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Original Research Article

Assessment of nutritional status in chronic obstructive airways disease patients in a tertiary care hospital at Himachal Pradesh, India: a cross sectional study

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ABSTRACT

Background: Chronic obstructive pulmonary disease (COPD) is a major cause of morbidity and mortatlity worldwide. Malnourishment in COPD patients is very common and is a prognostic factor in its treatment. The present study has been conducted to assess nutritional status in COPD patients and its correlation with severity of disease.
Methods: This institutional based analytical cross sectional study was conducted in the Department of Pulmonary Medicine at tertiary care hospital in Himachal Pradesh (India) from 1 Dec 2017 to 31st May 2018. A total of 52 COPD participants attending the pulmonary Medicine OPD and fulfilling the inclusion criteria were enrolled.
Results: All participants reported being smoker since long with the mean years of smoking since 31 years and about 13.6 cigarettes being smoked per day. 22 (42%) of the participants were undernourished as per BMI criteria But when compared with MUAC criteria, a large number 38 (73%) came out to be undernourished. haemoglobin and cholesterol levels were less in patients with severe diseases than mild and moderate category (76.9%).
Conclusions: The malnourishment and severity of the disease has direct correlation. More the severity of COPD, more is the malnourishment. Biochemical parameters, although not deranged significantly in any group, but more on the lower side in patients with severe COPD. There is a need for regular nutritional assessment of every COPD patient and recommendation of supplementary food for them.

Keywords: COPD, Malnourishment, Body mass index, Mid-arm upper circumference, Anthropometry

INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is an important and growing cause of morbidity and mortality worldwide. The WHO Global Burden of Disease Project estimated that COPD was the fifth leading cause of death worldwide in 2001 and will be the third leading cause by 2020. The growing burden of COPD is partly due to the ageing of the world's population and partly to the continued use of tobacco, which is the most important risk factor for this disease. The reported prevalence of COPD is highly variable ranging from 0.2% in Japan to 37% in the United States. According to the 12-site Burden of Obstructive Lung Disease (BOLD) study, the average prevalence of COPD is 10.1%, with wide variations.[1] The estimated burden of COPD in India is about 15 million cases. These figures may however

underestimate the true burden since questionnaire based prevalence rates tend to underestimate the true spirometry-based prevalence of COPD.[2]

Nutritional status disorders pose a serious problem, which concerns about 1/5 of the COPD population. Body mass index <20 is shown to be a predictive factor for hospitalization in COPD.[3] Patients with COPD often lose weight and, depending on the population studied and the indicator used to determine the nutritional status, between 19-60% of patients are classified as malnourished.[4] The reasons of loss of weight, and fat mass are unambiguous. Enhanced metabolic rate and decreased caloric consumption among patients may play an important role in it. Other critical factors are tissue hypoxia, release of systemic inflammatory mediators, oxidative stress, drugs, and sedentary life. The occurrence of malnutrition is lethal to COPD patients, leading to respiratory failure due to decreased respiratory muscle strength, and decreased immunity.[5,6] Malnutrition directly affects both the respiratory muscles and the lung parenchyma, thereby contributing to worsening of the underlying disease.[7] Previous studies had documented increased COPD-related mortality rates in underweight and normal-weight patients than in overweight and even obese patients.[8]

The high prevalence of weight loss, muscle and fat mass wasting in COPD patients suggests that effective nutritional screening must be implemented to detect and treat nutritional problems, to minimize COPD-related medical care costs, to improve the patients' health and to ameliorate their quality of life. Therefore the present study will be conducted to assess nutritional status in COPD patients and its correlation with severity of disease.

METHODS

Study area: Maharishi Markendeshwar Medical College and Hospital, Kumharhatti, Solan (HP).

Study population: Patients of COPD attending to Pulmonary Medicine OPD of MMCH, Solan.

Study period: 1 December 2017 to 31 May 2018.

Study design: Institutional based analytical cross sectional, interventional study.

Study size and sample

A total of 52 COPD participants attending the pulmonary Medicine OPD (including patients who were admitted later) of MMMCH, Solan were enrolled in the study.

Study tools and techniques

Participants were classified according to smoking status.

Current smokers: who have smoked regularly with 1 month prior to examination.

Non-smokers: who have never smoked and subjects occasionally have smoked.

Ex-smokers: who have stopped more than 1 month prior to examination.

Smoking index was defined as number of cigarettes smoked multiplied by duration smoked in years. Pack years was calculated from the average number of cigarettes smoked per day in a year. One pack year was calculated as smoking of 20 cigarettes per day for one year.

