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How to Evaluate the Risk of Malnutrition in Patients with COPD?.

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ABSTRACT

The risk of malnutrition in patients with COPD increases the length of hospital stay, early readmission rates and poorer prognosis. Malnutrition is a significant problem in COPD and often goes undetected and often untreated. Many patients with COPD suffer with poor dietary intake and consequently reduced muscle mass. To evaluate the effect of duration of disease and malnutrition in patients with COPD**.** Ten patients with COPD both male and female) aged 30-50 yrs were recruited in this study. After getting informed consent the subjects were instructed to fill the questionnaire for the history related to our study. The subjects Body Mass Index (BMI Kg/m2), Body surface area, Duration of Disease, Skinfold thickness (Caliper), Calories intake, and Pulmonary function tests (RMS Polyrite) were evaluated. A significant individual patients variation was observed in our study. The mean BMI of the patients was (23.45±6.34) found to be reduced than normal. Duration of the disease (2yrs-28yrs) was negatively correlated with BMI, Free Fat Mass, Calorie intake and Expiratory Flow Rates (55%-65% pred). By using skinfold thickness (Biceps, Triceps, Sub scapular, Waist, Knee, Calf) Free Fat Mass was calculated. Being an inflammatory disease COPD involves with lungs and affect other body tissues like bones and muscles, these are known as co morbidities. Diet and nutritional intake are important in COPD because they help to combat some of these co morbidities. So nutrition is an important therapy in the management of patients with COPD.

Keywords: Malnutrition, COPD, Body Mass Index, Skinfold thickness, Calories intake, Body surface area

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INTRODUCTION

From 1950s useful screening tools such as body weight and body mass index have been used to evaluate the nutritional status. Patients who are underweight or losing weight voluntarily associated with severity of airflow obstruction are the poor prognostic sign in chronic obstructive pulmonary disease (COPD). The causes of weight loss in patients with COPD are multifactorial including decreased oral intake as malnutrition, the effect of increased work of breathing due to abnormal respiratory mechanics and the effect of chronic systemic inflammation. Malnutrition can be defined as weight less than 90% of the predicted value as given by the Metropolitan Insurance Company or body mass index (BMI) of less than 18.4 kg/m2.

The quality of life and survival limitation of chronic obstructive pulmonary disease (COPD) could be due to exercise intolerance and alterations in skeletal muscle like muscle wasting, muscle weakness and muscle fatigue rather than pulmonary problems [1]. Patients with COPD are commonly characterized by thin, breathlessness and voluntary weight loss. Long term use of medications such as bronchodilators (malabsorption), Corticosteroids (peripheral myopathy), and antibiotics (Gastrointestinal disturbances) can indirectly affect the nutritional status of COPD patients [2]. Studies have been proved that reduced maximal expiratory flow [3], FEV1 in COPD correlates poorly with exercise capacity [4]. Hence this study was designed to evaluate the baseline parameters to assess the nutritional status in patients with COPD.

MATERIALS AND METHODS

Study population

Ten COPD male patients aged 30-50 yrs with clinically stable were recruited from chest & TB department of Sree Balaji Medical College and hospitals. The study design was explained to the subjects and their informed consent was obtained. The COPD subjects were diagnosed according to the criteria given by Global Initiative for Chronic Obstructive lung Disease (COLD) Patients history like duration of disease, diet intake were obtained by questionnaire. Study was approved by the institutional medical Ethics committee of Sree Balaji Medical College, Chennai.

Parameters measured

Body weight (Kg) and height (cm) were measured with subjects wearing indoor clothing and BMI was calculated as by weight and height^2. Pulmonary function test: Flow rates and lung volumes were determined using computerized spirometer (Medispiror). Forced inspiratory and expiratory maneuvers were performed three times and the best values obtained from the maximum inspiratory and expiratory flow-volume curves were used for comparison. Body surface area was calculated in m^2. Skin fold thickness was taken in six sites of the body like biceps, triceps, subscapular, waist, knee and calf muscles by using digital skinfold thickness calipers. With the Skinfold Thickness and Body Surface Area, Total Body Fat was calculated.

Statistical analysis

Statistical analysis will be performed by using statistical package for social sciences (SPSS). Data will be expressed as mean ± standard deviation. The correlation between the parameters will be analyzed by using Pearson's moment product correlation analysis. Any p value <0.05 will be considered significant

Result

In our results Table-1 showed duration of disease of the study population from 2-40 years and the BMI from 16.90 to 30.37. Only thirty percent of the study population had less than normal BMI. In Table II duration of disease was compared with pulmonary function tests of study population. Values of FEV% and FEF 25-75% proved the obstructive pattern of lung disease and severity of diseases. Moreover as the duration of disease progresses reduction in pulmonary function tests parameters were observed.

