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Research Article

CORRELATION OF SEVERITY OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE WITH BODY MASS INDEX

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ABSTRACT

Chronic Obstructive Lung Disease (GOLD) recently defind COPD as "a common preventable and treatable disease characterized by persistent airflow limitation that is usually progressive and associated with an enhanced chronic inflammatory response in the airways and the lung to noxious particles or gases. Exacerbations and comorbidities contribute to the overall severity in individual patient". This is an open label, comparative, analytical and prospective study done in the Department of Respiratory Medicine, New Medical College Hospital, Kota during period Oct. 2014 to Sept. 2015. On the basis of history, clinical examination and various investigation 200 study cases of COPD were taken from Respiratory medicine OPD & ward. The aim of study to evaluate the correlation between oxygen saturation and BMI in stable COPD patients. The diagnosis was established by a detailed history, clinical examination followed by chest X- ray & Spirometery. ln our observations, most of patient's, 55% were undernourished, 37.5% patients had normal BMI, 6% patient was overweight and only 1.5% patients were obese. The relationship between BMI and COPD stage was explored multidimensionally.

INTRODUCTION

Global Initiative for Chronic Obstructive Lung Disease (COLD) recently defind COPD as "a common preventable and treatable disease characterized by persistent airflow limitation that is usually progressive and associated with an enhanced chronic inflammatory response in the airways and the lung to noxious particles or gases. Exacerbations and comorbidities contribute to the overall severity in individual patient".[1] The definition of emphysema by the National Heart, Lung and Blood Institute in 1984 is as "a condition of the lung characterized by abnormal, permanent enlargement of airspaces distal to the terminal bronchiole, accompanied by the destruction of their walls, and without obvious fibrosis" COPD include two terms Emphysema and Chronic bronchitis.

Emphysema occurs when the elastic tissue of the small airways (including alveoli) is damaged, causing hyperinflation and impaired gas-exchange. Emphysema is one of the diseases included in the term COPD.

Chronic bronchitis is a progressive, recurring inflammation of the bronchi and the bronchioles. The hallmark of chronic bronchitis is a persistent wet cough, caused by mucus hypersecretion, and dyspnoea. It progressively worsens over time. It is mainly caused by toxic particles in cigarette smoke or other pollutants.

It is called *chronic* when the coughing and sputum production have lasted for at least three months in two consecutive years. Due to inflammation and thickening of the bronchial walls, patients with chronic bronchitis may develop chronic bronchial obstruction and, hence COPD. The British Medical Research Council (BMRC) defined chronic bronchitis as "daily productive cough for at least three consecutive months for more than two successive years.[2]

Chronic Obstructive Lung Disease affect nutrition status of patients because of high energy expenditure for respiration, so this study was planned to find correlation of severity of disease and body mass index of patients.

MATERIAL AND METHOD

The source of data: This is an open label, comparative, analytical, and prospective study was carried out on patients with signs and symptoms suggestive of COPD between 40-70

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yrs of age of either sex attend the Dept. of Respiratory medicine, New Medical College and Hospital Kota, during a period of one year Oct.2Ol4 to Sept. 2Ol5.

Method of data Collection

This study was done on 200 patients of COPD. The diagnosis was established by a detailed history, clinical examination followed by chest X- ray and Spirometery. According to the aims and objectives, patients were studied as follows:-

1. Patients with clinical suspicion of COPD were subjected to chest radiology and spirometery examinations. The diagnosis of COPD was confirmed by post bronchodilatation ratio of FEV1/FVC which should be less than 70% of percentage predicted
2. Patients with chest symptoms suggestive of COPD (Shortness of breath, Cough, expectoration chest pain etc.) associated with past or present history of chronic smoking were Subjected to spirometery.
3. Patients with chronic history of bronchial asthma with the age above 40 years were subjected to spirometery examination
4. Patients with chest clinico-radiologically suggestive of COPD, but not exposed to any type of smoke inhalation were subjected to spirometery examination (in rare cases of alpha-1 anti-trypsin deficiency)

Inclusion criteria

1. Both male and female patient with.age more than 40 years presenting with clinical features suggestive of COPD and who attend respiratory medicine out patient department.
2. Patients who had given valid consent.