All patients underwent the Spirometry test with a trained technician. The participants were instructed not to use bronchodilator on the day of pulmonary function assessment. All patients were investigated in a sitting position. The highest values from at least three technically acceptable Spirometic manoeuvres were taken to calculate Forced Vital Capacity (FVC) and Forced Expiratory Volume in First Second (FEV1).

Measurements of body composition were used to assess nutritional status in COPD patients and its correlation with severity of disease. Nutritional status was assessed by anthropometric and biochemical indices. In Anthropometric indices, body weight was taken nearest to 0.1 kg with participants standing barefoot and in light clothing. Height was measured by anthropometric rod in bare or stocking feet. Mid upper arm circumference (MUAC) was measured on the left side to the nearest 0.1 cm with a non-stretchable tape midway between Olecranon and Acromion. Body Mass Index (BMI) which was defined as weight (kg) divided by the square of height (meters). Criteria for under nutrition considered were BMI less than 18.5 kg/m^2.[9] Similarly MUAC measurement of less than 24 cm was taken as cut off for labelling as under nutrition.[10]

In addition, to calculate biochemical indices, blood samples were analyzed for haemoglobin, albumin, total protein and cholesterol. Normal ranges accepted for these parameters biochemistry were-Haemoglobin: 12-16 g/dl, Albumin: 3.5-5.3 g/l, total protein: 6.4-8.3 g/l and cholesterol: 150-200 mg/dl.

The treatment of the patient was as per the standard protocol followed routinely in the department of Pulmonary Medicine Maharishi Markandeshwar Medical College and Hospital, Kumarhatti, Solan. The study in no way interfered or guided the treatment decisions for the patient. The study involved blood sample collection for study in the laboratory, spirometry and anthropometric measurements. Informed consent for enrolment in the study including taking the blood samples was obtained from the participants.

A pre tested semi-structured questionnaire was designed to collect the information from participants. The Principal Investigator had asked the questions, observed the findings and documented the response in the proforma. The questionnaire was piloted among the few participant groups before finalization.

Statistical analysis

The data collected was entered in an Excel spread sheet. Chi-square test, proportions, percentages mean and other appropriate statistical tests were applied to analyse the data to identify important relationships between variables and determine the level of significance. P<0.05 will be considered as significant.

Inclusion criteria

All clinically diagnosed COPD patients by a pulmonary specialist as per Indian COPD guidelines were subjected to spirometry test. Post brochodilator FEV1/FVC<0.7 was used as the criteria of COPD guidelines and the severity of disease was determined as mild when post bronchodilator FEV1 (% predicted) was ≥ 80, moderate when 50-79 and severe when <50.[2]

Exclusion criteria

Patients with history of recent surgery (major) and trauma (major) or with concomitant disease that might alter nutritional status (heart disease, cirrhosis, diabetes, thyroid disorders, pregnancy, malignancy, chronic renal failure) were excluded from the study.

Ethical clearance

The study project was approved by the Institutional Ethics Committee (IEC), Maharishi Markendeshwar Medical College and Hospital, Kumharhatti, Solan (HP). The confidentiality has been maintained and the information thus obtained has not been used for any other purpose except for academic purposes.

RESULTS

A total of 52 participants were enrolled for the study, out of which 81% were males. All of them were from rural background. This might be due to the location of the hospital in a remote village area where maximum patients came from rural areas. The mean age observed was 60.1 years. Majority of the participants were farmers and labourers (96%). The education level of respondents was very low with only 11% of respondents were having education level metric and above (Table 1).

When enquired about the smoking history, all participants reported being smoker since long with the mean years of smoking since 31 years and about 13.6 cigarettes being smoked per day (Table 2).

Table 1: Socio-demographic profile of the respondents.

Characteristic	Number	%
Gender		
Male	42	80.7
Female	10	19.3
Total	52	100
Residence		
Urban	0	0
Rural	52	100
Total	52	100
Occupation		
Farmer	32	61.5
Labour	18	34.6
Retired	1	2
Unemployed	1	2
Total	52	100
Marital status		
Married	52	100
Unmarried	0	0
Total	52	100
Education		
Illiterate	10	19.3
Primary	36	69.2
Matric	5	9.5
Graduate	1	2.0
Total	52	100
Religion		
Hindu	52	100
Others (Sikh, Muslim, Christian)	0	0
Total	52	100
History of Smoking		
Smokers	52	100
Non smokers	0	0
Total	52	0

Table 2: Exposure to smoke (n=52).

