based study found that one in five outpatients and one in three inpatients with COPD in the UK are at risk of malnutrition [6]. Using data from medical records and a patient questionnaire, a cross-sectional study involving 200 COPD patients affiliated with the COPD outpatient clinic at a Danish university hospital was carried out. Of the trial participants, 21.5% had malnutrition, and 21.5% experienced unintended weight loss, with a median weight reduction of 3.5 kg [7]. As much as 77.8% of 180 COPD patients at North District Hospital in Hong Kong were at risk of malnutrition, according a study that looked at their electronic dietetics data [4].

Both nutritional intake and anthropometric measurements may include a sizable proportion of missing values due to the retrospective acquisition of data from the electronic dietetics patient record system. Their limited patient base, which was primarily made up of COPD patients who had seen a nutritionist for food advice, was a disadvantage. According to Hogan et al. [8], 20.7% of patients were at risk of developing malnutrition, and the prevalence of malnutrition in Vietnamese society was reported to be 45%.

Overall, 47.6% of individuals with COPD had malnutrition, according to a meta-analysis that assessed the association between the two conditions. Sehgal et al. [9] found that the prevalence was higher in patients experiencing acute exacerbations of COPD than in those with stable COPD. In a prospective cohort study at a tertiary hospital in Porto Alegre, 208 patients with AECOPD were shown to have 93.9% malnutrition and 45.1% sarcopenia [10]. A case-control study of 100 stable COPD patients aged 65 and over and 80 healthy controls at the El Demerdash Hospital outpatient clinic in Egypt found that 45 percent of the patients suffered from malnutrition [11].

Clinical Considerations

For the purposes of this review, COPD was defined as any patient who had been exposed to disease risk factors, had a history of recurrent lower respiratory tract infections, had chronic dyspnea, or had a chronic cough

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or sputum production [12]. Although the sigs and symptoms of COPD predominantly impacts the lungs. However, there is extrapulmonary manifestation includes alteration of physical and metabolic due to malnutrition, insufficient dietary intake, diminished exercise intolerance [13].

Nutritional insufficiency in COPD is multifaceted, including energy imbalances (weight loss), bouts of extremely elevated inflammation (pulmonary cachexia), and protein imbalances (sarcopenia). It may also lead to the loss of both fat mass (FM) and fat-free mass (FFM) [2].

Mechanisms and Pathophysiology

The mechanism by which COPD induces malnutrition involves multiple factors, including an imbalance between dietary energy expenditure and intake and an increase in overall expenditure of energy in patients with clinically stable COPD. Exacerbations of COPD also result in a marked reduction in caloric intake and an increase in resting energy expenditure (REE).

Increased circulating leptin levels, which have been observed in cachectic COPD patients and during acute exacerbations of the disease and seem to be related to hypoxemia and systemic inflammation, may be the cause of the energy imbalance and subsequent catabolic state brought on by anorexia and increased REE. Elevated serum levels of TNF-a and its soluble receptors were also linked to hypoxemia in underweight COPD patients (Langen et al., 2013).

Furthermore, At the level of the cells, requiring energy functions like protein synthesis are impaired as compensatory responses to extreme hypoxia. Consequently, mTOR activity is inhibited by hypoxia, which reduces protein synthesis on several levels. This involves regulated in development and DNA damage responses-1 (REDD1), 5_-adenosine monophosphate-activated protein kinase (AMPK), and the sensor of cellular energy balance. The tuberous suppressor complex 2 (TSC2) is phosphorylated by both proteins, further inhibiting mTORC1 [13].

The majority of COPD patients do not receive adequate nutrition, as demonstrated by the fact that 51% of patients did not consume enough protein and calories, which is defined as an average intake that is less than 75% of what is advised [14].

The prevalence of malnutrition in hospitalized patients is very high, ranging from 9.2 to 50%. Patients with chronic conditions, such as Chronic Obstructive Pulmonary Disease (COPD), most likely to have greater rates than other patients. According to studies, between 10% and 60% of people with COPD are malnourished [4].

Malnutrition in COPD patients result from inadequate nutritional intake, which also affects lung and immunological function, weakens muscles, alters body composition, and impairs immune response When daily needs are not met by calorie intake, weight loss happens [15]. As a result, the body produces less new muscle and uses up its fat stores. During exacerbations, a decrease in exercise, the use of corticosteroids, and an increase in inflammation are often associated with reduced nutritional intake [2]. Alcohol conception, aging process, disuse atrophy, tissue hypoxia, inflammation, and medication use are all potential contributors to energy imbalance. Patients with low body weights had more gas trapping, lesser diffusing capacity, and less exercise capacity than those with normal body weights and similar respiratory mechanics. The diaphragm and respiratory muscles lose mass when body cell mass decreases, which results in a reduction in strength and stamina. Airway defenses may be further undermined by immune system dysfunction brought on by malnutrition. Such effects may result in undesirable clinical outcomes such as nosocomial lung infections, hypercapnic respiratory failure, and difficulty weaning off of mechanical ventilation.

Management and Interventions

In Uganda, multidisciplinary strategies to address COPD and malnutrition are now essential for improving clinical results and the lives of those impacted. In order to control malnutrition in individuals with COPD, nutritional interventions such dietary advice, micronutrient supplements, and fortification are essential. Important elements of COPD treatment in Uganda also include smoking cessation programs, methods for reducing indoor air pollution, and immunization against respiratory infections.

Challenges and Future Directions

There are several challenges in addressing the combined burden of COPD and malnutrition in Uganda, most

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notably the lack of adequate healthcare facilities, financial constraints, and social disparities. In order to determine the effectiveness of integrated management strategies, future research should concentrate on gathering trustworthy epidemiological data on the prevalence of COPD, malnutrition, risk factors, and outcomes in Uganda as well as on doing intervention trials. Additionally, coordination among healthcare professionals, policymakers, researchers, and community stakeholders is essential to plan and execute comprehensive initiatives to limit the impact of malnutrition-related COPD burdens in Uganda.

Conclusion

In conclusion, it is critical to address both illnesses in integrated healthcare programs since malnutrition has a substantial impact on the clinical course and results of COPD in Uganda. This narrative review offers insights for creating customized interventions and policy frameworks targeted at lowering the burden of both diseases and enhancing population health in Uganda by clarifying the intricate interactions between COPD and malnutrition.

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