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General Medicine

SERUM LIPD PROFILE IN COPD PATIENTS,BENEFICIAL ROLE OF STATINS IN TREATMENT OF COPD.

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ABSTRACT **INTRODUCTION:** Smoking is an important risk factor for COPD and Cardiovascular disease. Smoking affects lipid profile by oxidative pathway. The anti inflammatory properties of statins and utility in treatment of COPD is uncertain.

AIMS: To study the lipid profile parameters(TG,LDL,VLDL,HDL) in COPD among smokers and non smokers ,effectiveness of statins on pulmonary function test in COPD patients.

METHODS: Based on severity of COPD serum TC , TG, LDL,VLDL ,HDL was measured .Patient with abnormal lipid profile and COPD were given a trail of statin therapy for three months.PFT were performed before and after the statin trial.

RESULTS: Out of sixty patients smoking history seen in fifty patients ,have a positive correlation with abnormal lipid profile, results of COPD severity and abnormality lipid profile was not significant. Statin therapy showed improvement in pulmonary function tests.

References: 1Ishida W, Kajiwara T, Ishii M, et al. Decrease in mortality rate of chronic obstructive pulmonary disease (COPD) with statin use: a population-based analysis in Japan. The Tohoku journal of experimental medicine 2007;212:265-73

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KEYWORDS :

INTRODUCTION:

Chronic obstructive pulmonary disease (COPD) is a preventable and treatable disease with some significant extra pulmonary effects that may contribute to the severity in individual patients, characterized by airflow limitation that is not fully reversible and is mainly due to obnoxious particles or gases that produces inflammatory response to the lungs[1].

Smoking mainly affects the lipid profile by decreasing high-density lipoprotein (HDL) and increasing low-density lipoprotein (LDL), triglycerides, and very low-density lipoprotein (VLDL) levels.[2,3]Effects of Smoking and COPD on blood lipid profiles shows the same finding in smokers.Oxidative pathway appears to be one important mechanism for modifying LDL[4] and Cigarette smoke contains oxidizing substances among its > 4000 identified constituents[5] hence it leads to oxidant mediated cellular injury by producing Oxidative damage to unsaturated lipids.

The plasma β-lipoprotein, cholesterol and triglycerides concentration are higher and HDL cholesterol is lower in smoker than in non-smokers.Atherogenicdyslipidemia, Low-grade inflammation and hypercoagulability are the risk factors for coronary atherosclerosis seen in smokers.The clinical importance of hyperlipoproteinemia derives chiefly from the role of lipoproteins in atherogenesis.[6]

Statins, inhibitors of 3-hydroxy-3-methyl glutaryl coenzyme A reductase, are potent inhibitors of cholesterol biosynthesis.[7]Within the last few years, it has been suggested that the anti-inflammatory properties of statins , may lead to their utility in the treatment of other diseases in which inflammation plays a role in pathogenesis.[8] Might statins have a place in the treatment of COPD.[9]

Hence the present study was carried out as an attempt was made to investigate the levels of total cholesterol (TCH), triglycerides (TG), low density lipoproteins (LDL), very low density lipoproteins (VLDL), high density lipoproteins (HDL) in COPD patients and to see the lipid profile parameters with the severity of the COPD disease and study the effect of statin on PFT in patients of COPD with hyperlipidemia.

MATERIALS AND METHODS:

The present study was carried out in a tertiary care teaching hospital in Raichur, Karnataka.The study was carried out as a mixed method study, involving a cross sectional evaluation followed by intervention.

The minimum required sample size was calculated to be 60. Convenient sampling technique was used to select study participants from all the patients who visited OPD and who were admitted in IPD.The present study was carried out during the period of August 2018 To August 2019.

As per GOLD guidelines, any patient who has symptoms of chronic cough, sputum production, or dyspnoea, and / or a history of exposure to risk factors for the disease are considered and is confirmed by spirometry.

The values of Forced Expiratory Volume in first second (FEV1) less than 80% of the expected value and ratio of forced expiratory volume in first second to the fixed vital capacity less than 0.7 (70%) after post bronchodilator inhalation were included in this study.