Exclusion Criteria

1. Patients who had not given valid consent.
2. Hemo-dynamically unstable patients.
3. Contra-indications of spirometery.

Table 1 Age of study cases

S. No.	Age groups(in Years)	No. Of COPD patient.
1.	40-50	28
2.	51-60	69
3.	61-70	103

The table shows :- In our study cases the most common most patients found in age group 61-70 years which is 52.5% ,than 34.5% cases found between age group 51-60 years and minimum patient found in age group 40-50 years which was only 14%.

Table 2 Mean age ± S.D of study cases in different categories of COPD in years

S.N	COPD stage	Male	Female	Total
1.	Cat.1	7	1	8
2.	Cat.2	44	2	46
3.	Cat.3	59	4	63
4.	Cat.4	75	8	83
Total Study Cases		185	15	200

1. **Cat.1 COPD GOLD : 59.87±6.13**
2. **Cat. 2 COPD GOLD : 60.13±6.10**
3. **Cat. 3 COPD GOLD : 60.73±7.92**
4. **Cat. 4 COPD GOLD : 60.27±7.31.**

Table 3 Body Mass Index in Study Cases

COPD stage	BMI<18 Undernutrition	BMI 18-22.99 Avreage	BMI 23-24.99 Overweight	BMI >25 Obese	Total
Cat.1	1	4	2	1	8
Cat.2	20	21	4	1	46
Cat.3	35	23	4	1	63
Cat.4	54	27	2	0	83
Total	110	75	12	3	200

We observe in our study maximum found undernourished or malnourished. About 55% of studied cases were undernourished which was 110 patient out of 200 cases .however we know that normal BMI in Indian population condisered between 18-22.99 kg/m2, and we found 37.5% (75 cases out of 200 cases) are in average BMI

Table 4 Correlation between Copd Stage & Bmi

SN.	COPD Categories	NO. OF PATIENTS (Male + Female)	Mean BMI ± S.D
1.	CATEGORY –I	8 (7+ 1)	20.93 ± 2.71
2.	CATEGORY – II	46(42 +2)	19.31 ± 2.72
3.	CATEGORY –III	63 (59 + 4)	17.97 ± 2.10
4.	CATEGORY –IV	83 (75 + 8)	17.37 ± 2.37

Table 5 COPD stages and Pack Year of smoking

COPD Stages	Stage 1	Stage2	Stage 3	Stage 4
Mean Pack Year ± S.D	4.37 ± 2.53	7.71 ± 3.03	13.00 ± 3.5	14.22 ± 5.17

DISCUSSION

This is an open label, comparative, analytical and prospective study done in the Department of Respiratory Medicine, New Medical College Hospital, Kota during period Oct. 2014 to Sept. 2015. On the basis of history, clinical examination and various investigation 200 study cases of COPD were taken from Respiratory medicine OPD & ward.

In present study we have explored the correlation between COPD with BMI. In this study the majority of subjects were males 184 (92%) and only 16 (8%) were female.

Jindal *et al* (2001)[3] reported that prevalence of COPD was uniformly higher amongst male in all reported studies.

SM Liu *et al* (2005)[4] reported in his study that male and female ratio of COPD .prevalence was 3.3: 1

We observed that the most common cause of COPD was chronic, present or past history of bidi smoking.

In our study 186 cases out of 200 cases were COPD due to chronic present or past history of smoking in which mainly due to bidi smoking, only some cases found which were due to cigarette smoking.

We also observe that COPD in females in our study is due to smoke inhalation due to making of food by using of wooden burning stove in long duration (25-30years). out of 16 females only 2 females COPD patient found due to chronic bidi smokers.

