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ASSESSMENT OF NUTRITIONAL STATUS (ASSESSED BY BMI AND TRICEPS SKIN FOLD THICKNESS) IN PATIENTS WITH COPD AND ITS CORRELATION WITH SEVERITY OF THE DISEASE

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ABSTRACT

Background: Malnutrition is a common finding in COPD. Malnutrition in patients with COPD is associated with an impaired pulmonary status, reduced diaphragmatic mass, lower exercise capacity, and higher mortality rate when compared to adequately nourished individuals with COPD. **Objectives a)** To assess the nutritional status measured by BMI and triceps skin fold thickness of COPD patients. b) To correlate the nutritional status with severity of COPD patients. **Methodology - Study Design -** Prospective, Observational, Cross sectional study. This study included 38 patients presenting to OPD. History, BMI, triceps skin fold thicknesss were noted. Severity of COPD was assessed according to GOLD guidelines based on airflow limitation. **Results:** The mean age was 63.47years. About 21% of the study population was between 40 to 59 years and 79% of study population above 60 years of age. The study group had mean symptom duration of 3.68 years. The study group had a mean BMI of 21.82 kg/m2. Out of 38 patients 23.6% patients were under weight. 44.7% had normal BMI. 10.5% were overweight and 21% (8 out of 38) were obese. All of the patients in the study population belong to the GOLD 1 and GOLD 2. Simple scatter chart of BMI and COPD severity (assessed by Post FEV1) does not show a significant pattern, implying weak correlation between the variables. Similarly scatter chart for variables COPD severity (assessed by Post FEV1) with triceps skin fold thickness also does not show a significant pattern, however the graph shows distribution of values in the left lower quadrant with outliers, implying weak correlation between the variables. **Conclusion:** Malnutrition is important co morbidity in COPD patients. However there is weak correlation between nutritional status (as measured by BMI and Triceps skin fold thickness) and severity of COPD (in mild and moderate COPD).

INTRODUCTION

The word emphysema is derived from Greek and means "to blow into", "air-containing" or "inflated". In 16th century, "Voluminous lungs" and lungs "turgid particularly from air" were described respectively by Bonet and Morgagni.

The Global Burden of Disease Study reports a prevalence of 251 million cases of COPD globally in 2016. It is estimated that 3.17 million deaths were caused by the disease in 2015 (that is, 5% of all deaths) [1]. The primary cause of COPD is exposure to tobacco smoke (either active smoking or secondhand smoke). Other risk factors include exposure to indoor and outdoor air pollution and occupational dusts and fumes. COPD is preventable by avoidance or early cessation of smoking. COPD is not curable, but treatment can relieve symptoms, improve quality of life and reduce the risk of death [2].

Global initiative for chronic obstructive lung disease defines COPD as a common, preventable and treatable disease that is characterized by persistent respiratory symptoms and airflow limitation that is due to airway and/or alveolar abnormalities usually caused by significant exposure to noxious particles or gases [3].

COPD has many co morbidities like coronary heart disease, heart failure and lung cancer, pulmonary artery disease and malnutrition. Others, such as systemic venous thromboembolism, anxiety, depression, osteoporosis, obesity, metabolic syndrome, diabetes, sleep disturbance and anaemia are also seen even though there is no direct relation with COPD. The common ground between most of these co morbidities is chronic systemic inflammation. Comorbidities make the management of COPD difficult and need to be evaluated and treated adequately [4]. Close to three-fourths of patients with chronic obstructive pulmonary disease (COPD) suffer from weight loss. Several factors-including chronic mouth breathing, dyspnea, aerophagia, certain medications, and depression-often act in concert.

Malnutrition can exacerbate symptoms of COPD by decreasing ventilatory muscle strength, exercise tolerance, immune competence, and by increasing the risk of depression and anxiety. Malnutrition in patients with COPD is associated with an impaired pulmonary status, reduced diaphragmatic mass, lower exercise capacity, and higher mortality rate when compared to adequately nourished individuals with COPD. There are different methods used in assessment of nutritional status employed in the above studies like measurement of Mini nutritional assessment chart, Bio-Impedance Test (BIA), mid arm circumference and BMI.

