

ORIGINAL ARTICLE

NUTRITIONAL STATUS IN PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE: A CROSS SECTIONAL STUDY

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ABSTRACT: INTRODUCTION: Changes in nutritional status, such as weight loss and malnutrition, are a very common complication in patients with chronic obstructive pulmonary disease (COPD). These changes primarily affect the patients' quality of life and functional capacity and they are also independent prognostic indicators of both morbidity and mortality. The above information inspired us to evaluate the nutritional status in these patients by measuring daily oral intake and anthropometric measures. **METHOD:** This cross-sectional study was conducted during the period October 2008 to April 2009. Seventy two COPD patients in the age group of 40-65 years, with an FEV₁ < 65% of predicted and an FEV₁/FVC ratio < 70% were included in the study. All the patients were assessed for anthropometric parameters such as height, body weight (BW), Body Mass Index (BMI), Hip Circumference, waist circumference and mid upper arm circumference (MUAC). Daily dietary intakes were calculated by 24 hour recall method with the help of cups, spoons, and glasses which were standardized with commonly consumed recipes. Standardized models of chapatti, rice, fruits, and snacks items were used for accurate data. Energy and nutrient intakes were derived using the Nutritive value of Indian foods. **RESULTS:** The prevalence of under nutrition were (30/72) 41.6% based on body mass index (<18.5 kg/m²) and (46/72) 63.8% based on mid-upper arm circumference (<24 cm). More number of patients was above 60 years of age in the income grouping 3000-5000 INR/ month living with family members of more than 3 per house. The daily intake of food as compared to reference RDA is as follows energy 54.51%, carbohydrates 84.85%, protein 60.52% and Fats 71.2%. **CONCLUSION:** The prevalence of under nutrition were (30/72) 41.6% based on body mass index (<18.5 kg/m²) and (46/72) 63.8% based on mid-upper arm circumference (<24 cm). Nutritional assessment should be made mandatory in order to recognize malnutrition early and initiate timely nutritional therapy.

KEYWORDS: Chronic obstructive pulmonary disease, Body Mass Index, Mid-upper arm circumference, 24 hour dietary recall method.

INTRODUCTION: Chronic obstructive pulmonary disease (COPD) is a major cause of disability, and fourth leading cause of death according to statistics from the World Health Organization. Malnutrition is a common problem in patients with COPD, and its prevalence ranges from 30-60% for inpatients and 10-45% for outpatients.⁽¹⁾ The causes of malnutrition in these patients are multifactorial and include decreased oral intake, the effect of increased work of breathing due to abnormal respiratory mechanics, and the effect of chronic systemic inflammation.⁽²⁾ Changes in nutritional status, such as weight loss and malnutrition, are a very common complication in patients with chronic obstructive pulmonary disease (COPD). These changes primarily affect the

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patients' quality of life and functional capacity and they are also independent prognostic indicators of both morbidity and mortality.⁽³⁾ The above information inspired us to evaluate the nutritional status in these patients by measuring daily oral intake and anthropometric measures.

METHODS: This cross-sectional study was conducted during the period October 2008 to April 2009. Seventy two COPD patients in the age group of 40-65 years, with an FEV⁽¹⁾ < 65% of predicted and an FEV (1)/FVC ratio < 70% were included in the study. Patients with history of concomitant disease that might alter nutritional status such as heart disease, cirrhosis, uncontrolled diabetes, chronic renal failure, uncontrolled cor-pulmonale, or gastro intestinal surgery, total parenteral nutrition, prolonged hospitalization, trauma were excluded. Institutional Ethical Committee approved the study protocol. A written consent was taken from each of the subjects before participating in the study and they were assured of complete confidentiality. All the patients were assessed for anthropometric parameters such as height, body weight (BW), Body Mass Index (BMI), Hip Circumference, waist circumference and mid upper arm circumference (MUAC). BMI was calculated by the formulae given as weight (kg) divided by height² (m). MUAC was measured to the nearest 0.1 cm with a non-stretchable tape graduated from 0 - 150 cm.

BMI categorization was defined as underweight with BMI <18.5 kg/m²; normal with BMI 18.5-24.9 kg/m²; overweight with BMI 25.0-29.9 kg/m²; and obese with BMI ≥30 kg/m² (WHO2006). A non-stretchable measuring tape was placed around the arm, perpendicular to the long axis of the arm, and at the level of the triceps skinfold site (which is located midway between the lateral projection of the acromion process of the scapula and the olecranon process of the ulna, with the elbow flexed 90 degrees) (Robert & David 2007). The reference ranges of waist circumference (WC) value of ≥88 cm for women and ≥102cm for men. Malnutrition was defined as BMI less than 25 kg/m² and MUAC less than 24 cm. Daily dietary intakes was calculated by 24 hour recall method with the help of cups, spoons, and glasses which were standardized with commonly consumed recipes. Standardized models of chapatti, rice, fruits, and snacks items were used for accurate data. Dietary pattern was collected by food frequency questionnaire. Energy and nutrient intakes were derived using the Nutritive value of Indian foods. (<http://icmr.nic.in/final/rda-2010.pdf>)

STATISTICAL ANALYSIS: Data entry, cleaning, mining, extraction and statistical analysis was performed using excel spread sheet 2007. Data was presented as Mean±SD, percentages and actual numbers.

