Original Research

The Evaluation Of Risk Factors For Metabolic Syndrome In Chronic Obstructive Pulmonary Disease Patients

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ABSTRACT

Background: The complex interaction of genetic and environmental factors is a common feature of MetS and COPD. The aim of this study was to investigate the frequency of MetS in patients with COPD and to assess the status of systemic inflammation in COPD patients with MetS and those without MetS. **Material & Methods**: A case control study done on 540 outdoor & indoor patients attending the department of Medicine with clinical history consistent with Chronic Obstructive Pulmonary Disease (COPD) and diagnosed so as per GOLD guidelines. Age, sex and BMI matched healthy subjects will form the control group. For NCEP criteria abdominal obesity is a component of the syndrome but not a prerequisite for diagnosis. The IDF criteria of MetS uses central obesity (waist circumference ≥90 cm for South Asian men or ≥80 cm for South Asian women) as a mandatory criterion and the presence of at least two of the other four criteria which are identical to those provided by NCEP ATP III. **Results:** Our study showed that the majority of cases were seen in 31-75 years in case group but in control group were seen in 15-75 years of age. The BMI, Life style, FBS, Blood pressure and lipid profile was not statistically significant. The grade 2 & grade 3 GOLD criteria of COPD was statistical significant with metabolic syndrome. **Conclusion:** The present study shows that MetS is frequent in patients with COPD. Management of these disorders should reduce the risk of cardiovascular morbidity and mortality in patients with COPD.

Keywords: COPD, Met's, GOLD Criteria, NCEP-ATPIII criteria

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INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is a growing epidemic and remains a major public health problem.[1-3] The overall prevalence of COPD is estimated to be in the vicinity of 4-5% in our country.[4,5] An inappropriate/excessive inflammatory response of the lungs to respiratory pollutants, mainly tobacco smoking is hallmark of Chronic obstructive pulmonary disease (COPD). As a result, many of these patients have co-morbidities as well due to circulating inflammatory mediators.[6] Metabolic syndrome is found to be twice more common in COPD when compared to the general population. By 2016 it is estimated that about 59.1 lakh people in urban areas and 163 lakh people in rural areas in India will suffer from COPD.[7] The prevalence of obesity and metabolic syndrome is rapidly increasing in India and approximately about one-third of the urban populations have MetS.[8] Several workers have reported increased prevalence of metabolic syndrome in COPD. Lam et al in 2009[9] studied 7,358 adults, of which, 6.7% had air flow obstruction. MetS criteria were met by 20.0%. The risk of MetS was higher in those with air flow obstruction than those without. Akpinar et al in 2012[10] studied 91 stable COPD patients and 42 control subjects. The severity of COPD was determined according to GOLD criteria. NCEP-ATPIII criteria were used to diagnose MetS. Hs-CRP levels were also measured. Wells CE et al in 2013[11] found that COPD patients had multiple risk factors predisposing to MetS and diabetes i.e. obesity, sedentary lifestyle, increased inflammation and oxidative stress and are treated with corticosteroids. They suffered from diabetes mellitus and MetS, about 1.5 times more commonly than the general population. In a study of 232 patients suffering from COPD with no signs of exacerbation and usage of corticosteroid therapy three months

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prior the examinations, Lazovic et al in 2013[12] found that 60 of them (26%) had MetS. This being so the inflammation theory behind MetS is difficult to explain. None of the previous researchers have correlated the risk of MetS (or its components) with severity of COPD based on risk factors. Further, obesity, by itself, is also associated with systemic inflammation and it is not very clear whether it is the associated obesity that causes the MetS or the COPD. It was hypothesized that: Risk factors in Chronic Obstructive Pulmonary Disease (COPD) by itself may not contribute to Metabolic Syndrome (MetS).

MATERIAL & METHODS

A case control study done on 540 outdoor & indoor patients attending the department of Medicine with clinical history consistent with Chronic Obstructive Pulmonary Disease (COPD) and diagnosed so as per GOLD guidelines (GOLD-2016)[13]. Age, sex and BMI matched healthy subjects will form the control group.

