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ORIGINAL ARTICLE

Coronary Artery Disease Patients have an Abnormally High Frequency of Aberrant Lipid Profiles

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ABSTRACT

Objective: The study was conducted with the aim to estimate the frequency of abnormal lipid distribution in patients with coronary artery disease.

Study design: cross sectional, comparative study

Place and duration: This study was conducted at Rawal Institute of Health Sciences, Pakistan and Rashid Latif Medical College Lahore in the period from April, 2022 to September, 2022.

Methodology: A total of one hundred and thirty two participants of both genders were selected as the study population on obeying the inclusion and exclusion criteria of the study. Participants were distributed in the two comparable groups with 92 CHD patients in case group and 40 healthy people in control group. An informed written consent was signed by all the participants to record patients detailed demographics age, sex and body mass index. Blood sample was taken from each participant to analyze the lipid profile. Frequency of lipid profile (cholesterol, triglycerides, HDL-C, LDL-C and VLDL) were measured using commercially available kits. The entire data was analyzed via SPSS 24.0.

Results: Among the total participants, the majority were males (75.8%) while females were (24.2%). Most of the participants were aged > 60 (36.4%), while participants had BMI >25kg/m^2 were (56.8%). Majority of the participants were married (64.4%). In the case group, mean TC(>200mg/dl) was 263.91± 23.73, mean TG(>150mg/dl) was 210.71± 42.17, mean HDLc(<40mg/dl) was 47.44±5.91 and mean LDLc(>130mg/dl) was 99.88±20.73 respectively. Case group with CAD showed the majority of males (70.65%) while 29.35% were females.

Conclusion: In the given study, it was found that the frequency of abnormal lipid profile (TC, TG, HDL-C and LDL-C) concentrations were considerably higher in the patients with coronary artery disease. Total cholesterol and serum triglyceride were significantly higher than LDL-C and HDL-C. Moreover, males were more likely to had lipid profile abnormalities than females.

Keywords: lipid profile, abnormalities, CAD, frequency

INTRODUCTION

Heart disease (also known as CVD) kills over 30% of the world's population every year, according to figures published by the World Health Organization (WHO). The number of people who lost their lives due to cardiovascular disease reached 17.3 million in 2016, and it is projected to climb to 23.3 million by 2030 [1]. Secondary CVD prevention is currently assisted greatly by pharmaceutical treatment, including antiplatelet drugs, ACE inhibitors/ARBs, beta-blockers, and lipid-lowering medications [2,3,4]. Still, cardiovascular disease remains a possibility, thus research into prevention strategies is ongoing.

Risk factors for atherosclerosis and coronary heart disease that can be altered include blood lipids. Hydrophobic lipoproteins transport a wide variety of lipids throughout the body, including cholesterol, cholesterol esters, triglycerides, and phospholipids. Where they are constructed, the lipids they include, and the apo proteins they comprise are all different for chylomicrons (CM), low density lipoproteins (LDL), and high density lipoproteins (HDL). Triacyglycerols are formed when free fatty acids (FA) from the liver are joined with phospholipids, free and esterified cholesterol, and other apo proteins to form extremely low density lipoprotein (VLDL). Lipoprotein lipase (LPL) hydrolyzes the triacyglycerol content of lipoproteins into fatty acid (FA) and very low density lipoprotein (VLDL) residues during transport through peripheral tissues [5]. The triglyceride content of VLDL residues is hydrolyzed further to produce IDL and LDL. The LDL that contains the apoB100 is the main lipid transporter in the body's periphery [6]. Coronary heart disease risk factors include elevated plasma levels of these non HDL lipoproteins [7]. Studies show that an individual's lipid profile has a significant role in the development of CVD. Researchers have found that those with high levels of both triglycerides (TG) and total cholesterol (TC) are more likely to develop cardiovascular disease [6]. The effects of TG and TC are similar in that they both restrict blood channels and increase cardiac output. Additionally, LDL-C buildup in the intima-media of the artery, which causes atherosclerosis, may stimulate thrombocytopoiesis [7]. High levels of high-density lipoprotein cholesterol (HDL-C) may lower the risk of cardiovascular disease, whereas low levels of low-density lipoprotein cholesterol (LDL-C) may raise the risk. It has been hypothesised that persons with high HDL-C levels and low non-HDL-C levels are less likely to suffer from cardiovascular disease. [8]