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RESULTS

Table I

Subject	Age (yrs)	Sex	Disease Duration	Weight (Kg)	Height(M)	BMI	BSA
1	45	F	20	46	1.65	19.90	1.70
2	40	F	2	57	1.39	29.50	1.57
3	52	M	8	77	1.67	27.61	2.14
4	38	F	2	58	1.5	25.78	1.71
5	47	F	15	47	1.37	25.04	1.42
6	37	F	25	45	1.43	22.01	1.46
7	57	M	2	65	1.6	25.39	1.91
8	65	M	40	46	1.5	20.44	1.55
9	54	M	16	65	1.6	25.39	1.91
10	50	F	5	57	1.37	30.37	1.55

BMI- Body Mass Index, BSA-Body Surface Area

Table II Comparison of duration of disease with pulmonary function tests

Subject	Disease Duration			PFT		
	Years	FEV_1	FVC	FEV_1%	FEF_{50}	FEF_{25-75}
1	20	44	58	76	55	51
2	2	38	47	82	75	77
3	8	41	50	69	55	67
4	2	35	45	70	77	76
5	15	35	49	78	69	57
6	25	35	42	75	51	50
7	2	46	55	84	74	79
8	40	37	47	66	46	47
9	16	47	57	74	58	54
10	5	40	50	79	73	71

PFT- pulmonary function tests, FVC- Forced vital capacity, FEV1- Forced Expiratory volume

Table III Comparison of duration of disease with Nutritional status

Subject	Disease Duration	Cal Intake	Calorie Deficiency	Sum(SFT)	TBF
1	20	1450	850	91.2	3.08
2	2	1165	1135	102.09	8.43
3	8	1400	900	190.1	11.65
4	2	1850	450	102.6	3.77
5	15	1450	850	99.2	2.98
6	25	735	1565	95	2.83
7	2	2045	255	164.33	8.58
8	40	1300	1000	72.3	1.71
9	16	1400	900	189	10.32
10	5	1500	800	159.56	6.66