All patients with irreversible airway obstruction were recruited in the study subject to the their written consent & following inclusion and exclusion criteria:-
Inclusion criteria:-
1. Age between 20 to 80 years.
2. Body weight between 30 to 90 kg.
3. Willing to participate in study.
Exclusion criteria:-
1. Other illnesses like active pulmonary tuberculosis, Malignancy, Renal or Hepatic disease.
2. Present or past history of wheeze, chest tightness, eye allergy, nasal allergy or skin allergy, suggesting bronchial asthma.
3. H/O Acute Exacerbation of COPD or systemic steroid use in past 3 months.
4. Patients who refuse consent.

Severity Stage Characteristics of COPD (GOLD Criteria)

In patients with $FEV_1/FVC < 0.70$:		
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	$FEV_1 < 30\%$ predicted

Definitions of Metabolic Syndrome:

The modified NCEP criteria[14] require at least three of the following components:

1. Abdominal obesity (waist circumference ≥90 cm for Asian men or ≥80 cm for Asian women)
2. Triglycerides ≥150 mg/dL
3. HDL cholesterol ≤40 mg/dL for men or 50 mg/dL for women
4. Systolic/diastolic blood pressure ≥130/85 mmHg or receiving drug treatment
5. Fasting plasma glucose ≥100 mg/dL.

For NCEP criteria abdominal obesity is a component of the syndrome but not a prerequisite for diagnosis. The IDF criteria of MetS[15] uses central obesity (waist circumference ≥90 cm for South Asian men or ≥80 cm for South Asian women) as a mandatory criterion and the presence of at least two of the other four criteria which are identical to those provided by NCEP ATP III.

Statistical analysis:-
The data collected were analyzed for validity statistically with the software SPSS
(Statistical Package for the Social Sciences)

RESULTS

Our study showed that the majority of cases were seen in 31-75 years in case group but in control group were seen in 15-75 years of age (table 1). The BMI, Life style, FBS, Blood pressure and lipid profile was not statistically significant (table 2). The grade 2 & grade 3 GOLD criteria of COPD was statistical significant with metabolic syndrome (table 3).

Table 1: Distribution of age groups in case & Control group				
Age (yrs)	Case	Control	T-test	Pvalue
15 – 30	0	43	-9.148	P < 0.0001
31 – 45	35	64		
46 – 60	95	67		
61 – 75	102	84		
>75	28	2		
Mean	59.96	48.64		
SD	11.38678	16.03285		

Table 2: BMI

	Case	Control
Mean	24.69612	24.67162
SD	3.294584	2.503188
T test	-0.117	
p value	0.9015	

Table 3: Correlation between GOLD Criteria of COPD with Metabolic syndrome

Gold Criteria	Positive	Negative		
1	3	8		
2	37	70	chi square test	6.079
3	24	90	p value	0.1062
4	4	24		
significant at 10.5% level				

DISCUSSION

The main findings of the current study were the following: more than 26.15 % of COPD patients had MetS, and the level of systemic inflammation was higher in COPD patients with MetS in comparison with COPD patients without MetS.

The prevalence of MetS in COPD patients is highly variable between studies. The prevalence depends on the criteria used to diagnose MetS and the study inclusion criteria. Also, it depends on the country/ethnicity studied. In the research carried out in Germany by Wats et al, IDF criteria were applied and the prevalence was estimated at 47.5 %[16]. On the other hand, Minas et al performed a study in Greece, using Adult Treatment Panel III criteria and excluding patients with diabetes, cardiovascular disease, and other comorbidities. They found the prevalence of Mets 21 %.[17] Studies conducted in China (Lam et al) and Japan (Funakoshi et al) revealed that 22.6 % and 23 % of COPD patients had MetS, respectively.[9,18] In the study performed by Hosny et al in Egypt, MetS was present in 40 % of COPD patients.[19]

MetS is less frequent in patients with severe form of COPD. This is a consequence of weight loss that often occurs in patients with advanced disease. Various studies show that the MetS is more common in younger patients and the earlier stages of COPD (GOLD I-II). It is suggested that these patients may constitute a specific COPD phenotype which indicates higher risk of diabetes and cardiovascular diseases and requires a closer follow up.[17]

In our study, the frequency of MetS was the highest in COPD patients in GOLD stage II, as observed in studies of Wats[16], Akpinar[10] and Diez-Manglano[20].

CONCLUSION

The present study shows that MetS is frequent in patients with COPD. These findings suggest that physicians should screen COPD patients for associated MetS and elevated circulatory inflammatory markers.

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