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Critical Analysis of Lipid Profile in Chronic Obstructive Pulmonary Disease and Its Correlation with Disease Severity

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Abstract: This paper aims to assess the lipid composition of people with COPD (chronic obstructive pulmonary disease) by comparing it with the severity of the illness. A study group of 50 patients suffering from COPD and another group with 50 normal adults who were not having any chronic medical condition and were not receiving any treatment that affects lipids formation in their bodies were chosen. The majority of cases were males (88%) and over 60 years, with a mean age of 60.09 ± 8.06 years for males and female ages averaging 56 ± 2.56 years. The aim of the study is to analysis outcomes which describe the differences in serum lipid levels between COPD patients and controls; these included low-density lipoprotein (S.LDL), triglycerides (S.TG), and cholesterol. In patients with COPD, it was observed that the levels of S.LDL, S.TG, and cholesterol were considerably higher, while serum high-density lipoprotein (S.HDL) levels were lower (P-value < 0.05). However, any relationship between the lipid profile and severity of COPD was not statistically significant (P-Value > 0.05). According to the results obtained, S.LDL was higher among people with COPD compared to the control group, while S.HDL was lower. In contrast, S.LDL, Cholesterol, and S.TG demonstrated a marked increase in severe and very severe stages of COPD as compared to moderate stages but, differently from those of moderate stages did not show any statistically significant differences.

Keywords: Chronic Obstructive Pulmonary Disease (Copd); Dyslipidemia; Lipid Profile; Severity Of Deisease.

INTRODUCTION

Chronic obstructive pulmonary disease, more commonly known as COPD, is a prevalent disease that is capable of being avoided and managed [Begum, K. *et al*., 2010]. It is characterized by ongoing respiratory symptoms and restricted airflow, resulting in abnormalities to the airways and/or alveoli. These abnormalities usually occur by prolonged exposition to harmful particles and can also be influenced by factors associated with people's lung development [Burtis, A. C. *et al*., 1993 – Global Initiative for Chronic Obstructive Lung Disease, 2018]. The diagnosis requires the use of spirometry. The prevalence of this condition in individuals that have never smoked varies between 3 to 11%. [Global Initiative for Chronic Obstructive Lung Disease, 2013].

The incidence of this illness is on the rise and is strongly associated with the frequency of smoking. It's the main factor resulting in illness and death in people having chronic illnesses. It causes more than three million fatalities per year. Due to the rise in tobacco smoking, pollution, and the aging population, it is projected that the number of yearly fatalities would escalate in the forty years that follow, reaching millions by 2030. [Hitchman, S. C. *et al*., 2011 – Piazzolla, G. *et al*., 2017].

Spirometry enables the categorization of patients into various groups based on the decline in FEV1. However, there is an important difference in the way the condition presents clinically and progresses, which cannot be effectively described by FEV1 [Postma, D. S. *et al*., 2003 – Ramayan, U. K. *et al*., 2013]. Efforts have been made over the course of multiple years to define the phenotypes of COPD based on specific attributes that can distinguish people who have COPD in terms of important clinical outcomes. These attributes include signs, exacerbations, response to treatment, rate of disease progression, and mortality. [Ramayan, U. K. *et al*., 2013].

Patients with COPD may have comorbidities, either independently or as a consequence of the systemic impact of the disease or smoking. The frequently associated diseases are ischemic heart disease, systemic arterial hypertension, osteoporosis, depression, anxiety, lung cancer, asthma, respiratory infections, metabolic syndrome, diabetes mellitus, malnutrition, and gastroduodenal ulcer [Ritabrata, M. *et al*., 2015 – Simon, G, 1990].

For a few years now, COPD has also been linked to cognitive impairment. The cognitive function evokes the brain functions that include the process

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by which the individual perceives, records, stores, retrieves, and uses information in order to adapt his behavior to new situations [Sin, D. D. *et al*., 2003].