Its danger elements must be mitigated. Integrating many strategies is necessary to combat CHD. In asymptomatic people over the age of 40, it is crucial to identify and regulate risk factors for primary and secondary prevention of CHD, respectively. The prevention of further damage to artery walls might be viewed as a form of therapy for atherosclerotic disease. There are both modifiable and unchangeable risk factors for coronary heart disease; the presence of risk factors which cannot be changed may need more intense risk factors management. [9] Despite the large number of research on the lipid profile of CHD patients, there is substantial disagreement over what those studies have shown. Even when comparing studies conducted at the same hospitals or research facilities, there are differences and differences. That's why we ran this survey; we needed more nuanced data.

MATERIALS AND METHODS

This cross-sectional comparative study was conducted at Rawal Institute of Health Sciences, Pakistan and Rashid Latif Medical College Lahore in the period from April, 2022 to September, 2022. By following the study's inclusion and exclusion criteria, 132 people of both sexes were chosen to participate. Liver impairment, renal illness, and thyroid disease, as well as those who did not provide written consent, kept patients out of this research. A total of 92 patients with coronary heart disease (CHD) and 40 healthy

individuals were split evenly between the two groups. Patients' full ages, sexes, and BMIs were recorded once they gave their written consent for this. A lipid profile analysis was performed using blood samples from all participants. Fasting blood sugar, blood pressure, and serum homocystein levels, as well as the patients' lipid profiles (serum triglycerides, LDL, and HDL). Commercially available kits were used to assess the lipid profile (cholesterol, triglycerides, HDL-C, LDL-C, and VLDL) at regular intervals. Numerical data was assessed using the standard deviation formula, while demographic information was quantified using percentages and frequencies. SPSS 24.0 was used to analyse all the data.

RESULTS

We found that majority of the participants were male 100(75.8%) and females were 32(24.2%). 24 (18.1%) participants were aged from 30-40 and 25(19%) patients were aged from 41-50 and 35(26.5%) were aged between 51-60 and remaining 48(36.4%) were >60 years of age. 85(64.4%) patients were married while 47(35.6%) were unmarried. Participants had body mass index >25kg/m^2 were 75(56.8%) and 57(43.2%) had BMI <25kg/m^2. Patients with urban habitat were 66(50%) and with rural residence were also 66(50%). (Table 1)

Table 1: Demographic data of the selected population

Variables	Frequency (n=132)	Percentage %
Sex		
Male	100	75.8
Female	32	24.2
Age distribution		
30-40	24	18.1
41-50	25	19
51-60	35	26.5
>60	48	36.4
Marital status		
Married	85	64.4
Unmarried	47	35.6
Body mass index (BMI)		
Greater than 25kg/m^2	75	56.8
Less than 25kg/m^2	57	43.2
Habitat		
Urban	66	50
Rural	66	50

Table 2: Mean comparison of lipid profile abnormalities among the two groups

Variables	Control group (healthy)	Case group (CAD patients)
Lipid profile	Mean	Mean
TC(>200mg/dl)	193.8±20.88	263.91± 23.73
TG(>150mg/dl)	125.64±31.71	210.71± 42.17
HDLc(<40mg/dl)	75.32±9.19	47.44±5.91
LDLc(>130mg/dl)	75.87±12.56	99.88±20.73

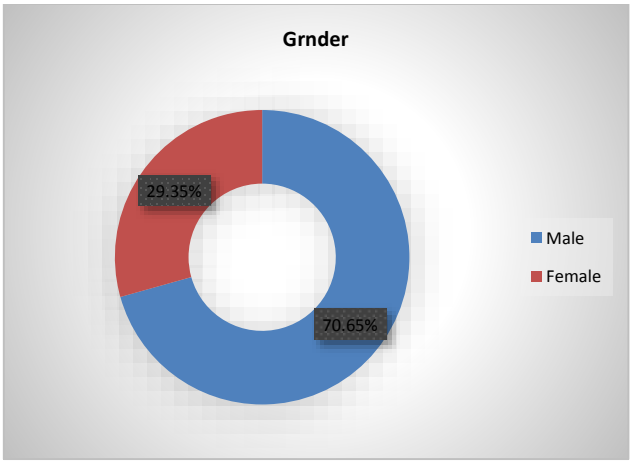

Figure 1: Sex ratio of the coronary artery disease study participants (n=92)

Table 2 shows that the Mean ± SD of total cholesterol concentration in the case group was 263.91± 23.73 and in the control group was 193.8±20.88. Mean ± SD of triglyceride concentration in the case group was 210.71± 42.17 and in the control group it was 125.64±31.71. Mean ± SD of high density lipid concentration in the case group was 47.44±5.91 and 75.32±9.19 in the control group. Mean ± SD of low density lipid concentration in the case group was 99.88±20.73 while 75.87±12.56 in the control group.