RESULTS: A total of 72 COPD patients participated in the study. The mean age of the patients was 56±8.6 years. All were smokers. All were receiving medications as prescribed by physician. The Socioeconomic, demographic, nutritional and anthropometric details were tabulated in table-1. The prevalence of under nutrition were (30/72) 41.6% based on body mass index (<18.5 kg/m⁽²⁾) and (46/72) 63.8% based on mid-upper arm circumference (<24 cm). More number of patients was above 60 years of age in the income grouping 3000-5000 INR/ month living with family members of more than 3 per house. The daily intake of food as compared to reference RDA is as follows energy 54.51%, carbohydrates 84.85%, protein 60.52% and Fats 71.2%.

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DISCUSSION: Malnutrition and risk of malnutrition was frequent, associated with lower body fat mass and lean body mass and independently predicted hospitalizations at six months.⁽⁴⁾ Malnutrition in these patients is due to multiple factors including increases in resting energy expenditure, decreased food intake, the effects of certain drugs, and, perhaps most importantly, a high systemic inflammatory response.⁽⁵⁾

All COPD patients in our study were smokers. More number of patients was above 60 years of age in the income grouping 3000-5000 INR/ month living with family members of more than 3 per house. All these factors could have been contributed to such a low nutritional status in these patients.

Nutritional depletion in patients with COPD is common and has a negative impact on respiratory and peripheral muscle function.⁽⁶⁾ A weak respiratory musculature contributes to dyspnea and has a negative impact on exercise tolerance. Body weight and body mass index are used as screening tools in the initial nutritional assessments, fat-free mass (FFM) has been considered as a better marker of under nutrition in patients with COPD. Under nutrition is a common cause and consequence of disease with a significant negative impact on patients' outcomes and quality of life as well as on health economics.⁽⁷⁾ Enhanced energy expenditure due to the increased work of breathing may also contribute to under nutrition.⁽⁸⁾ Body weight loss, often observed in patients with COPD, is related to lack of appetite.⁽⁹⁾ Additionally loss of appetite and taste of food are more affected in fat-free mass depleted COPD patients.⁽¹⁰⁾ Low body weight and low fat-free mass (FFM) have been recognized as unfavorable prognostic factors in patients with COPD.⁽¹¹⁾ Decrease in muscle mass with age is believed to contribute to decreased muscle strength which can affect nutritional status by impeding participation in food production, acquisition, preparation and in socialization at meals.⁽¹²⁾ Muscle atrophy could be the result of a marked activation of the ubiquitin-proteasome pathway as found in muscle of patients with COPD. Hypoxia, via hypoxia inducible factor-1, is implicated in mitochondrial biogenesis and autophagy.⁽⁹⁾⁽¹³⁾

CONCLUSION: The prevalence of under nutrition were (30/72) 41.6% based on body mass index (<18.5 kg/m²) and (46/72) 63.8% based on mid-upper arm circumference (<24 cm) Nutritional assessment should be made mandatory in order to recognize malnutrition early and initiate timely nutritional therapy.

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Details		N
Age (yrs.)	41-60	14
	>60	58
Marital status	Married	62
	Un married	10
Income (INR)	< 3000	30
	3000-5000	32
	>5000	10
Type of family	Nuclear	23
	Joint	47
	Staying lonely	2
Family Members	2 to 3 members	12
	4 to 5 members	25
	6 to 7 members	22
	8 and above	12
Nutritive values		% of RDA
Energy (kcal) RDA-2425	1322.48 ± 212.1	54.51%
Carbohydrates (g) RDA-330(g)	280.25 ± 26.23	84.85%
Protein (g) RDA-60(g)	36.42 ± 11.7	60.52%
Total fat (g) RDA-20(g)	14.22 ± 8.2	71.2%

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Anthropometric Measures (Mean \pm SD)	
Body Mass Index Kg/m ²	20.27 \pm 3.73
Mid Upper Arm Circumference (cm)	22.52 \pm 2.94
Waist Circumference (cm)	79.06 \pm 10.17
Hip Circumference (cm)	86.53 \pm 8.76
Waist-to-hip ratio	0.91 \pm 0.18

Table 1: Socioeconomic, demographic, nutritional and anthropometric details of COPD patients

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