BMI is the international standard that measures body size in adults. It is a statistical measure of an individual's weight scaled according to his/her height. It is widely used to classify adults as underweight, overweight and obeseUnderweight – BMI <18.5 kg/m^{2}Normal weight – BMI ≥18.5 to 24.9 kg/m^{2}Overweight – BMI ≥25 to 29.9 kg/m^{2}Obesity – BMI ≥30 kg/m^{2}Obesity class I – BMI 30 to 34.9 kg/m^{2}Obesity class II –

BMI 35 to 39.9 kg/m^{2}Obesity class III – BMI ≥40 kg/m^2 (also referred to as severe, extreme, or massive obesity)Because these cutoffs underestimate risk in the Asian and South Asian population, WHO and the NIH guidelines for Asians define overweight as a BMI between 23 and 24.9 kg/m^2 and obesity as a BMI >25 kg/m^2[5to7]

A skinfold thickness is one of the measures of an individual's nutritional status. Measured with a help of a Vernier callipers, it gives a prediction of the total amount of body fat. This method is based on the hypothesis that the body fat is equally distributed over the body and that the thickness of the skinfold is a measure for subcutaneous fat. The triceps skinfold is measured at the back of the left arm, midway between the acromial process of the scapula and the olecranon process of the ulna. For adults, the standard normal values for triceps skinfolds are 2.5mm (men) or about 20% fat; 18.0mm (women) or about 30% fat. Measurement half, or less, of these values represent about the 15th percentile and can be considered as either borderline, or fat depleted. Values over 20mm (men) and 30mm (women) represent about the 85th percentile, and can be considered as obese[8].

There is no standard guidelines regarding the nutritional assessment in COPD patients.

Justification / need for study

- Measuring BMI and skin fold thickness is a simple, cost effective and easy tool for assessment of nutritional status in COPD patients.
- Assessment and addressing malnutrition with other treatment modalities at the earliest brings significant improvement in exercise capacity and quality of life.
- Less literature available on the nutritional assessment in COPD patients in the Indian population

Objectives of the Study

To assess the nutritional status measured by BMI and triceps skin fold thickness of COPD patients.

To correlate the nutritional status with severity of COPD patients.

MATERIAL AND METHODS

Methodology

Study Design

Prospective, Observational, Cross sectional study.

Materials and Methods

Clinical Evaluation

This study included 38 patients presenting to the Department of Pulmonary Medicine, Yenepoya Medical College, Mangalore with COPD.

A detailed participant information brochure was provided to all participant and they were apprised of the study.

Written and informed consent was obtained from all the participants.

Severity of COPD was assessed according to GOLD guidelines based on airflow limitation

GOLD 1 – Mild - $FEV_1 \geq 80\%$ predicted
GOLD 2 – Moderate – $50\% \leq FEV_1 < 80\%$ predicted
GOLD 3 – Severe – $30\% \leq FEV_1 < 50\%$ predicted
GOLD 4 – Very Severe < 30% predicted

Anthropometric measurements like height, weight, BMI, triceps skin fold thickness (with the help of a skin fold callipers) were measured.

Spirometry was performed for confirmation of COPD. Best of the three readings are taken. The same test was repeated after a bronchodilator to check for reversibility.

Management of COPD and nutritional status were continued as per standard of care.

Source of Data/Sampling Method

Stable COPD Patients presenting to the Department of Pulmonary Medicine, Yenepoya Medical College, Mangalore, were included in the study based on convenient sampling (non probability sampling).

Inclusion criteria

All patients aged more than 40 years, diagnosed as COPD based on GOLD criteria

Exclusion criteria

1. Patients suffering from chronic respiratory illness such as Tuberculosis, Bronchiectasis, Lung Fibrosis, Malignancy.
2. Patients with chronic systemic illness such as AIDS, Hepatitis, cirrhosis, chronic renal failure, diabetes mellitus and other conditions which can interfere with the nutritional assessment of the patient.
3. Patients who are not willing to participate in the study.

Statistical methods:

Sample size of 38 was calculated after consultation with a statistician based on the COPD load and similar studies. The data obtained was tabulated and a master chart was prepared. Statistical analysis was done with the help of SPSS version 23.