People with COPD seem to have an increased risk as a result of various factors. The prevalence ranges from 10 to 61% [Zafirova-Ivanovska, B. *et al.*, 2016]. This variation depends on the study sample and the neuropsychological method used. The study comprehensively offers accurate information on alterations in levels of cholesterol between individuals affected with chronic obstructive pulmonary disease (COPD) [Sonestedt, E. *et al*., 2015, Te-Wei, H. *et al*., 2017]. Furthermore, providing instructions on how to utilize these observations will be advantageous to people treating chronic pulmonary obstructive disease (COPD). People with chronic asthma have various amounts of cholesterol in comparison to those without the disease. This study presents a thorough evaluation of the significance of lipid profiles in persons with chronic lung disorders, revealing major differences in lipid levels among blood samples of patients with chronic lung diseases and those of healthy individuals [World Health Organization, 2015 – Zafirova-Ivanovska, B. *et al*., 2016].

PATIENTS AND METHODS

With randomness, findings emanate involving consent from 50 people suffering from chronic obstructive pulmonary disease (COPD) and 50 well individuals. Each patient's thorough account was made, and a thorough examination was conducted on him/her. Several tests, e.g., chest X-ray (post-anterior view) (Simon 1990), were carried out on both patients and those with normal health conditions in order to see chronic bronchitis characteristics. Before and after inhaling a bronchodilator (salbutamol), spirometry was performed, and computerized spirometry was used to record age, sex, race, weight, and height, as well as predicted and test values that were matched. In this case, the diagnosis of COPD was based on the Post-bronchodilator FEV 1 /FVC ratio of less than 0.7 (70%), which classified its severity based on GOLD criteria. The subject was administered 200 micrograms of salbutamol via a metered-dose inhaler after two hours, after which time a baseline spirometry test was carried out, and the test was repeated again after 20 minutes. GOLD guidelines stipulate that no increases above 200 ml (12%) from pre-bronchodilator FEV1 are considered for inclusion in the study. Patients suffered from four different categories of severity based on their illness according to GOLD guidelines. Before breakfast in the morning, blood samples were gathered from all participants after a fast for eight hours. The lipid profile, measurements of overall cholesterol, triglycerides, or TG, high-density lipoprotein (HDL) cholesterol, and low-density lipoprotein (LDL) was evaluated.

Additionally, very-low-density lipoprotein (VLDL) was computed using the equation VLDL cholesterol = TG/5. The standard software utilized for statistical analyses on SPSS 25 was used on the data for biochemical analyses. The data were summarized by descriptive statistics whereas differences in lipid profiles among COPD patients and healthy controls were assessed through comparative analyses, in addition to considering associations between levels of lipids and severity of disease.

RESULTS

This article analyzed a sample of 50 patients who had chronic obstructive pulmonary disease (COPD), including 44 men and six women. The age and sex distribution are depicted in **FIG. 1**. Most of the patients were elderly, with 56% of them in the age group above 60 years. In particular, 26% were aged between 51-60 years, 16% were within the range of 41-50 years, while only 2% were aged from 31-40 years. Gender-wise, there were more males compared to females since it was observed that male patients constituted about 88% while females accounted for just about 12%.