Patients with Bronchial asthma ,Pulmonarytuberculosis, Bronchectasis,known congenital or acquired heart diseases,Diabetes mellitus and Hypertension,Patients on hypolipidemic drugs were excluded.

After applying above inclusion and exclusion criteria, the 60 patients were selected on the basis of simple random sampling method in patients attendingOPD and IPD in Navodaya Medical College, Hospital and Research Centre.

Patients are subjected to complete examinations including Hb%, TC, DC, urine routine, ESR, RBS, blood urea, serum creatinine, chest radiography,ECG,spirometry, lipid profile parameters.

Along with objectives, extended to study the participants with abnormal lipid profile parameters were administered statin therapy based on their body weight for a period of three months. These participants who were administered statins were subsequently evaluated with pulmonary function tests after three months of treatment.

Institute ethical committee clearance was sought and obtained before the study was begun.

Demographics

Majority of the study participants were in the age group of 61-70 years, who represented 40% of the study population. The mean age of the study participants was 62.03±8.2 years. (50%) reported having a history of smoking with 21-40 pack years. The mean pack years of smoking among the smokers in study was 39±11.2.

Majority of the study participants were found to be in Normal weight category (63.3%), while 25% of them were overweight/obese.

Pulmonary function tests

Pulmonary function test done using computer assisted spirometry. Forced expiratory volume in 1 second (FEV1), forced vital capacity (FVC), and Inspiratory capacity (IVC) were calculated from the flow-volume curve and expressed as a percentage of reference values. The highest value of at least three measurements was used. The reversibility of airway obstruction assessed according to GOLD guidelines using 400 micrograms inhalation of salbutamol [15,16]. Severity of disease was staged by mean FEV1 (L) and percentage of predicted FEV1.

Lipid profile

Venous blood sample (5 ml) was drawn from all the patients in the fasting state of at least 14 hrs. The blood sample was centrifuged at 3000 rpm for 15 min; sera separated and stored at -80 °C until assayed. Total cholesterol, High density lipoprotein (HDL) and triglyceride (TG) levels were determined with Konelab auto analyzer using Randox test reagents. Low density lipoprotein (LDL) concentration was calculated using the Friedewald Equation (LDL = Total cholesterol-HDL-TG/5). Very low-density lipoprotein (VLDL) concentration was calculated using triglyceride/5 formula.

Statistical analysis:

- Means and proportions were calculated for continuous and categorical variables respectively. Tests for normality in distribution of data was done.
- Wilcoxon signed rank test was used to check for statistical significance in means of pulmonary function test parameters before and after treatment with statins since this data was non-parametric.
- Data entry was done in MS Excel 2013 and analysis was done using SPSS version 23.

RESULTS:

Based on pulmonary function test ,patients were were characterised according to GOLD criteria, Mean FEV1 percentage of normal was 54.1±11.89 and mean FVC percentage of normal was 77.7±12.7 among the study participants. Mean FEV1/FVC of the study participants was found to be 54.1±11

TABLE 1

Distribution of study participants based on severity assessed by GOLD criteria (n=60)		
GOLD Score	**Frequency**	**Percent**
2	40	66.7
3	19	31.7
4	1	1.7
Total	60	100.0

Majority of the study participants (66.7%) had a severity assessment by GOLD scoring of 2, while a score of 3 was observed in 31.7% of them.

LIPID PROFILE AND SMOKING STATUS

The abnormality in lipid profile in smoking population was significantly higher compared to non smoking population,even correleated with severity of copd.

TABLE 2:

Association between smoking and lipid profile parameters (n=60)				
Smoking status	**Lipid profile**		**Total n (%)**	**p value**
	Normal n(%)	High / Low for VLDL n(%)		
Total Cholesterol				
Yes	22(44.0)	28(56.0)	50(100.0)	0.355
No	6(60.0)	4(40.0)	10(100.0)	
LDL				
Yes	22(44.0)	28(56.0)	50(100.0)	0.355
No	6(60.0)	4(40.0)	10(100.0)	
HDL				
Yes	19(38.0)	31(62.0)	50(100.0)	0.062
No	7(70.0)	3(30.0)	10(100.0)	
VLDL				
Yes	39(78.0)	11(22.0)	50(100.0)	0.585
No	7(70.0)	3(30.0)	10(100.0)	
Triglycerides				
Yes	29(58.0)	21(42.0)	50(100.0)	0.055
No	25(78.1)	7(21.9)	10(100.0)	

The positive correleation between smoking and alteration in lipid profile was seen.