In this study we found that most patients occur in age group 61-70 years of age and minimum patient were in age group 40-50 years which was only 14% of the study cases. We also observe in this study that most patients with advanced age found in

cat.4 followed by cat.3, cat.2 and cat.1which was 41.5%, 31.5%, 23% and 4% respectievely.

James K Stoller (2012)[5]**:-** found in his study that prevalence of COPD in people aged <45 years is low and the prevalence is highest in patients aged >65 years. The prevalence of COPD in those aged >65 years was 4 times that among those aged 45-64 years, this support our study.

In our study, the cough with expectoration was the most common symptom in more than 90% cases 2nd most common symptom observed in our study was shortness of breath. We also observe 3rd most common in our study was bilateral chest pain / chest tightness. other less common symptoms we observe in this study were marked reduction daily activity living due to dyspnea, wheezing, described as noisy breathing or whistling sound, and some cases of purse lip breathing also observed, and we also seen our study that many patients also complain mild to moderate grade of Fever which was generally during exacerbation and caused by secondary infection.

Body Mass Index in Study Cases

In our observations, most of patient s, 55% were undernourished, 37.5% patients had normal BMI, 6% patient was overweight and only 1.5% patients were obese the relationship between BMI and COPD stage was explored multidimensionally. All of them yielded a significant inverse association. The association between COPD stage and BMI category revealed that with increasing COPD stage the proportion of subjects with undernourished BMI status increased significantly. The overall prevalence of undernourished BMI was 55% and was minimum in stage I (0.5%) and maximum in stage IV (27%).

A study done by Cochran (2004)[6] with 103 stable out patients, of whom 23% were malnourished, reported an association between reduced nutritional intake/malnourishment and severe lung disease.

In our study, high percentage of undernourished subjects as compared to study done by **Cochrane** was observed. In another study done by Gupta *et al* (2010)[7]**,** COPD in general was found to be associated with malnutrition (83% patients being BMI <20 kg/m^2) also supported our result, as their patients were admitted and had more severe form of disease.

In our study we have found that 44.5% of patients with severe and very severe COPD (stage III and IV) are undernourished

Our result is supported by study done by Schols *et al* (1993)[8]**,** where he found that approximately 50% patients suffered from weight loss in severe COPD. As mentioned earlier, the possible explanation for the higher prevalence of undernutrition in our set up could be due to lower socioeconomic strata, poor health care facility, late diagnosis and, intervention.

Association between GOLD, COPD stage and BMI. In stage (I+II) COPD, 38.88% of patients had BMI<18 and 61.11% had BMI>18 where as in stage (III +IV) COPD, 60.95 % of patients had BMI<18 and 39.04% had BMI>18

Similarly, the mean BMI was observed to be decreasing significantly with increasing age. The relationship with BMI was found to be holding similar trend with advancing COPD stages All the associations were observed to be significant statistically too.

Yang *et al*. (2010)[9] , too supported the similar findings and also found that low BMI was predicted as an indicator of mortality amongst the COPD patients, thus inferring that low BMI is an indicator of advanced stage of COPD.

The possible explanation of nutritional abnormality and weight loss is due to decreased caloric intake and increased basal metabolic rate[8,10]. Loss of muscle mass is main cause of weight loss in COPD patients, where loss of fat free mass contributes to lesser extent[(8)]. It has been seen that at a microscopic level, muscle fiber atrophy and alteration of fiber type can occur.[11] Plasma levels of certain pro-inflammatory cytokines like TNF-α are increased in COPD that can provoke muscle cell apoptosis and protein degradation. In most patients with COPD there is an imbalance between metabolic requirement and calorie intake leading to weight loss.[12]

Systemic inflammation could also play a significant role as shown by relationship between metabolic derangement and increased level of inflammatory mediators in COPD, and tissue hypoxia may also make a contribution. One reason for this association could be attributed to loss of metabolic functions owing to lack of SpO_2.