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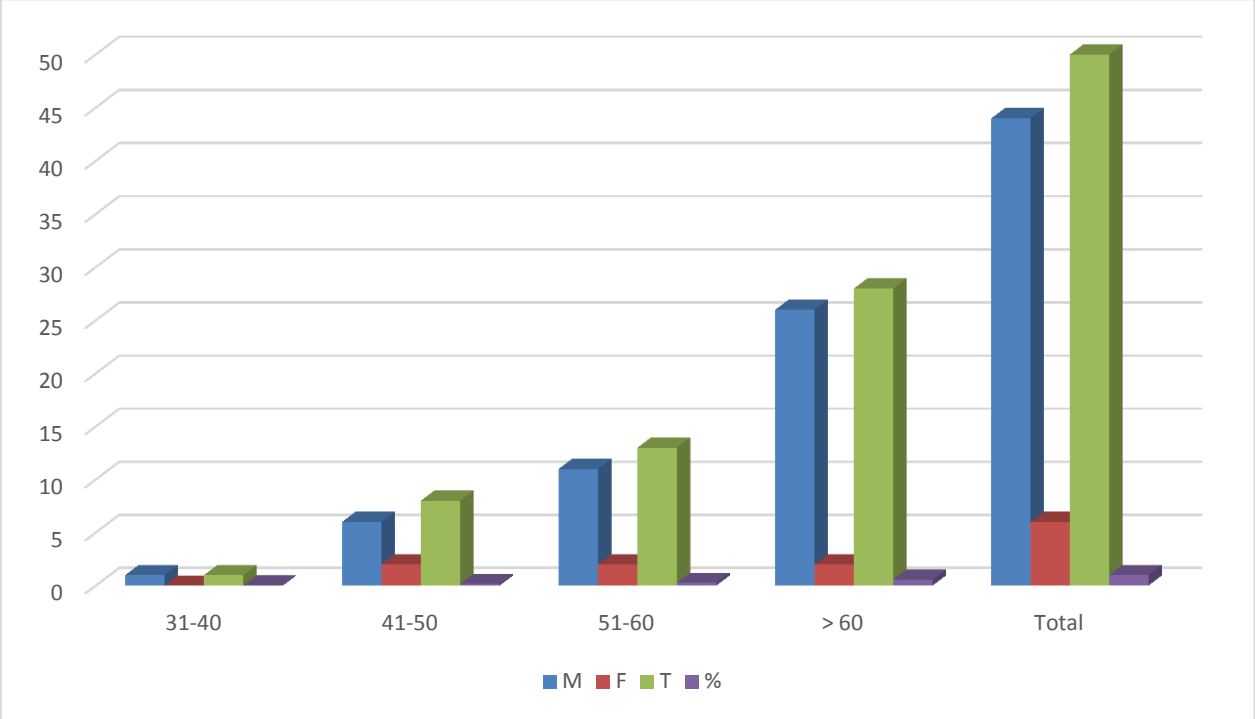

Figure 1: Identify The Demographic Of Patients Including Male And Female.

The length of sickness varied from one year to over fifteen years, with a majority of the cases (44 percent) being in the six-to-ten-year category **(FIG.2).** The characteristics and symptoms of patients with chronic obstructive pulmonary disease (COPD) during the survey are given in **FIG. 3**. All control individuals were non-smokers who were healthy.