GOLD SCORE SEVERITY AND LIPD PROFILE

TABLE 3

Association between severity by GOLD score and lipid profile parameters (n=60)				
Lipid profile parameter	**Gold Score**		**Total n(%)**	**p value**
	2 n(%)	≥3 n(%)		
Total Cholesterol				
Normal	15(53.6)	13(46.4)	28(100.0)	**0.044**
High	25(78.1)	7(21.9)	32(100.0)	
LDL				
Normal	15(53.6)	13(46.4)	28(100.0)	**0.044**
High	25(78.1)	7(21.9)	32(100.0)	
HDL				
Normal	14(53.8)	12(46.2)	26(100.0)	0.065
High	26(76.5)	8(23.5)	34(100.0)	
VLDL				
Normal	29(63.0)	17(37.0)	46(100.0)	0.281
Low	11(78.6)	3(21.4)	14(100.0)	
Triglycerides				
Normal	20(52.6)	18(47.4)	38(100.0)	**0.002**
High	20(90.9)	2(9.1)	22(100.0)	
Total	40(66.7)	20(33.3)	60(100.0)	

No significant correleation between Gold scores severity and abnormality in lipid profile was seen in the study

Based on the lipid profile parameters 32 participants were administered with statin therapy.

TABLE 4:

Distribution of study participants based on lung function test parameters before and after statin (n=32)			
Parameter	**Statin therapy**		**p Value***
	Before Mean±SD	**After Mean±SD**	
FEV1 Predicted	2.22±0.4	2.22±0.4	0.511
FEV1	1.25±0.25	1.3±0.25	**< 0.001**
FEV1 Percentage of normal	56.8±9.3	59.0±9.3	**< 0.001**
FVC Predicted	2.85±0.4	2.85±0.4	0.289
FVC	2.3±0.4	2.3±0.4	0.285
FVC Percentage of normal	79.3±10.9	80.4±11.7	0.511
FEV1/FVC	55.6±10.7	57.6±10.7	**< 0.001**

Mean FEV1 and FEV1 percentage of normal were significantly increased after 3 months of treatment with statins. Also, there was a significant increase in FEV1/FVC ratio. This increase in mean values were also found to be statistically significant.

DISCUSSION:

The present study was undertaken with an objective to study the lipid profile parameters in COPD among smokers and non-smokers and to study effect of statins on PFT in patients of COPD with hyperlipidemia. The study was carried out as a mixed method study, involving a cross sectional evaluation followed by intervention among 60 patients attending OPD and in IPD in the department of Pulmonary Medicine and General Medicine. Study participants with abnormal lipid profile parameters were administered statin therapy based on their body weight for a period of three months.

Abnormal lipid profile was seen in nearly 53% of the study participants. Mean FEV1 percentage of normal and FVC percentage of normal were significantly increased after 3 months of statin treatment with statins. This increase in mean values were also found to be statistically significant[10].

These findings supports the deranged lipid profile among nearly 53.3% of the patients in the present study and improvements in their lung function tests after administration of statins.[11,12]It is unknown if

dyslipidemia is another independent factor that could explain the increased risk of cardiovascular morbidity and mortality in COPD.[13,14,15]

CONCLUSION:

In the study population we observed lipid profile parameters, elevation of LDL,TGL, TCH present with lowered HDLpresent and are contributed to 53.3%.

Derangement in lipid profile seen in majority of smokers contributed to 87.5% of study population with hyperlipidemia.

No correlation seen forseverity of the COPD according to GOLD criteria to the derangement of lipid profile in our study.

Cases with COPD with hyperlipidemia are given statin for 3 months improvement of lung functions are observed.

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