Original research article

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MARKERS OF CARDIOVASCULAR CO MORBIDITY IN CHRONIC OBSTRUCTIVE PULMONARY DISEASE

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ABSTRACT

Objective: The purpose of this study was to provide an overview of the lipid derangements in COPD because India is one of the most affected countries in the world with COPD and contributes significantly to the mortality and morbidity of the disease. CVD is the most prevalent cause of co morbidities and the second most common cause of mortality, next to respiratory failure. Traditionally, dyslipidemia is considered to be one of the most important risk factors for the development of atherogenesis. **Methods:** This study was conducted in central Lab, Department of Biochemistry of S.M.S. Medical College and Hospital, Jaipur, India from the period of Dec.2013 to Nov.2014. In this study 33 patients of COPD taken as cases and 29 healthy controls. We analysed the levels of total cholesterol, triglycerides (TG), low density lipoproteins (LDL), high density lipoproteins (HDL) in COPD patients and control patients. **Results:** we found in this study that mean value of BMI, LDL,TCH of patients was 16.36 $\pm$ 2.82 kg/m2, 117.48 $\pm$ 30.93mg/dl, 177.21 $\pm$ 30.58mg/dl respectively in cases as compared to 20.00 $\pm$ 1.71 kg/m^2 101.32 $\pm$ 15.42 mg/dl, 164.45 $\pm$ 14.40 mg/dl respectively in controls. These relations are statistically significant. BMI decreases with severity of disease and LDL and TCH increases in COPD. **Conclusion:** To conclude, this study gives us an idea that the derangement in levels of LDL and TCH may be associated with cardiovascular co morbidities and it needs to be studied further.

Key words: Triglycerides, Total Cholesterol, Basal Metabolic Index, Chronic Obstructive Pulmonary Disease, Low Density Lipoprotein.

INTRODUCTION:

COPD has both airway central and small airways) and airspace abnormalities. The Global Initiative for Chronic Obstructive Lung Disease GOLD) recently defined 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 co morbidities contribute to the overall severity in individual patient. Chronic Obstructive Pulmonary Disease COPD), the

fourth leading cause of death in the world **(1)**, represents an important public health challenge that is both preventable and treatable.COPD is a major cause of chronic morbidity and mortality throughout the world; many people suffer from this disease for years, and die prematurely from it or its complications. Recently, the Indian Study on Epidemiology of Asthma, Respiratory sSymptoms and Chronic Bronchitis in Adults INSEARECH) involving a total of 85105 men, 84470 women from 12 urban and 11 rural sites was reported **(2).** This study had shown that the overall prevalence of chronic bronchitis in adults >35 yr was 3.49 per cent ranging 1.1% in Mumbai to 10% in Thiruvananthapuram). Thus there are wide variations in the prevalence of COPD in India subcontinent. Based on this study, the national burden of chronic bronchitis was estimated as 14.84 million.

Globally, the COPD burden is projected to increase in coming decades because of continued exposure to COPD risk factors and aging of the population (3). COPD is associated with several co morbidities like hypertension, Diabetes mellitus and Cardiovascular Disease CVD) (4,5). Amongst these, CVD is the most prevalent cause of co morbidities and the second most common cause of mortality, next to respiratory failure (4). Traditionally, dyslipidaemia is considered to be one of the most important risk factors for the development of atherogenesis and to assess the cardiovascular risk. Increased LDL cholesterol levels and decreased HDL cholesterol levels are indicative of an atherogenic lipid pattern (6).

So, The aim of the present study was to investigate the levels of total cholesterol TCH), triglycerides TG), low density lipoproteins LDL), high density lipoproteins HDL) in COPD patients. and to reveal the correlation with FEV1%, as is predicted in COPD and to assess the agreement in between these parameters in COPD.

MATERIAL AND METHODS

This study was conducted in Department of Biochemistry and central Lab S.M.S. Medical College and Hospital, Jaipur, India from the period of Dec.2013 to Nov.2014. In this study 33 patients of COPD taken as cases and compared to age and sex matched 29 healthy controls. For this study subjects Male & Females b/w 18 to 70 years)were selected from the general population of Jaipur and screened for COPD. Subjects were distributed on the basis of GOLD criteria according to severity. This study was Hospital based comparative analysis and Cross sectional study. Clinically diagnosed cases of COPD from OPD/IPD were taken as cases and control group taken from patient's attendants, staff, and students.

Inclusion and exclusion Criteria:Only newly diagnosed cases of COPD Age 18-70 years) and willingness to participate were included in the present study. Age under 18 and above 70 years, Patients with bronchial asthma, pulmonary tuberculosis, bronchiectasis, known congenital or acquired heart disease, diabetes mellitus, hypertension & obesity Patient taking any Anti-Hyperlipidemic medications, previously diagnosed case of COPD who is taking medication were excluded from the study.