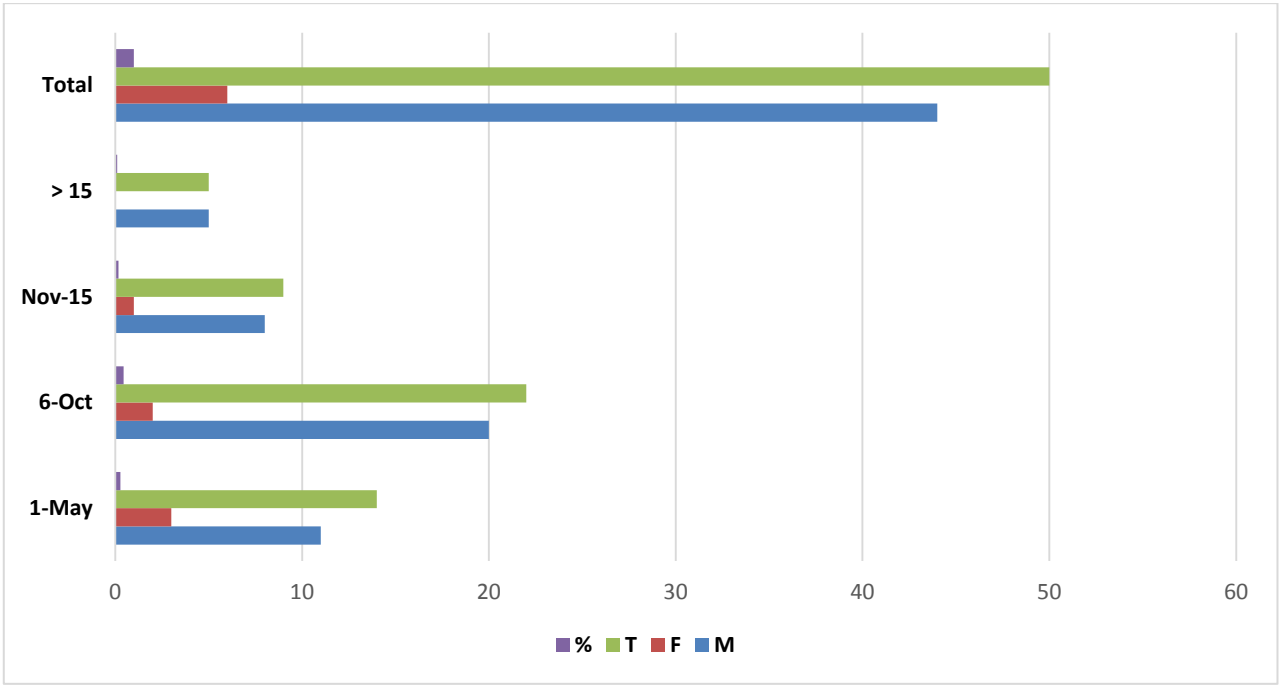

Figure 2: Identify Clinical Findings Based On The Period Of Disease.

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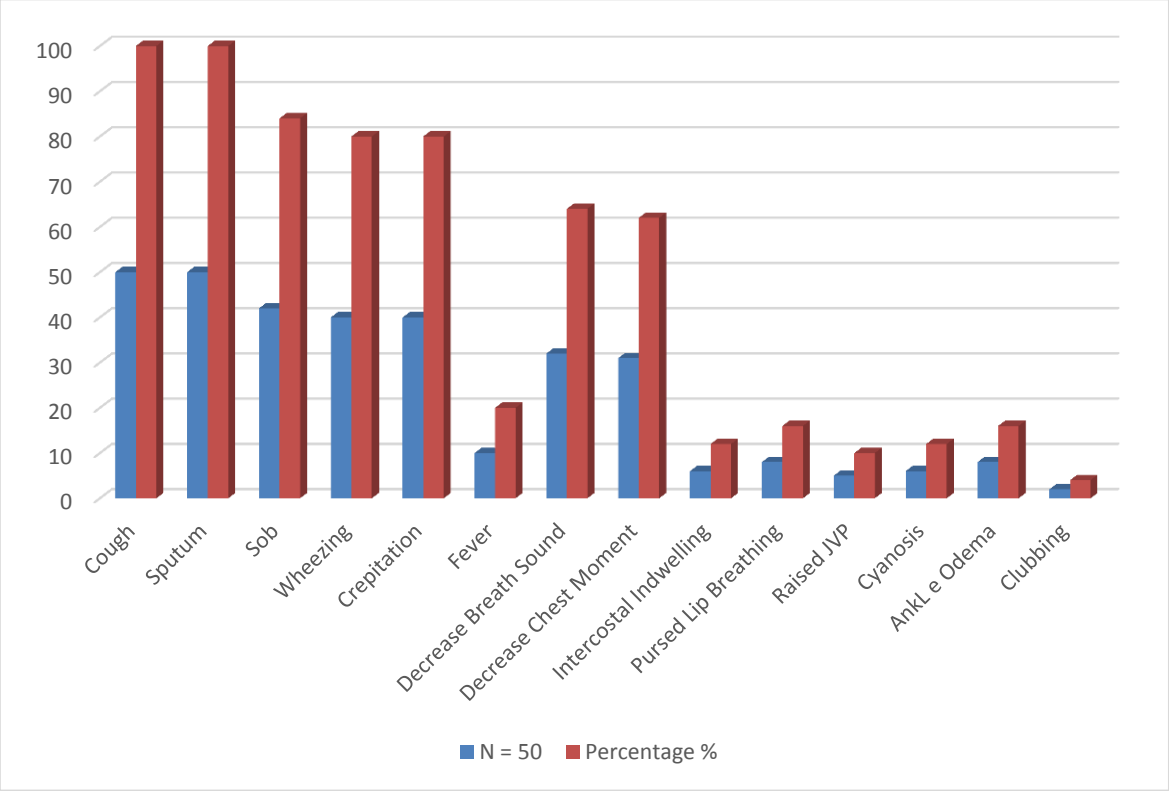

