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Review Article
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INVESTIGATION OF LIPID PROFILE ABNORMALITIES IN CARDIOVASCULAR DISEASE PATIENT

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Abstract

Background: CHD is a major cause of morbidity and mortality on a global scale and is highly linked with the abnormalities in lipid profile parameters, including cholesterol, triglycerides, high-density lipoprotein (HDL), and low-density lipoprotein (LDL).

Objective: To evaluate the lipid profile parameters and their association with gender in patients with coronary heart disease

Materials and Methods: This cross-sectional descriptive study was done at Udhyana Institute of Medical Sciences (UIMS), Abbottabad. There were 300 CHD patients (male and female). Blood samples were obtained and lipid profile parameters of total cholesterol, triglycerides, HDL and LDL analysed using standard laboratory procedures.

Results: High cholesterol was found in 13% of male patients and high triglycerides were found in 35% of male patients and high cholesterol in 23% and high triglycerides in 28% of female patients. The levels of HDL varied with 10% of the male population and 12% of the female population having high levels. High LDL levels were seen in 14% of men and 15% of women. The chi-square test showed that there was no statistically significant relationship between gender and the lipid profile parameters ($p > 0.05$).

Conclusion: CHD patients have dyslipidemia, which is more common in males than in females, but there was no significant gender-specific associations. Lipid abnormalities screening and treatment should be conducted regularly and at an early age to minimize the risk and complications of CHD.

Keywords: *Dyslipidemia,Atherosclerosis, Low-density lipoprotein (LDL), Cardiovascular risk.*

INTRODUCTION

Coronary heart disease (CHD) refers to a group of closely related syndromes caused by an imbalance between the myocardial oxygen demand and the blood supply [1]. Coronary heart disease (CHD), also known as coronary artery disease (CAD), is the narrowing, as a result of atherosclerosis, of the blood vessels that supply blood and oxygen to the heart.The most common cause of CHD is narrowing of the lamina of the coronary arteries by atherosclerosis. Initially, an area of atheromatous plaque forms in the coronary artery. The mechanism for plaque formation is unclear, although the predominant view is that lipid [2, 3]. It is widely described that cardiovascular disease is related with hypertension and blood levels of lipid (including high density lipoprotein (HDL), low-density lipoprotein (LDL), total cholesterol and triglycerides) [4]. Various studies show that a low level of high-density lipoprotein (HDL) is a hazardous factor of

death from cardiovascular disease. Hyperhomocysteinemia is also one of the key factors in causing heart attack (myocardial infarction) and stroke [5]. The correlation between dietary variables, especially saturated fats and cholesterol, and CHD emergence was initially determined in the middle of the 20th century. Atherosclerosis has since been widely accepted as the key causative factor of CHD [6]. Atherosclerosis pathogenesis starts with the process of lipid deposition under the endothelial layer of the coronary arteries. The Macrophages ingest these lipids and form foam cells triggering the formation of fatty streaks [7]. Smooth muscle cells then grow and migrate to the intimal layer, which leads to the growth of the plaque. When the plaque grows and covers over half of the lumen of the arteries, blood supply to the heart is insufficient particularly when there is increased physical activity or stress [2, 8].

Lipid abnormal metabolism has a pivotal role in the pathogenesis of CHD. Cardiovascular risk is most commonly determined by parameters of the lipid profile, such as total cholesterol, triglycerides, high-density lipoprotein (HDL), and low-density lipoprotein (LDL) [9]. High concentration of total cholesterol, LDL, and triglycerides are closely linked with atherosclerosis whereas HDL has a protective effect and enhances reverse cholesterol transportation. The high-LDL and the low HDL levels pose a significant risk to cardiovascular morbidity and mortality [10].

CHD is considered one of the major causes of death globally with an escalating burden in the developing world as in Pakistan. The accelerated urbanization, sedentary living, poor dietary habits, smoking, and the increased rates of diabetes and high blood pressure have played a major role in this trend [11].The management of modifiable risk factors is important in the minimization of disease burden.CHD prevention and management are based on lifestyle change and medications. Preventive measures are regular exercising, healthy eating, quitting smoking, and keeping weight under control [12]. To decrease the LDL level and prevent the progression of the disease, Lipid-lowering agents, especially statins are common. Lipid profile screening is a valuable method of early diagnosis and risk assessment [13].

Thus, the research was carried out to determine the level of lipid profile parameters, such as cholesterol, triglycerides, HDL and LDL in patients with coronary heart disease and to determine how these parameters relate to gender in District Abbottabad.