Smoking details	Average±SD
Average number of cigarettes smoked/day	13.6±5.1
Average number of years smoked	31±10.7
Smoking Index	
Mild	457.1±205.3
Moderate	325.0±106
Severe	417.3±185.2

Table 3 depicts that 22 (42%) of the participants were undernourished as per BMI criteria out of which 20 (91%) were in those who were having the severe disease. But when compared with MUAC criteria, a large number 38 (73%) came out to be undernourished out of which 26 (68.4%) were observed to be in participants with severe disease.

When the anthropometric results were co-related with the severity of the disease, it was observed that BMI was lowest in those participants who were having severe disease (77%). This means that as the severity of the disease increased, the BMI tends to decrease in those patients. In case of MUAC, again 77% participants were having low MUAC findings as compared to those with moderate disease (Table 4).

Table 3: Relation between under nutrition and severity of disease.

Nutritional status	Severity of disease			
	Mild	Moderate	Severe	Total
Based on BMI				
Undernourished	2 (25)*	0	20 (50)	22 (42.3)
Normal	6 75)	4 (100)	19 (47.5)	30 (57.7)
Overweight	0	0	1 (2.2)	1 (1.9)
Total	8	4	40	52
P value	0.236			
Based on MUAC				
Undernourished	8 (100)	4 (100)	26 (65)	38 (73.1)
Normal	0	0	14 (35)	14 (26. 9)
Total	8	4	40	52
P value	0.056			

*Figures in parenthesis are proportions.

Table 4: Correlation between anthropometry and severity of disease.

Anthropometric measurement	Severity of disease				
	Mild	**Moderate**	**Severe**	**Total**	**P value**
Number of patients	8	4	40	52	
BMI (Mean±SD)	20.2±4.2	21.6±2.7	19.0±4.1	19.4±4.6	0.396
MUAC (Mean±SD)	21.0±0.8	23.0±0	21.6±5.7	21.6±5.0	0.766

Table 5: Biochemical indicators and severity of disease.

Biochemical indicator	Severity of disease				
	Mild	**Moderate**	**Severe**	**Total**	**P value**
Number of patients	8	4	40	52	
Haemoglobin (Mean±SD)	14.0±1.2	15.0±0	13.6±1.6	13.7±1.5	0.193
Total Protein (Mean±SD)	6.8±0.5	7.3±0.3	6.9±0.9	6.9±0.8	0.600
Albumin (Mean±SD)	3.5±0.4	3.9±0.3	3.8±0.6	3.8±0.5	0.346
Cholesterol (Mean±SD)	174.8±18.9	158.0±9.9	155.0±32.7	158.0±30.1	0.247

Table 5 depicts the biochemical changes according to the severity of disease. Haemoglobin and cholesterol level seems not be deranged in the study participants but haemoglobin and cholesterol levels were less in patients with severe diseases than mild and moderate category (76.9%).total protein and albumin levels were within normal limits irrespective of severity of the disease.

DISCUSSION

The COPD seems to more in farmers and labourers as none of the patient enrolled in the study was from professional or service sector. Maximum of the respondents were either illiterate or educated up to primary level. All of the respondents were heavy smokers. Malnutrition was observed in about half of the patients. Pirabbasi et al reported malnutrition was more prevalent (52.4%) in the subjects with severe stages of COPD as compared to mild and moderate COPD stages (26.2%).[11] Similar findings were observed by Ahmedi et al that the mean BMI of the severe group was significantly lower than the controls.[12]

Fernandez et al in 2006 studied nutrition related complications in COPD and concluded that improving nutritional status went long way in improving the quality of life and also poor nutrition the study also showed mortality benefits by improving nutritional status in COPD patients.[13] Park et al studied the nutritional status of COPD from 2003 to 2006 using national health and evaluation datasheet and reported the prevalence of frailty was 57.8% in COPD patients. They found statistically significant correlation between COPD severity and nutrition.[14] Biochemical indicators seems not be deranged

in all groups of patients with different level of severity but in severe COPD group this was observed to be on lower side indicating potential biochemical derangements in this group.

CONCLUSION

The malnourishment and severity of the disease has direct correlation. Education and occupation seems to have important role to play in the etiology and severity of the disease. More the severity of COPD, more is the malnourishment. Biochemical parameters, although not deranged significantly in any group, but more on the lower side in patients with severe COPD.

Recommendations

There is a need for regular nutritional assessment of every COPD patient both in out-patient and indoor patient department. Nutritional counselling by a dietician in a tertiary care setting and by the physician in single set up should be a regular and mandatory feature of COPD management. Nutritional counselling of the patient and their attendants should be conducted during treatment. If possible, provision of supplementary food for the COPD patients could be thought for on the similar lines as that of tuberculosis patients.

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