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Respiratory Medicine

A STUDY OF METABOLIC SYNDROME IN COPD PATIENTS

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ABSTRACT

INTRODUCTION : The overall prevalence of COPD is estimated to be 4-5% in our country . To date, the magnitude of metabolic syndrome in COPD patients compared to healthy subjects has been studied scarcely. In the present study we analysed and evaluated the prevalence / load of metabolic syndrome in COPD patients compared to healthy subjects, and also its association with severity of disease.

METHODS: The present Cross sectional analytical comparitive study is carried out on 100 diagnosed COPD patients (GOLD criteria) as well as 100 apparently healthy non smoker volunteers (control group). All the patient were recruited from local Randomly selected Pulmonary / Chest TB Units of Tertiary care Hospitals after taking written informed consent prior to participation in the study. Information on each patient selected were carefully obtained by using a pre- designed structured proforma. Study duration was 15 months.

RESULTS: During the study period, out of 100 COPD patients, 48 patients were diagnosed to have metabolic syndrome as compared to control group in which 16 were found to have metabolic syndrome. Based on the GOLD criteria , all COPD patients were classified as mild, moderate, severe and very severe category and NCEP ATP III criteria was used to diagnose metabolic syndrome. 04 (33.33%) patients in Mild, 29 (53.70%) patients in Moderate, 09 (29.03%) patients in Severe and 06 (26.08%) patients in very severe COPD group to have metabolic syndrome.

CONCLUSIONS : Study concludes that prevalence of metabolic syndrome is more common in COPD patients compared to control group and more prevalent in Grade II COPD subsets. Hence components of metabolic syndrome being the most serious co-morbidities encountered with COPD amounting for severe disease and major cause of mortality.

KEYWORDS : LRTI , Mycobacterium , DM, Streptococcus .

INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is characterized by persistent airflow limitation that is usually progressive and associated with chronic airway inflammation. Additionally, exacerbations and co- existing morbidities contribute to the overall severity in the individual patient. The overall prevalence of COPD is estimated to be 4-5% in our country [1]. It has been recognized as a major cause of morbidity worldwide and is likely to be the third leading cause of death by the year 2020 [2]. It is most commonly occurs in tobacco smokers and is characterized by an increase in the annual rate of decline of forced expiratory volume in 1 second (FEV1).

COPD has been associated with several extra- pulmonary systemic manifestations such of diabetes mellitus, osteoporosis, and metabolic syndrome, cardiovascular disease and lung cancer [3,4]. Metabolic syndrome, also called insulin resistance syndrome or syndrome X is a cluster of risk factors that is responsible for much of the excess cardiovascular disease morbidity among overweight and obese patients and those persons with type 2 diabetes mellitus [5].

The major characteristics of metabolic syndrome include insulin resistance, abdominal obesity, elevated blood pressure, and lipid abnormalities (i.e., elevated level of triglycerides and low levels of high-density lipoprotein cholesterol). Metabolic syndrome is age dependent and has been related to several other health conditions and an increased mortality risk. In addition, metabolic syndrome has clinically relevant negative effects on subjects exercise capacity as well as on health status. Several etio-pathogenic mechanisms have been proposed as a possible link between COPD and metabolic disorders that include systemic inflammation, adipose tissue inflammation, medications and physical inactivity .[6,7].

To date, the magnitude of metabolic syndrome in COPD patients compared to healthy subjects has been studied scarcely. In the present study we analysed and evaluated the prevalence / load of metabolic syndrome in COPD patients compared to healthy subjects, and also its association with severity of disease.

METHODOLOGY

The present Cross sectional analytical comparitive study is carried out on 100 diagnosed COPD patients (GOLD criteria) as well as 100 apparently healthy non smoker volunteers (control group). All the patient were recruited from local Randomly selected Pulmonary / Chest TB Units of Tertiary care Hospitals after taking written informed consent prior to participation in the study. Information on each patient selected were carefully obtained by using a pre- designed structured proforma. Study duration was 15 months, All patients and controls were analysed for clinical and laboratory findings, including full history taking, clinical examination, routine laboratory investigations including complete blood picture with differential white cell count, erythrocyte sedimentation rate, complete liver and kidney functions test, serum uric acid, lipid profile including HDL-cholesterol, triglycerides, and ECG, 2D ECHO has also been done in all patients. Body weight, height, and waist circumference were obtained in all participants. Waist circumference was measured by a single observer using an inelastic tape at the midpoint between the lowest rib and the iliac crest. Blood pressure was taken from both arms and the higher measurement was used for analysis. Participants were asked to fast for 12 h before blood sampling. Serum triglycerides were measured by Lipase-Glycerol kinase method. HDL-C was assessed by oxidase method.

Standard pulmonary function test was done for all COPD patients and control group. Based on the GOLD criteria (Table 1) all COPD patients were classified as mild, moderate, severe and very severe category. We used NCEP ATP III criteria to diagnose metabolic syndrome (Anneure 1).

STATISTICAL ANALYSIS

The data obtained were analyzed in detail using the statistical

software SPSS 23 for Windows. Data are reported as mean ± SD or proportions and 95% confidence intervals. Statistical analysis was performed by tests of significance and p-value < 0.05 was considered statistically significant.

Annexure-1
NCEP ATP III criteria
3 out of the following 5 criteria must be present for diagnosing metabolic syndrome.
1. Waist circumference (WC > 102 cm in men or > 88 cm in women)
2. Fasting blood glucose >100 mg/dl (5.6mmol/l) /previously diagnosed type II diabetes.
3. Serum triglyceride >150 mg/dl (1.7mmol/l) or specific treatment for this lipid abnormality.
4. Serum high density lipoprotein (HDL) ≤ 40 mg/dl (1.03mmol/l) in men or ≤ 50mg/dl (1.29mmol/l) in women or specific treatment for this lipid abnormality.
5. Systolic blood pressure ≥130 mmHg and/or diastolic blood pressure ≥ 85 mmHg or treatment of previously diagnosed hypertension.