Sample collection and Storage:The blood samples of the COPD patients will be taken from outdoor & indoor in morning after overnight fasting. Blood samples of control group will be taken after overnight fasting. The samples will be left standing for one hour; Serum will be separated at 2500 rpm centrifugation and analyzed on fully automated analyzer randox imola). In this study serum levels of HDL-

cholesterol, LDL-cholesterol, Total cholesterol and Triglycerides in COPD patient and healthy controls were analyzed using standard protocol.

Statistical Analysis: Data were analyzed with MS office 2007 and expressed in the form of Mean±SD using student t test and ANNOVA.

RESULT

Male: female ratio in COPD cases was 5.6:1.

In this study BMI shows significant difference between the cases and control groups with mean value in cases 16.36 ± 2.82 kg/m^2 and 20.00 ± 1.71 kg/m^2 in control group p value <0.001).

In this study we found negative correlation between BMI and severity of disease. As severity of disease increases according to GOLD criteria), BMI decreases.

In this study we found significant difference in the LDL and Total cholesterol level in between cases and control group.

The mean value for LDL 117.48 ± 30.93 in case group as compared to 101.32 ± 15.42 in control group which was statistically significant p value .01) and mean of TC in patients with COPD was 177.21 ± 30.58 in case group as compared to 164.45 ± 14.40 in control group which was statistically significantp value= 0.037)

There were 33 cases and 29 controls in this study. Most of them were males. All subjects in this study were smoker.

TABLE 1: Distribution according to sex of case & control group subjects

Gender	Case		Control		Total	
	No.	%	No.	%	No.	%
Male	28	84.85	27	93.10	55	88.71
Female	5	15.15	2	6.90	7	11.29
Total	33	100.00	29	100.00	62	100.00

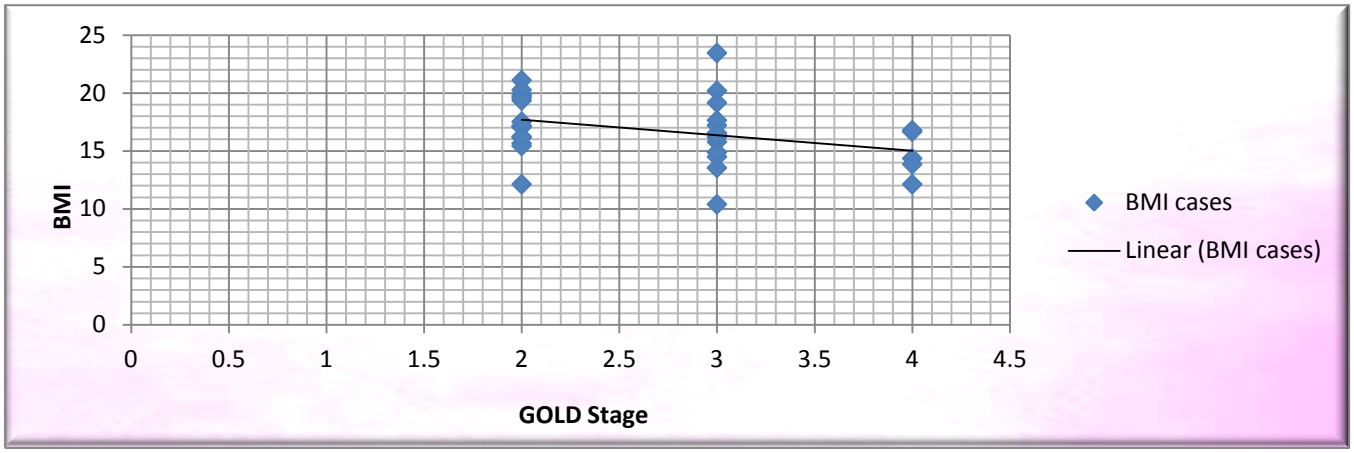
This table shows male preponderance of COPD

TABLE 2: Correlation of BMI with COPD Severity

	Group	N	Mean	Std. Deviation	'p' Value*
BMI	Case	33	16.36	2.82	<0.001
	Control	29	20.00	1.71	

Table shows that COPD patients has low BMI as compared to controls which was significant.