MATERIAL AND METHOD

The research was done as a descriptive cross-sectional study in the Department of medical laboratory Technology, Udhyana institute of medical sciences (UIMS), Abbottabad. The data and blood samples were taken at different pathology laboratories such as Ayub Teaching Hospital in District Abbottabad. It was also found that the study period has been increased to a range of April 1 st, 2019 to 10 th of August, 2019. A total of 300 participants were included in the study, which was done according to the feasibility and availability of the participants at the time of the study. The WHO sample size calculation formula was used, sample size based on a 95% confidence interval and a 5 % margin of error, which also provided sufficient representation of the study population [14].

A venous blood of about 5 mL was collected in aseptic conditions with typical venipuncture methods and put in clean gel tubes. The samples were stored in the absence of direct sunlight and taken to the laboratory. The samples were centrifuged at 3500 rpm and allowed to stand at 5 min to separate serum after the formation of clots. The sample was then thoroughly pipetted into labelled samples and kept under suitable conditions (between 2-8 C) till analysis that was done within a period of one week.

The inclusion criteria included patients with coronary heart disease, including myocardial infarction and obese patients with coronary syndrome. The study excluded the patients who suffered a stroke or had abnormalities of the heart at birth. The parameters of the lipid profile, such as total cholesterol, triglycerides, HDL, and LDL were analysed with lab-based assay kits. Enzyme measurements were done on total cholesterol and triglycerides, and HDL was measured after other lipoproteins were precipitated. The Friedewald formula was used to compute LDL cholesterol [15].

The gathered data were keyed in and analysed in Statistical Package of Social Sciences (SPSS) version 25. There were the descriptive statistics like mean, standard deviation, and frequency distribution. The parameters of lipid profile were compared between study groups where it was possible, and results were provided in the table and graph forms. The p-value below 0.05 was considered statistically significant.

RESULT

A total of 300 patients were included in the study of these, 200 (66.7%) were males and 100 (33.3%) were females indicating that coronary eart disease was higher among males than females across the study population shown in the figure 2.

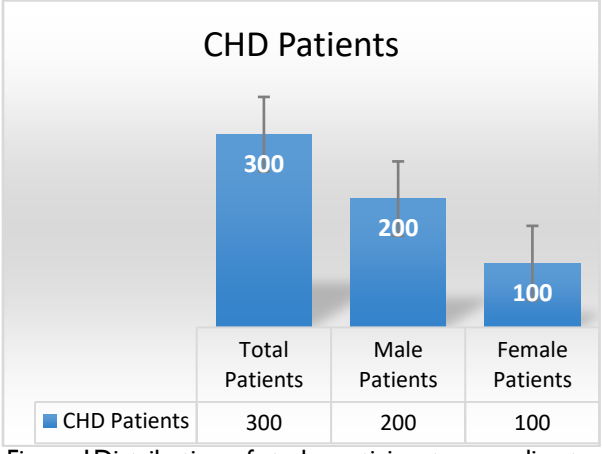

Figure 1Distribution of study participants according to gender among coronary heart disease patients.

The data in Table 1 shows the differences in cholesterol and triglycerides between men and women being treated for CAD. In which 200 men in this study, 26 (13%) had elevated levels of total cholesterol (TC) and 174 (87%) had low TC, while among the women, 23 (23%) had elevated TC and 77 (77%) had low TC therefore there are more females with abnormal TC than males.In regards to TG, 70 (35%) of the male patients had high levels of TG and 130 (65%) had low levels of TG however among the female study subjects, 28 (28%) had high levels of TG, while 72 (72%) had low levels of TG. Thus, it can be said that the majority of men had high levels of TG, whereas there were more women than men with elevated TC.

Table 1 Comparison of cholesterol and triglyceride levels in male and female patients with coronary heart disease.

Parameter	Gender	Total	High Value	Percentage	Low Value	Percentage
Cholesterol	Male	200	26	13%	174	87%
	Female	100	23	23%	77	77%
Triglycerides	Male	200	70	35%	130	65%
	Female	100	28	28%	72	72%

Table 2 presents the assessment of the level of HDL and LDL in male and female patients with coronary heart disease. In male patients, 20 (10%) patients had high HDL values and 14 (7%) patients had low HDL values. Both high and low HDL levels were noted in 12 (12%) patients each in female patients. On the LDL levels, 28 (14%) male patients had their LDL levels high, and 46 (23%) had low LDL levels. In females, 15 (15%) had high LDL and 20 (20%) had low LDL.

Table 2 Evaluation of HDL and LDL levels in male and female patients with coronary heart disease.