Figure 3: Enrol The Clinical Features For Patients With Copd.

The chest X-ray findings revealed that 58% of patients had emphysema (hyper-inflated lungs), 24% had chronic bronchitis, and 18% had normal chest X-rays **FIG 4.** According to Global Initiative for Chronic Obstructive Lung Disease (GOLD) guidelines, most of the patients are in stage II with moderate flow limitation (Mean FEV1 - 62.12 ±5.99), while 32% were in severe stage (mean FEV1 - 37.01 ±8.48), and only 10% were in very severe stage (mean FEV1 - 26.22 ±3.13) (**TABLE 1**).

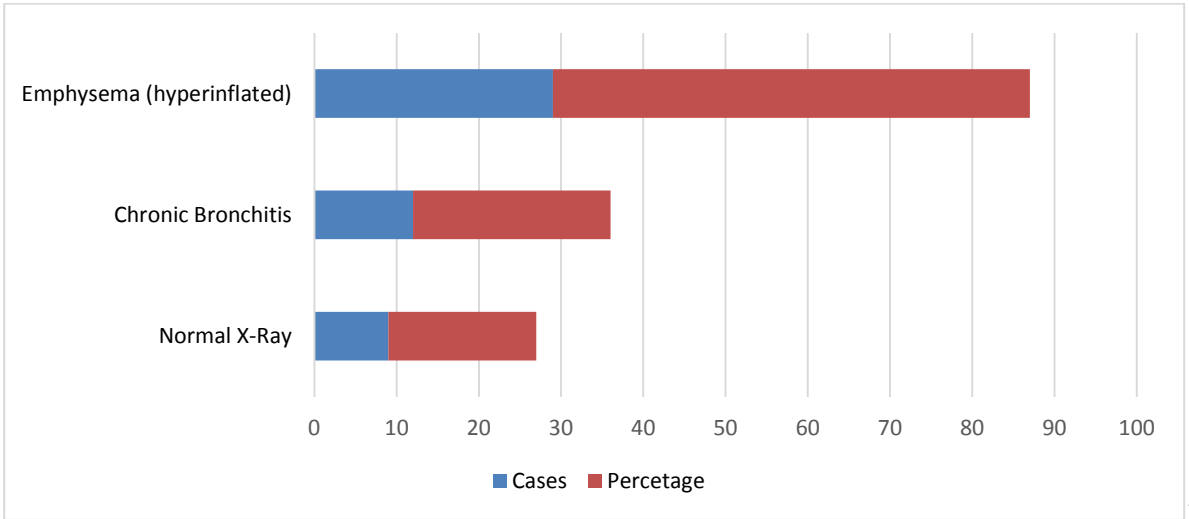

Figure 4: Clinical Results Of Cxr.

Table 1: Determining Findings Related To Copd Disease Stages.