Figure 1: Showing BMI Correlation with COPD Severity



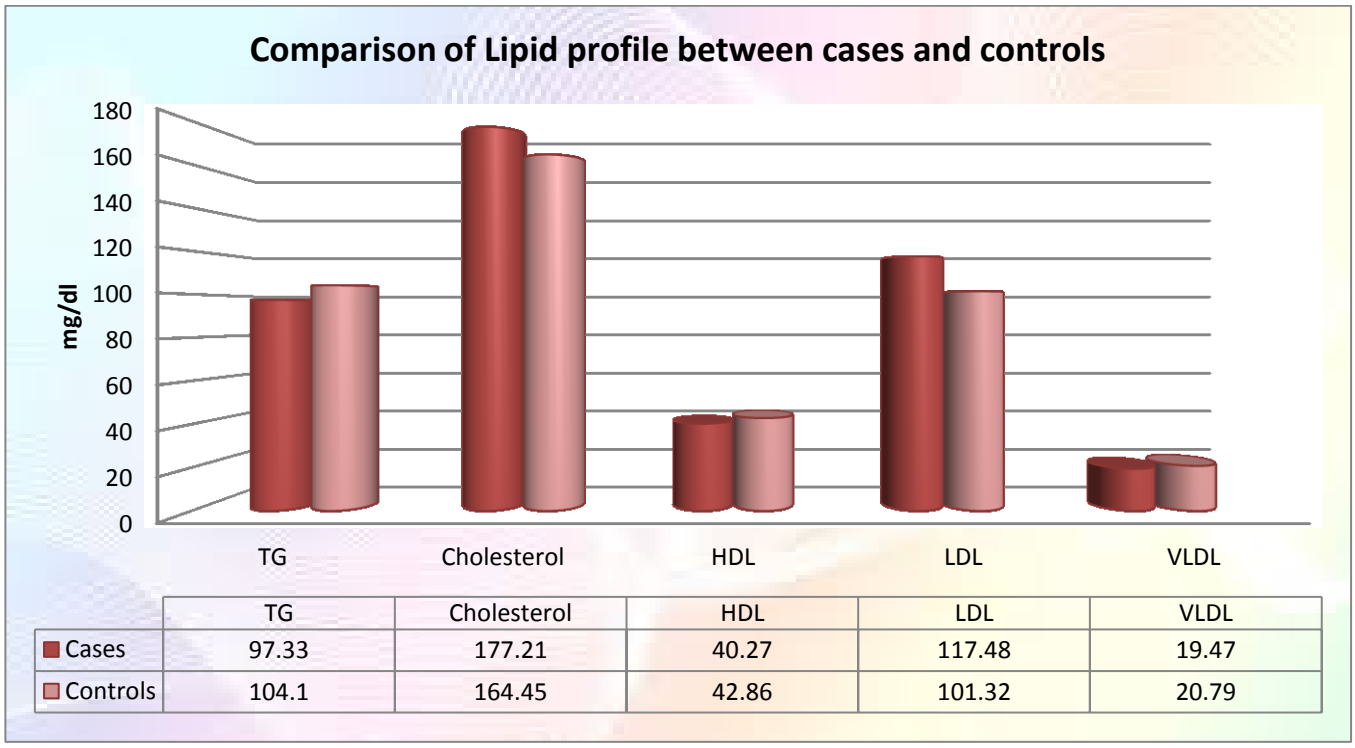
r-value – 0.3486, p=0.0468) Graph showing BMI has significant negative correlation with severity of COPD.

Table 3: Statistically significant changes in mean cholesterol and LDL levels in cases as compared to controls.

Parameters	Group	N	Mean	Std. Deviation	'p' Value*
TG	**Case**	33	97.33	30.89	0.260
	Control	29	104.10	13.67	
Cholesterol	**Case**	33	177.21	30.58	0.037
	Control	29	164.45	14.40	
HDL	**Case**	33	40.27	7.27	0.092
	Control	29	42.86	4.44	
LDL	**Case**	33	117.48	30.93	0.011
	Control	29	101.32	15.42	
VLDL	**Case**	33	19.47	6.15	0.269
	Control	29	20.79	2.72	

Table shows the changes in mean TG, HDL,VLDL levels was statistically non significant in cases as compared to controls.

Figure 2: Lipid profile Comparison between Cases and Controls



DISCUSSION

COPD is the fourth leading cause of death in adults in the United States, and is projected to be the third most common cause of death by 2020. Between 1970 and 2002, death rates due to

stroke and heart disease decreased 63% and 52%, respectively), while death rates due to COPD increased 100% (7). India contributes very significantly to mortality from COPD 102.3/100,000 and 6,740,000 DALYs out of world total of 27,756,000 DALYs; thus significantly affecting health related Quality of Life in the country. COPD is surpassing Malaria, TB even today and the gap would get wider with time in near future. Some studies evaluating the cause of death in patients with COPD suggest that patients are more likely to die of co-morbid conditions than from COPD, whereas others revealed that COPD is the more likely cause of death. Patient selection and severity of disease probably account for these reported differences. Lipid parameters abnormalities are a highly important condition. Its alteration in lipid metabolism increases cardiovascular risk, and so the mortality and morbidity among patients (7). Quantitative and qualitative alterations both happen in COPD (8). Qualitative alterations include size difference in lipid parameters, increase in triglycerides content of LDL, and the susceptibility of LDL cholesterol to form peroxides, which was found specifically responsible for atherogenesis (9). Both lipid profile and body fat have been shown to be the important predictors for metabolic disturbances including dyslipidemia, hypertension, diabetes, cardiovascular diseases, hyperinsulinemia etc. Any alteration in the levels of lipids in body makes the individuals more prone to develop cardiovascular diseases. So in this study an attempt was made to estimate TC, TG, LDL and HDL concentrations in COPD patients.