Table 1: Gender And Age Cross tabulation

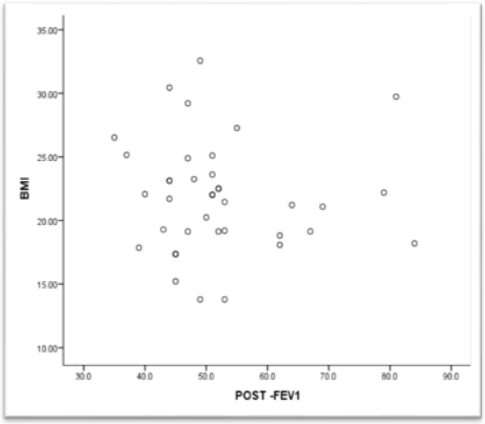
		Age		Total
		40-59 years	> 60 years	
Gender	Male	4	18	22
	female	4	12	16
Total	8	30	38	

Table 2 : Gender And Duration Of Symptoms Cross tabulation

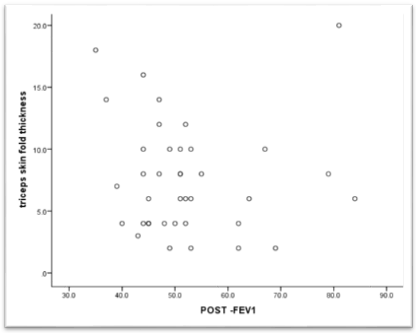
		duration of symptoms			Total
		1 - 2 years	3 - 5years	> 5 years	
Gender	Male	9	7	6	22
	Female	7	7	2	16
Total	16	14	8	38	

Table 3 : Gender and GOLD Classification Cross tabulation

		GOLD Classification		Total
		>80 FEV1	50 – 80 FEV1	
Gender	M	7	15	22
	F	0	16	16
Total	7	31	38	



Graph 1 : (BMI in Kg/m^2, Post bronchodilator reversibility FEV_1 in % of predicted value)



Graph 2 : (Triceps skin fold thickness in mm, Post bronchodilator reversibility FEV_1 in % of predicted value)

RESULTS :

38 stable COPD patients diagnosed based on GOLD guidelines were enrolled in the study. The **mean age was 63.47years**. About 21% of the study population was between 40 to 59 years and 79% of study population above 60 years of age. The study group had mean symptom duration of 3.68 years.

The study group had a **mean BMI of 21.82 kg/m^2**.

Out of 38 patients **23.6% patients were under weight**.

44.7% had normal BMI. 10.5% were overweight and 21% (8 out of 38) were obese.

All of the patients in the study population belong to the GOLD 1 and GOLD 2 classification based on the post bronchodilator FEV_1 reading.

Simple scatter chart of **BMI and COPD severity** (assessed by Post FEV_1) does not show a significant pattern, implying **weak correlation** between the variables

Similarly scatter chart for variables **COPD severity** (assessed by Post FEV_1) with **triceps skin fold thickness** also does not show a significant pattern, however the graph shows distribution of values in the left lower quadrant with outliers, implying **weak correlation** between the variables.

Similar study conducted showed importance of malnutrition in COPD patients. Burak Mete et al[9] conducted a study in Turkey to find the Prevalence of malnutrition in COPD and its relationship with the parameters related to disease severity and found that malnutrition is an important and frequently encountered problem in COPD patients, which is in consistence with the present study. Burak et al also concluded that spirometric values of the patients with malnourishment and with low BMI are significantly lower. However present study group shows weak correlation of COPD severity with nutritional status (as measured by BMI and triceps skin fold thickness).

CONCLUSION

23.6 % of the COPD patients in the study population were underweight. Malnutrition is important co morbidity in COPD patients. However there is **weak correlation** between **nutritional status** (measured by BMI and Triceps skin fold thickness) and **severity of COPD** (mild and moderate COPD).

Limitations of the study

Stable COPD patients were selected based on convenient sampling (non probability sampling).

Study population consisted only of COPD in stage 1 and 2.

Mean duration of symptoms of COPD was 3 years.

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