Table 1: Grading of COPD (GOLD criteria)

Grade	Severity	Spirometry
I	Mild	FEV1/FVC < 0.7 FEV1 ≥ 80% Predicted
II	Moderate	FEV1/FVC < 0.7 50% ≤ FEV1 < 80% Predicted
III	Severe	FEV1/FVC < 0.7 30% ≤ FEV1 < 50% Predicted
IV	Very Severe	FEV1/FVC < 0.7 FEV1 < 30% Predicted

RESULTS
We tabulated Baseline characteristics of all the subjects participated in the study in Table 2. All COPD patients and control participants were matched for age and gender.

In our study we noted COPD patients of average age 54.7±5.8 yrs and male predominance (male: female = 72:28). We noted slightly higher BMI in COPD group (26.1 ± 3.7) compared to control group (23.1 ± 4.2) but not statistically significant. Among 100 COPD patients 78 were smoker or tobacco chewers (which include former and current smokers / tobacco chewers) and 28 were non-smokers. We also noted higher WC in COPD group (88.9 ± 7.3) compared to control group (86.1 ± 8.5). SBP (131.1 ± 11.4) and DBP (84.4 ± 9.12) were also higher in COPD group compared to control group which were 125.4± 12.7 and 79.6 ± 8.8 respectively.

TG concentration were higher in COPD (144.7 ± 13.7) compared to healthy groups (140.2 ± 9.2), but HDL value was higher in control group (45.4 ± 7.1) compared to COPD (41.5 ± 6.5) group. One noted point was more Diabetes among COPD group, as FBS value was higher in COPD group (108.1 ± 17.5) compared to control group (95.2 ± 12.2).

Our study revealed statistically significant differences between the two groups in various parameters like body mass index (p-value < 0.001) fasting blood glucose (p-value <0.0001) waist circumference (p-value=0.026) and systolic blood pressure (p-value=0.0140) where as Age (p-value=0.6264), DBP (p-value =0.312) and triglyceride levels (P value=0.172) and high density lipoprotein cholesterol levels (p-value=0.23) among two groups were statistically insignificant During the study period, out of 100 COPD patients, 48 patients were diagnosed to have metabolic syndrome as compared to control group in which 16 were found to have metabolic syndrome.

Based on the GOLD criteria (Table 1) all COPD patients were classified as mild, moderate, severe and very severe category and NCEP ATP III criteria was used to diagnose metabolic

syndrome. 04 (33.33%) patients in Mild, 29 (53.70%) patients in Moderate, 09 (29.03%) patients in Severe and 06 (26.08%) patients in very severe COPD group to have metabolic syndrome (Table 2). We noted more percentage 29/54 (53.70%) of patients in Moderate COPD group with co existed metabolic syndrome.

Table 2: Prevalence of metabolic syndrome in relation to severity of COPD

Grade of COPD	Metabolic Syndrome (present) in Various Grades of COPD	
	No.	Prevalence
Mild	04/12	33.33%
Moderate	29/54	53.70%
Severe	09/31	29.03%
Very severe	06/23	26.08%

(n=100)

DISCUSSION
COPD is complex disease with multiple systemic morbidities and complications [8]. Systemic inflammation and physical inactivity have been identified as relevant extra pulmonary marker of the severity of COPD and they lead to exacerbations, hospitalizations, and mortality in this patient population [9,10]. When COPD and metabolic syndrome coexists cardiovascular complications are more common when compared to general population.

Our study showed high prevalence of metabolic syndrome in COPD patients compared to healthy group of patients . Our study also showed presence of metabolic syndrome is more common in moderate group of COPD patients. (Table -2)

Similar studies done by Hosny et al. [11], also reveals presence of metabolic syndrome more common in COPD group of patient compared to healthy group. One more study done by Marie-Kathrin et al. [12] showed similar observations.

Our study revealed statistically significant differences between the two groups in various parameters like body mass index (p-value < 0.001) fasting blood glucose (p-value <0.0001) waist circumference (p-value=0.026) and systolic blood pressure (p-value=0.0140) where as Age (p-value=0.6264), DBP (p-value =0.312) and triglyceride levels (P value=0.172) and high density lipoprotein cholesterol levels (p-value=0.23) among two groups were statistically insignificant.

Our study also revealed that presence of diabetes is more common in Grade III and IV COPD patients. Possible explanation being as the diseases progress in severity, patients use more medications in the form of steroids and also presence of adipose tissues inflammation leading to body insulin resistance leading to development of diabetes [13].

It is important to emphasize that COPD result in sedentary lifestyle and physically inactive condition, which could explain the higher prevalence of the metabolic syndrome in COPD patients compared to the control participant. COPD is an important risk factor for cardiovascular disease, increasing the risk by two to three folds [14]. Thus in COPD patients the presence of metabolic syndrome might explain the increase in incidence of cardiovascular complications.

CONCLUSIONS
Our study concludes that prevalence of metabolic syndrome is more common in COPD patients compared to control group and more prevalent in Grade II COPD subsets. Hence components of metabolic syndrome being the most serious co-morbidities encountered with COPD amounting for severe disease and major cause of mortality. Early recognition of metabolic syndrome in COPD patients and early intervention

can prevent the mortality and morbidity related to cardiovascular complications.

Conflict of interest: None declared ,

Consent – Yes

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