Severity of OPD	No. OFP	%	FEV1 mean +SD
Moderate FEV1/FVC (79-50)	24	48	62.12 + 5.99
Sever eFEV1/FVC (49- 30)	16	32	37.01 + 8.48
Very severe FEV1/FVC (<30)	5	10	26.22 + 3.13

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It can be observed that the COPD patients and the control subjects showed significant differences in their lipid profile analysis. The mean HDL concentration of the COPD cases was 31.12 ±13.15, significantly lower than 47.92 ±7.10 in the control group (P-value <0.05). The mean triglyceride concentration in COPD cases was 161.81 ±46.39, while that of controls was 128.99 ±30.25, which too was statistically significant (P-value <0.05). For similarly, the mean LDL concentration was 119.10 ±16.96 in COPD patients versus 90.93 ±17.76 in controls with a significant p-value <0.05. In addition, COPD cases had higher VLDL concentrations (44.20 ±23.87) than those without (30.18 ±17.55), which were statistically significant (P-value <0.05) **(TABLE 2).**

Table 2: Enroll Outcomes Of Serum Lipid Profile Prevalent In Control Groups.

LP	NO. PATIENTS	CONTROL GROUP	P-v
TOTAL CHOLESTROL	192.46 + 14.01	158.23 + 9.33	<0.05
HDL	31.12 + 13.15	47.92 + 7.10	<0.05
Triglyceride	161.81 + 46.39	128.99 + 30.25	<0.05
VLDL	44.20 + 23.87	30.18 + 17.55	<0.05
LDL	119.10 + 16.96	90.93 + 17.76	<0.05

The results indicate that severe cases of COPD had marginally higher triglycerides, total cholesterol, and LDL compared to moderate ones; however, these variations were not statistically significant **(FIG. 5).** It is illustrated by this study that the lipid profile in patients with COPD is more disrupted when compared to similar individuals who are healthy comprising of elevated LDL, triglycerides and a decrease in HDL.

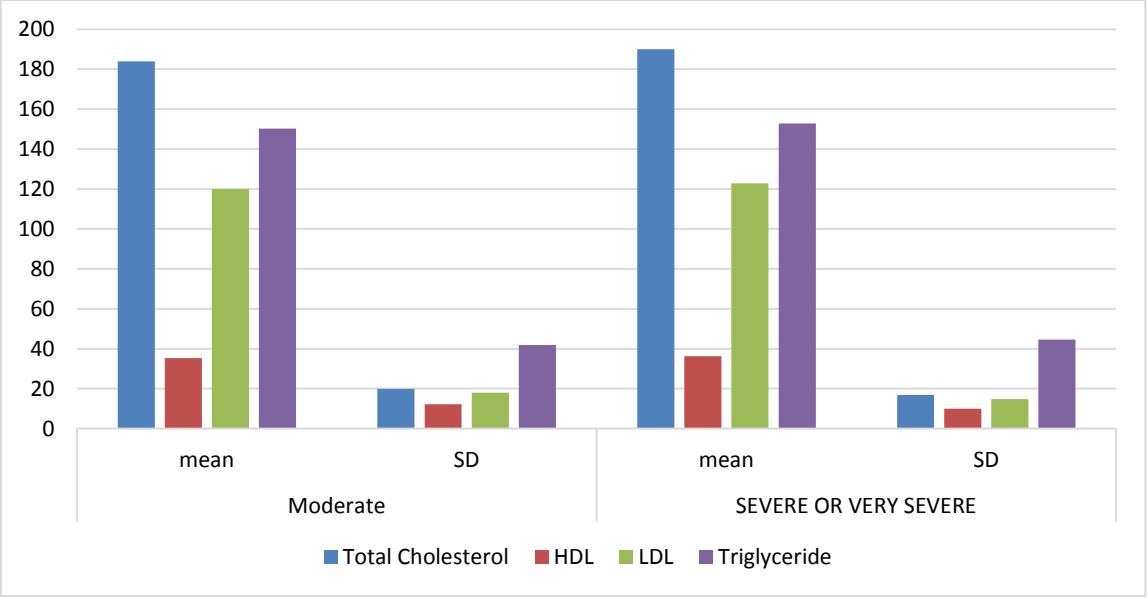

Figure 5: Establishing The Correlation Of Lipid Level With Profile Severity Of Copd.

