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ORIGINAL ARTICLE

The metabolic syndrome in patients with chronic obstructive pulmonary disease

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Abstract Chronic obstructive pulmonary disease (COPD) has extrapulmonary effects that seem to be related with systemic inflammation. The relationship between metabolic syndrome which is an important determinant of systemic inflammation in the general population and COPD is still not clear.

Introduction

COPD is a growing cause of morbidity and mortality worldwide, and will be the third leading cause of death by 2020 COPD is defined as a preventable and treatable disease with significant extra pulmonary effects that may contribute to its severity in individual patients [1].

Chronic obstructive pulmonary disease (COPD) is a state characterized by airflow limitation that is not fully reversible. The airflow limitation is usually both progressive and associated with an abnormal inflammatory response of the lungs to noxious particles or gases [2].

The term chronic systemic inflammatory syndrome has been proposed to take account of the inflammatory nature common to chronic obstructive pulmonary disease (COPD) and its comorbid conditions [3]. One of these possible comorbid conditions is metabolic syndrome, an aggregate of interrelated cardio metabolic risk factors, comprising glucose intolerance, abdominal obesity, dyslipidemia and hypertension, which are associated with an increased risk of cardiovascular disease and type 2 diabetes.

Approximately 40–50% of individuals >60 years of age in industrialized countries meet the criteria for metabolic syndrome. The metabolic syndrome represents a cluster of risk factors (abdominal obesity, atherogenic dyslipidemia, hypertension and insulin resistance) that predispose affected patients to systemic inflammation, cardiovascular disease and physical inactivity [4].

Aim of work

Aim of the work is to detect incidence of metabolic syndrome in COPD patients and its correlation with severity of COPD.

Patients and methods

70 Stable COPD patients and 20 control subjects were included in the study. The severity level in patients with COPD

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was determined according to GOLD (Global Initiative for Chronic Obstructive Lung Disease) criteria. American Heart Association/National Heart, Lung, and Blood Institute (AHA/NHLBI) definition was used in the diagnosis of metabolic syndrome. We measured the characteristics of the metabolic syndrome (waist circumference, blood pressure, fasting blood glucose, serum triglycerides and HDL).

Results

The results are provided in Tables 1–6.

Discussion

The present study was to detect incidence of metabolic syndrome and its components. This study included 90 individuals: 70 male stable COPD patients and 20 male healthy control group. COPD patients were chosen from the chest department and outpatient clinic of Beni Sweif University hospital. Healthy control group was selected at random. All COPD patients and healthy control group are cigarette smokers with a higher smoking index for COPD patients than the control group.

Comparing each metabolic parameter between COPD patients and control group showed higher serum triglycerides in COPD than the control group (mean 181 vs 101.6) with statistical significance (p value = 0.001). Also, fasting blood sugar was higher in COPD than control group (mean 100.3 vs 90.4) with statistical significance (p value = 0.022) but HDL was lower in COPD than the control group (47.1 vs 58) with statistical significance (p value = 0.040).

However, waist circumference and blood pressure both were higher in COPD than the control group (92.9 vs 94.4), (systolic BP 118.4 vs 113.5) but not statistically significant (p value = 0.707, 0.218 respectively) (Table 2).

Our study, found a high significance between COPD and control group regarding hyperglycemia that agrees with Akpinar. In contrast to the present study, it was found that abdominal obesity and hypertension were significantly high in COPD than the control group [5].

This disagrees with Waqar A. who found that HDL concentrations in COPD patients were significantly higher than the controls [6].

Then percent of each component of the metabolic syndrome was estimated in COPD patients and control group.

Table 1 Demographic, functional parameters of syndrome of COPD patients (70) and control (20).

Items	Patient (n = 70) Mean ± SD	Control (n = 20) Mean ± SD
Age	56.6 ± 9.02	42.7 ± 2.5
Sex	All are males	All are males
Smoking index	420 ± 12.2	110 ± 10.5
FEV1/FVE	53.1 ± 10.9	79.1 ± 5.0
Waist cir	92.9 ± 16.1	94.4 ± 10.2
FBS	100.3 ± 12.5	90.4 ± 14.6
BP	123.4 ± 17.5	113.5 ± 13.1
TG	181 ± 79.2	101.6 ± 37.7
HDL	49.1 ± 18.6	58.0 ± 7.4

Table 2 Comparative statistical analysis between patients and control according to metabolic parameters.

	Patient Mean ± SD	Control Mean ± SD	p-Value	Sig
Waist	92.9 ± 16.1	9404 ± 10.2	0.707	NS
FBS	100.3 ± 12.5	90.4 ± 14.6	0.022	S
BP	118.4 ± 17.5	113.3 ± 13.1	0.248	NS
TG	181 ± 97.2	101.6 ± 37.7	0.001	HS
HDL	47.1 ± 18.6	58 ± 7.4	0.012	S

Table 3 Percent of each content diagnosing metabolic syndrome in COPD patients and control and its statistical comparative analysis.

	Patient%	Control%	p-Value	Sig
Waist	21 (30)	5 (25)	0.665	NS
FBS	40 (57.1)	6 (30)	0.042	S
BP	22 (31.4)	3 (15)	0.171	NS
TG	36 (51.4)	1 (5)	0.001	HS
HDL	25 (35.7)	1 (5)	0.009	HS

Table 4 Incidence of metabolic syndrome in COPD patients and control.

	Metabolic	Non-metabolic	Total
Patient no%	23 (32.9)	47 (67.1)	70 (100)
Control no%	1 (5)	19 (95)	20 (100)

Table 5 Incidence of metabolic syndrome in different severity of COPD patients.

Severity	Metabolic no%	Non-metabolic no%
Mild	1 (11.1)	8 (88.9)
Moderate	8 (34.8)	15 (65.2)
Severe	5 (25)	15 (75)
Very severe	9 (50)	9 (50)

In COPD patients, abdominal obesity was represented in 30%, elevated triglyceride levels in 51.4%, low HDL-C levels in 35.7%, elevated fasting glucose levels in 57.1%, and raised blood pressure in 31.4%.

Control participants showed 25% abdominal obesity, 5% elevated triglycerides, 5% had low HDL-C levels, 30% elevated fasting glucose levels, and 15% raised blood pressure (Table 3). So, in COPD patients, the highest percent was hyperglycemia followed by elevated triglycerides then HDL (57.1%, 51.4%, 35.7%) respectively but abdominal obesity and hypertension were of lowest incidence (30%, 31.4% respectively).

On studying incidence in other studies versus Akpinar found a higher incidence of abdominal obesity (52.2% vs 30%), and higher incidence of hypertension (77.2% vs 31.4%) but as regards incidence of hyperglycemia they found the incidence lower than our incidence (46.7% vs 57.1%) [5].