SFT- Skin Fold Thickness, TBF- Total Body Fat

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Figure-1

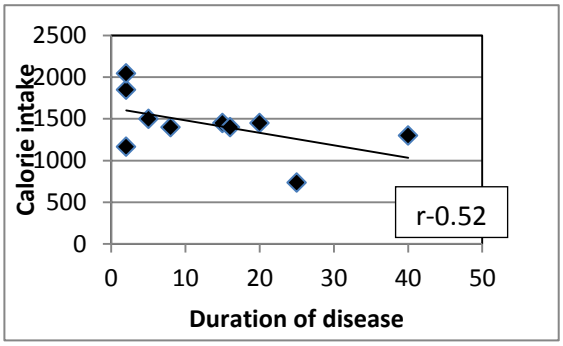


Figure-II

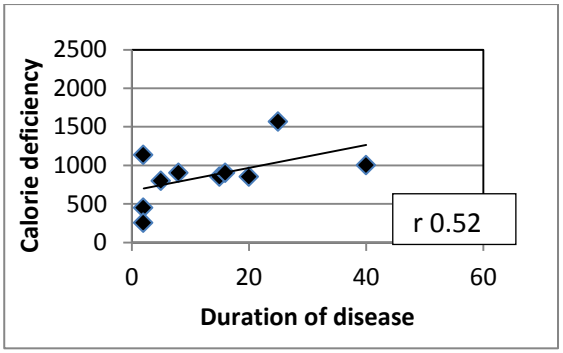


Figure-III

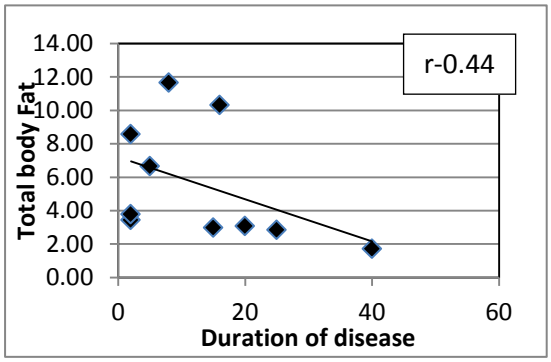


Figure-IV

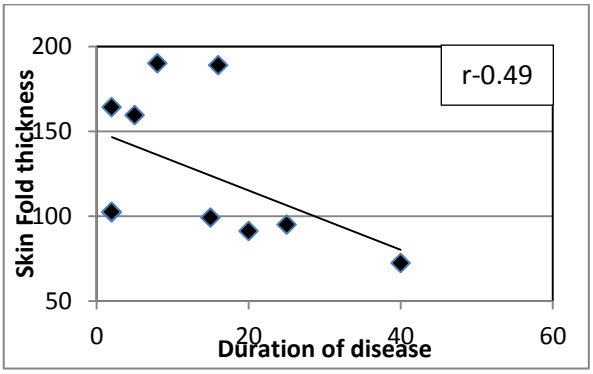


Figure-V

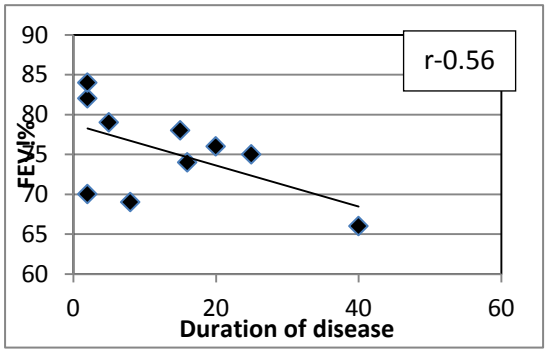
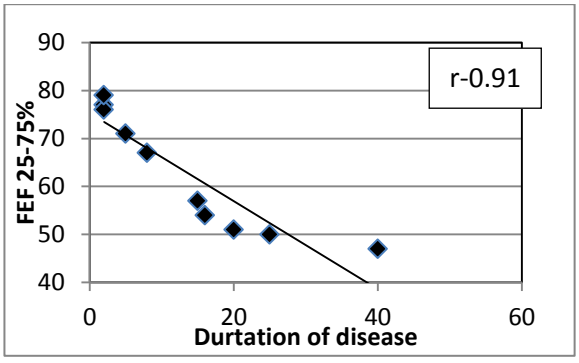


Figure-VI



Duration of disease and pulmonary function diaease parameters were negatively correlated which was shown in Fig-V and FIG-VI. Eighty percent of the study population were malnourished based on the calorie intake and calorie deficiency which was focused in Table III. In our study Calorei intake was significantly negatively correlated and calorie deficiency was statistically positively correlated which are shown in Fig-I and Fig-II and also statistically significant. This study showed that both SFT and TBF were very much reduced in all the subjects irrespective of BMI. Our study showed significant negative correlation between duration of disease and SFT, TBF (Fig III, IV).

DISCUSSION

Seventy percent of the COPD patients of our study with mild to severe disease had normal Body weight and BMI, this could be due to depletion of lean tissues [5].

Recent studies revealed that the regenerative capacity of skeletal muscle is impaired in mice with elevated circulating tumor necrosis factors (TNF) levels [6], lower testosterone [7], due to chronic hypoxia and corticosteroid therapy [8].

In our study BMI of patients with COPD were negatively correlated with disease duration. This prevalence of malnutrition may be due to systemic inflammation, Low dietary intake (chronic mouth breathing , aerophagia, Dyspnea, old age),bronchodialators, corticosteroids, antibiotics. Elevated circulating leptin level in COPD patients may affects dietary intake and consequently muscle mass and function [9].

Expiratory air flow limitation is the key to diagnose the severity of disease and traditional physiological changes in patients with COPD. This could be due to both small and peripheral airway obstruction and consequent increase in airway résistance. Loss of small airway patency due to destruction of alveolar tissues may play important role. Low FEV1 , FEF 25-75% and FEV1% indicate the severity of disease of COPD patients. The airflow obstruction may the increase the cost of breathing [10] which cause structural changes in the respiratory muscles due to the continuous overload [11]. The energy requirements of a healthy person vary depending on a number of factors including: age; gender; body composition; current and past nutritional status; and basal metabolic rate (BMR). BMR may be defined as the metabolic activity required for the maintenance of life including respiration, heartbeat and body temperature.When people experience illness, injury or surgery, their BMR increases. This causes metabolic stress, which, if uncontrolled, can lead to weight loss and eventually malnutrition. Without sufficient energy, protein stores in the body are mobilised from skeletal muscle, resulting in loss of lean body mass. This protein is broken down via biochemical oxidation to meet the body's increased energy needs. If the person's diet does not contain enough protein, this will lead to a negative nitrogen balance. A positive nitrogen balance is essential for tissue repair after illness or major trauma [12-14].

CONCLUSION

Being an inflammatory disease COPD involves with lungs and affect other body tissues like bones and muscles, these are known as co morbidities. Diet and nutritional intake are important in COPD because they help to combat some of these co morbidities. So nutrition is an important therapy in the management of patients with COPD.

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