The findings suggest that dyslipidemia in COPD patients may contribute to an increased risk of cardiovascular disease. These results are consistent with previous studies indicating systemic inflammation, oxidative stress, and other COPD-related factors can negatively impact lipid metabolism. Regularly monitoring and managing lipid profiles in COPD patients is essential to reducing cardiovascular morbidity and mortality.

DISCUSSION

This study, conducted at Baghdad Teaching Hospital and Al-Karkah General Hospital, examined 50 COPD patients, predominantly male (88%), with a mean age of 60.09 ±8.06 years for males and 56 ±2.56 years for females. The duration of illness ranged from 1 to over 15 years, with 44% of patients having been ill for 6-10 years. Clinical features observed included cyanosis in 12% of cases, raised JVP in 10%, and ankle edema in 16%. Most patients were classified within the moderate (48%) and severe (32%) stages of COPD according to GOLD criteria.

The study revealed significantly elevated LDL (119.10 ±16.6) and triglycerides (161.81±46.39) in COPD patients compared to controls, with significant p-values. Total cholesterol levels were

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also higher in COPD patients (192.46 ± 14.01), while HDL levels were lower (31.12 ±13.15 mg/dl) than controls, both statistically significant. These findings are consistent with the results from other studies conducted in India, Bangladesh, and various other regions, which also reported dyslipidemia in COPD patients characterized by higher cholesterol, LDL, and triglyceride levels and lower HDL levels.

The observed dyslipidemia in COPD patients could be attributed to several factors. Systemic inflammation and oxidative stress, common in COPD, may negatively impact lipid metabolism. Additionally, physical inactivity and tissue hypoxia in COPD patients might contribute to abnormal lipid profiles. The relationship between smoking and lipid metabolism also plays a crucial role; smoking is known to increase LDL and triglyceride levels while reducing HDL levels, further exacerbating dyslipidemia in COPD patients.

Interestingly, although the study found slight variations in cholesterol, LDL, and triglyceride levels between moderate and severe stages of COPD, these differences were not statistically significant. This aligns with previous research, suggesting that while lipid abnormalities are prevalent in COPD patients, the severity of COPD may not directly correlate with the extent of dyslipidemia.

These findings have significant implications for clinical practice. Given the increased risk of cardiovascular disease in COPD patients, regular monitoring and management of lipid profiles are essential. Interventions aimed at reducing LDL and triglyceride levels and increasing HDL levels could mitigate cardiovascular risks in this population. Moreover, further large-scale studies with comprehensive subgroup analyses are needed to understand the mechanisms underlying dyslipidemia in COPD better and develop targeted strategies for its management.

CONCLUSIONS AND RECOMEDATIONS

The current research reveals that compared with fit individuals, those suffering from COPD have higher serum LDL, total cholesterol, triglycerides (S.TG), and lower serum HDL levels. While some slight increases in LDL, cholesterol, and triglyceride levels were observed during severe or very severe stages of COPD as opposed to moderate ones, they were not found to be statistically significant. As far as sex differences are concerned, case number means were higher among men who had a mean age of 60.09±8.06 years as opposed to women whose average was 56±2.56 years old. This is due to the findings that doctors should often check for dyslipidemia in COPD patients, which includes high levels of S.TG, S. cholesterol, and S.LDL. The need to reduce cardiovascular problems among individuals with COPD calls for early diagnosis and treatment of dyslipidemia in such patients. Some ways of doing this are modification of one's lifestyle (dietary changes, increased physical activity) or use of drugs targeting improvement of lipid profile in general.

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