In the multivariate analysis, we tried to explore the role of age, sex, smoking packs year and BMI with COPD stage but could get only significant association between BMI and COPD stage. One of the reasons of our inability to find any association with sex could be the disproportionate size of two genders in present study whereas smoking packs per year could not emerge as an associating factor as most of the patients were heavy smokers. However, emergence of BMI as an independent marker associated with COPD staging in both univariate as well as multivariate analysis was the most significant finding of the present study.

Finally we concluded from the present study that

1. Spirometery is superior in COPD diagnosis even in , mild to moderate symptomatic cases, past history of dyspnea, no any symptom but only history of smoking etc. We can better differentiate restrictive and obstructive lung disease by spirometery.
2. In stage I of COPD where chest x-ray appears normal and it very difficult to diagnose by any other method like CT-scan of thorax or any other investigations spirometery may diagnose easily.
3. In stage II where where chest x-ray and all investigations are normal in range and patient have dyspnea but no history of smoking (chronic/present or active/passive), and bronchial asthma spirometery can diagnose the COPD (suspected alpha 1 anti-trypsin deficiency).
4. Finally we concluded that, as the severity or grade of COPD increase the oxygen saturation of the patient and body mass index of the patient decreases. So we can say that as the severity of COPD increase the malnutrition level increased and oxygen saturation of the person decreases.

Bibliography

1. Global Initiative for Chronic Obstructive Lung Disease. Global strategy for the diagnosis, management and prevention of Chronic Obstructive Pulmonary Disease (Revised 2011) [accessed on September 17, 2016]. Available from: http://www.goldcopd.org/uploads/users/files/GOLD_Report_2011_Feb21_pdf .
2. Definition and classification of chronic bronchitis for clinical and epidemiological purposes. A report to the Medical Research Council by their Committee on the Aetiology of Chronic Bronchitis. Lancet. 1965; 1:775–9.
3. Jindal SK, Aggrawal AN, Gupta D, A review of population studies from India to estimate national burden of COPD and its association with smoking. Indian J Chest Dis Applied Sci 2001:43(3): 139-147
4. SM Liu *et al* 2005: Epidemiology analysis of COPD in Guongdong province. Zhonghua yi xue Za Zhi, 2005 mar 23, 85(11): 747 -52.
5. James K Stoller (2012)./ Hurd S: The impact of COPD on lung health worldwide: Epidemiology and incidence. *Chest* 2000; 117(suppl 2):1S-4S.
6. Cochrane WJ, Afolabi OA. Investigation into the nutritional status, dietary intake and smoking habits of patients with chronic obstructive pulmonary disease. *J Hum Nutr Diet*. 2004; 17:3–11.
7. Gupta B, Kant S, Mishra R. Subjective global assessment of nutritional status of chronic obstructive pulmonary disease patients on admission. *Int J Tuberc Lung Dis*. 2010; 14:500–5.
8. Schols AM, Soeters PB, Dingemans AM, Mostert R, Frantzen PJ, Wouters EF. Prevalence and characteristics of nutritional depletion in patients with stable COPD eligible for pulmonary rehabilitation. Am Rev Respir Dis. 1993; 147:1151–6.
9. Yang L, Zhou M, Smith M, Yang G, Peto R, Wang J, *et al*. Body mass index and Chronic obstructive pulmonary disease-related mortality: A nationally Representative prospective study of 220,000 men in China. *Int J Epidemiol*. 2010; 39:1027–36.
10. Schols AM. Nutrition in chronic obstructive pulmonary disease. Curr Opin Pulm Med. 2000; 6:110–5.
11. Kim HC, Mofarrahi M, Hussain SN. Skeletal muscle dysfunction in patients with chronic obstructive pulmonary disease. *Int J Chron Obstruct Pulmon Dis*. 2008; 3:637–58.
12. Schols AM, Wouters EF. Nutritional abnormalities and supplementation in chronic obstructive pulmonary disease. Clin Chest Med. 2000;21:753–62

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