Among the total 92 patients of case group, the majority of the patients were male 65(70.65%) while females were 27(29.35%). (Fig 1)

DISCUSSION

Chest discomfort, acute myocardial infarction, abrupt cardiac death, and chronic ischemic heart disease are all myocardial reactions to narrowed coronary arteries [10]. CHD risk factors include hypertension [11], smoking [12], obesity [12], diabetes [13], stress [14], gender, age, and dyslipidemia [13] [14]. High levels of total cholesterol, Triacylglycerols (TAG), low-density lipoprotein (LDL) cholesterol, and very-low-density lipoprotein (VLDL) and low levels of High-density lipoprotein (HDL) cholesterol [15] are regarded to be one of the most prevalent modifiable risk factors for CHD [16]. The cholesterol-diet-CHD theory emerged in light of cholesterol's central role in CHD and has now gained widespread acceptance. This theory proposes that higher plasma cholesterol concentrations are associated with an increased risk of CHD. Cholesterol levels in the blood, or plasma, are inversely proportional to this risk. Furthermore, Egyptian research also showed that high plasma cholesterol levels were associated with a higher risk of CHD. Having high cholesterol levels has been linked to coronary heart disease [17], as was shown in the well-known Framingham research.

In our study, total one hundred and thirty two participants were presented. Participants were distributed among two comparable groups with 92 in the case group (Coronary artery disease patients) and 40 in control group (healthy people). Overall frequency of males in this study was more 75.8% than females 24.2%. 24 (18.1%) participants were aged from 30-40 and 25(19%) patients were aged from 41-50 and 35(26.5%) were aged between 51-60 and remaining 48(36.4%) were >60 years of age. 85(64.4%) patients were married while 47(35.6%) were unmarried. Participants had body mass index >25kg/m2 were 75(56.8%) and 57(43.2%) had BMI <25kg/m2. Patients with urban habitat were 66(50%) and with rural residence were also 66(50%). These results were comparable to the previous study. [18]

In our study, among cases of abnormal lipid profile, cholesterol 263.91± 23.73 and LDL was found higher 99.88±20.73 as compared to control ones, while HDL-Cholesterol was lowered 47.44±5.91 than those of control group. We found that serum triglycerides were also higher 210.71± 42.17 among cases of abnormal lipid profile. These findings mirrored those from other regional studies showing that those with CAD had considerably higher TG and TC levels and lower HDL-C levels than people without CAD. [19, 20]

We discovered that males were 70.65% more likely than women to have an aberrant lipid profile among those with coronary artery disease. Consistent with the results of the prior investigation. [21] The bulk of our study's patients with aberrant lipid profiles were discovered in the 41–50 and 51–60 year age brackets, suggesting that these groups shared many characteristics. Heterozygote familial hypercholesterolemia individuals with low plasma HDL cholesterol levels and high triglyceride-to-HDL-cholesterol ratios were shown to be at increased risk. Increased risk of cardiovascular events was seen in those with FH who had an LDL C/HDL C ratio that was eight times higher than the HDLC level. [22] Clinical studies based on a broad body of research confirm the inverse relationship between HDL-C levels and atherosclerosis. HDL is associated with a reduced risk of cardiovascular disease because of its antioxidant, anti-

inflammatory, antithrombotic, and vasoprotective capabilities [23]. A number of studies have also demonstrated an inverse relationship between HDL-C and CHD risk. Consequently, raising HDL-C levels directly reduces the danger of cardiovascular disease. These findings were supported by the current study, which found that patients with CHD had lower HDL-C levels than patients in the control group [24].

CONCLUSION

In the given study, it was found that the frequency of abnormal lipid profile (TC, TG, HDL-C and LDL-C) concentrations were considerably higher in the patients with coronary artery disease. Total cholesterol and serum triglyceride were significantly higher than LDL-C and HDL-C. Moreover, males were more likely to had lipid profile abnormalities than females.

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