



Body mass index (BMI) V/S mid-upper arm circumference (MUAC) in the assessment of nutritional status on stable chronic obstructive pulmonary disease patients

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Abstract

Introduction: Nutritional status is considered as an independent factor that influences morbidity and frequency of exacerbations in COPD patients. The aim of this study is to evaluate mid-upper arm circumference and body mass index in stable COPD patients and its correlation with severity of COPD.

Materials and Methods: 100 Male patients with pre-registered diagnosis of COPD who attended respiratory medicine department OPD were enrolled. Severity of COPD was assessed using spirometry. BMI recorded and FFM (fat free mass) evaluated by measuring MUAC. Results analyzed using SPSS 20.0 software.

Results: Mild, moderate, severe and very severe COPD based on spirometry was seen in 24%, 25%, 46%, 15% respectively. 45% of patients had low BMI (21kg/m²) and 62% had decreased FFM (MUAC- <27cm). Decreased BMI and FFM both had significant correlation with severity of COPD. FFM depletion had better correlation than BMI with COPD severity (P value- 0.002)

Conclusion: Severity of COPD had strong positive correlation with severity of malnutrition. FFM depletion correlates better with COPD severity than BMI and hence to be considered more significant in planning nutritional supplemental strategies which helps in improving COPD disease prognosis.

Keywords: body mass index, malnutrition, mid upper arm circumference

Introduction

COPD is currently being recognized as a systemic disorder which causes increased mortality and morbidity. It is expected to be the 3rd most common cause of death in 2020 in a survey conducted by WHO [1]. Muscle mass depletion and osteoporosis are well characterized systemic manifestations and is considered as a poor prognostic factor in these subset of patients. Approximately 20-40% of COPD patients are malnourished which increases functional disability, independent of respiratory function [2]. These patients tend to have fat free muscle mass wasting despite normal BMI and muscle atrophy is recognized as a better predictor than BMI in assessment of nutritional status in COPD [3, 4, 5, 6]. The aim of our study is to evaluate mid-upper arm circumference and body mass index in stable COPD patients and its correlation with severity of COPD.

Materials and Methods

A cross sectional study constituting 100 stable COPD patients who visited respiratory medicine department OPD were included after obtaining informed consent. Inclusion criteria were A) age > 40 years /<65years males B) post-bronchodilator FEV₁/FEV < 0.70 C) willing to participate in the study. Exclusion criteria included patients who have concurrent chronic illness like hepatic/renal disease, coronary artery disease, malignancy and psychiatric disorders. Demographic details such as age, sex, occupation and smoking history recorded. Spirometry performed by a trained technician as recommend by ATS guidelines with

standard calibration. 3 acceptable and 2 reproducible attempts were taken for analysis. Severity of COPD was graded as recommended by GOLD guidelines [7]. BMI was calculated by standard formula weight in kg/height in m². It is then classified as <18.5- underweight; 18.5-24.9- normal; 25-29.9-over weight; >30- obese [8].

MUAC measured on the non-dominant arm using a non-stretchable fiberglass tape to the nearest 0.1cm at the mid-point between olecranon and acromion. 3 readings taken and average recorded [3]. Patient is said to be malnourished when BMI was <21kg/m² and MUAC <27cm. Statistical analysis done using SPSS software (version 20). P value of < 0.05 was considered significant

Results

Table 1: Descriptive Data (N=100) (%)

		N=100 (%)
BMI(kg/m ²)	<21	45
	>21	55
MUAC(cm)	<27	62
	>27	38
Spirometry Values (gold staging)	• Mild obstruction	24%
	• Moderate obstruction	25%
	• Severe obstruction	46%
	• Very severe obstruction	15%

Table 2: Relationship between BMI and MUAC with Severity of COPD

	Mild	Moderate	Severe	Very Severe	Chisquare	P-Value
BMI(kg/m ²)					19.132	0.031
<21	6	10	26	9		
>21	18	15	20	6		
MUAC					36.340	0.002
<27	7	12	33	11		
>27	17	13	13	4		

Results

Of examined study group one half of them were malnourished (having BMI <21kg/m² and MUAC- <27 cm. 60% of patients had severe-very severe stage of COPD based on spirometry grading (gold guidelines). Low BMI and decreased MUAC had a positive correlation with severity of COPD as well as frequency of hospitalisation. MUAC was found to be a better predictor than BMI in the assessment of malnourished status in COPD patients

Discussion

Malnutrition has its own proven independent deleterious effects in COPD patients and nutritional supplementation does improve both immune status and muscle function. Labban *et al.* analyzed factors affecting survival in COPD patients and found that nutritional status does have an effect in mortality and morbidity independent of underlying lung function [9]. Prevalence of malnutrition in COPD ranges between 10-45% which had been documented in many studies [10, 11, 12]. There is no ideal nutritional marker nor a gold standard test to detect malnutrition in COPD. Systemic inflammation and hypoxia in COPD causes anorexia and hence there is an energy imbalance. Severity of COPD had an inverse relationship with BMI and MUAC values in our study. Ardestane [13] and mitra *et al.* [14] also observed similar findings were severe COPD patients had lean body mass and had increased frequency of exacerbations and hospitalization. There is decreased protein synthesis and increased protein degradation in COPD contributing to selective muscle mass depletion which might be masked by overall body weight [15]. Hence normal or increased BMI does not protect against increased muscle depletion and FFM done by measuring MUAC is considered more significant in these subset of patients. 17% of patients who had normal BMI had low MUAC and low MUAC has a more strong correlation with COPD severity (P value-0.002) in our study. Pirabbasi *et al.* [16] did a study on 271 COPD patients and showed that 11% patients had low MUAC despite a normal BMI, a findings similar to our study. Disturbed protein balance in COPD warrants increased protein supplementation >1.5/kg/day in patients with decreased FFM. Increased whey protein intake, increased physical activity in the form of resistance training, consumption of dairy products and red meat has been shown to maintain protein balance and thus improves quality of life (QOL) in COPD patients.

Conclusion

This study concludes that malnutrition increases the severity of COPD and MUAC is a more significant marker of nutritional status than BMI. An urgent need for nutritional intervention should be planned in order to improve their QOL, functional impairment and disease prognosis.

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