In this study BMI shows significant difference between the cases and control groups.Table 2 and Graph1). This highly significant difference was observed using the unpaired t-test It was observed from the results of the current study that mean BMI of patients with COPD was 16.36 $\pm$ 2.82 kg/m^2 in case group and 20.00 $\pm$ 1.71 kg/m^2 in control group.

Landbo et al from Denmark had reported 9.6% of COPD patients were underweight <20 kg/m^2) (15). Whereas, Van den Bemt and co-workers from Netherlands had reported 11.7% COPD patients had low BMI $\leq$ 21 kg/m^2) (16). PLATINO study was conducted in five Latin American cities and reported 7% COPD patients were underweight <20 kg/m^2) (17). Vermeeren and co-workers observed 27% of moderate to severe COPD patients were underweight BMI < 21 kg/m^2) (18). Whereas Gupta et al observed 38% COPD patients were underweight when they evaluated 83 consecutive COPD patients who were hospitalized with acute exacerbation and mean BMI of them was 19.4±3.1 kg/m2. Mean BMI of our COPD patient was similar to those studies (19).

The possible mechanism for this may be many factors associated with COPD, In smokers who develop COPD there is an activation of adaptive immunity, with an infiltration of CD4+ and, especially, CD8+ cells. CD8+ cells are cytotoxic to epithelial cells through the release of granzymes and perforin, which can further induce apoptosis of alveolar cells. Moreover, any reduction in neutrophil apoptosis or dysregulation of macrophage uptake of apoptotic neutrophils could lead to chronic inflammation and tissue injury. Increased rates of T-cell apoptosis may lead to a defective immune response to infective organisms, contributing to the high frequency of infections seen in COPD. Increased apoptosis of skeletal muscle could be responsible for the skeletal muscle atrophy, the main cause of unexplained weight loss in patients with COPD.

This study also indicates that majority of outpatients were male 84%) with the mean age of 57.33 years. This observation agrees with the fact that COPD is common in males.

In our study TC shows significant difference between the cases and control groups Table 3 and Graph 2). This significant difference was observed using the unpaired t-test It was observed from the results of our study that mean of TC in patients with COPD was 177.21 ± 30.58mg/dl in case group as compared to 164.45 ± 14.40 mg/dl in control group which was statistically significant p value 0.037)

The results of our study correlate with study conducted by K Begum et al (10). in 2010 which showed that TC concentration is statistically significant in case group compared with control group. Another study is conducted by Davood Attaran et al (11) in 2013 showed that TC concentration in COPD was significantly higher in cases as compared with control groups. In contrast study conducted by Anup N. Nillawar et al (12) in 2013 showed that there is no significant difference in TC level in between cases and control group. Another contrast study conducted by Niranjan M.R. et al (13) in 2011 showed there is no statistical significant difference in level of TG in cases and control group of COPD.

In our study LDL shows significant difference between the cases and control groups Table3 and Graph 2). This significant difference was observed using the unpaired t-test It was observed from the results of our study that mean of LDL in patients with COPD was 117.48 ± 30.93mg/d l in case group as compared to 101.32± 15.42 mg/dl in control group which was statistically significantp value .011).These findings are in accordance with Niranjan M.R et al (13) in 2011 where they found significant difference in LDL level in case group of COPD and matched control group.In contrast study which is done by Anup N. Nillawar et al (12) in 2013 showed that there is no significant difference in serum LDL level in between cases and control group. Another study conducted by Bahar Ulubafl et al (14) in 2013 showed no statistically significant difference between LDL levels of cases and controls in COPD patients. Another study is conducted by Davood Attaran et al (11) in 2013 showed that there was no significant difference in LDL concentration in COPD in cases as compared to control groups.

CONCLUSION

To conclude, the present study gives us an idea that the derangement in level of LDL and Total Cholesterol may be associated with cardiovascular co-morbidities and it needs to be studied further.

Considering all this, improvement in parameters of serum Lipid Profile would have a beneficial effect on treatment, complication and progression of the diseases, so it is recommendable to undergo laboratory analysis of Lipid profile as a routine.

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