Parameter	**Gender**	**Total**	**High Value**	**Percentage**	**Low Value**	**Percentage**
HDL	**Male**	**200**	**20**	**10%**	**14**	**7%**
	Female	**100**	**12**	**12%**	**12**	**12%**
LDL	**Male**	**200**	**28**	**14%**	**46**	**23%**
	Female	**100**	**15**	**15%**	**20**	**20%**

The Chi-square test is used to determine the relationship between the parameters of the lipid profile with gender (Table 3). With cholesterol 26 males and 23 females were highly valued and 174 males and 77 females were lowly valued with Chi-square value of 3.21 and p-value of 0.07 not being significantly related. High and low of 70 and 28 males and 130 and 72 were found to be not significantly associated in triglycerides with Chi-square value of 1.84 and the p-value of 0.17.In the HDL, there were 20 males and 12 females with high values and 14 males and 12 females with low values respectively with a Chi-square and p-value of 0.56 and 0.45 respectively. Similarly in LDL 28 males and 15 females had a high level and 46 males and 20 females had a low level with a Chi-square= 0.89 and p-value=0.34.

Table 3 Association of Lipid Profile Parameters with Gender (Chi-square Test)

Parameter	Gender	High Value	Low Value	Total	χ^2 Value	p-value
Cholesterol	Male	26	174	200	3.21	0.07
	Female	23	77	100		
Triglycerides	Male	70	130	200	1.84	0.17
	Female	28	72	100		
HDL	Male	20	14	200	0.56	0.45
	Female	12	12	100		
LDL	Male	28	46	200	0.89	0.34
	Female	15	20	100		

DISCUSSION

One of the main risk factors for coronary heart disease is hyperlipidaemia. Hyperlipidaemia in CHD patients is assessed using a variety of metrics, such as blood levels of total cholesterol, triglycerides, HDL, and LDL (lipid profile). Males and females in the current research had high cholesterol levels of 13% and 23%, high triglyceride levels of 35% and 28%, low HDL levels of 7% and 12%, and high LDL levels of 27% and 32%, respectively. The study found that women had higher lipid profiles than men. Nonetheless, the guys in this research had the lowest cholesterol and the highest triglyceride levels [16]. Our current research aims to determine if the risk profile for cardiovascular disease is gender-specific and how much of these observations may be attributed to lifestyle and level of physical activity [17].

An alternative explanation for the increased frequency of triglyceride concentrations seen in the population,

which indicates that females had a higher proportion of hypertriglyceridemia than males, might be linked to dietary modifications and MI. According to a study on hyperlipidaemia in coronary heart disease published in the Journal of Clinical Investigation, 60% of cases of coronary heart disease were found in males under 40 and 60% in women under 50. The study involved a sample of 950 people [18].

Age, sex, economic development, urbanisation, consumption of fatty foods, and other risk factors, such diabetes mellitus, are all associated with elevated lipid levels in Asians. The current research was the first survey of dyslipidaemia patients from Kelantan, a state in northeastern Malaysia [19]. With the exception of HDL-, which had a much lower value, our research participants' lipid profile characteristics were significantly greater than those of the healthy Malaysian population studied [20].

Two more significant concerns were also identified by this investigation. First off, all patients were referred for elective angiograms after being stabilised, even though the necessity of anticoagulation in CAD is widely documented. Second, the CHD group generally accepts the advantages of anti-hyperlipidemia medications, particularly the statin class, and the early use of statins. The large proportion of patients in the CHD group who continue to smoke (35.5%) is another significant factor. One significant modifiable risk factor for CHD is smoking [21, 22].

LIMITATION OF THE STUDY

There are a few limitations that can be noted in this study when interpreting the findings. It was also carried out on a small sample size in one district, which may not be a sample of the general population. The cross-sectional design restricts the possibility of a cause-and-effect relationship between lipid abnormalities and coronary heart disease. Also, there was lack of proper consideration of important confounding factors including diet, physical activity, smoking habits, and socioeconomic status. Single-time laboratory measurements may not be applicable in determining long-term lipid levels. Irrespective of these drawbacks, the paper is an informative contribution to the study of lipid profile changes in CHD patients.

CONCLUSION

This study is significant because it identifies people with dyslipidaemia as possible candidates for early intervention and shows a clear correlation between hyperlipidaemia and CAD. Consequently, early identification of aberrant lipid profiles and appropriate Management of coronary artery disease by lifestyle changes and medication, if necessary, may be crucial in stopping the atherosclerotic process from advancing. According to the current study, there is a substantial correlation between CHD and lipid profiles. This study also shown that, in contrast to earlier research, the same findings were reported in the case of CHD. It has been demonstrated that the most crucial test for CHD is the lipid profile. According to this study, District Abbottabad has a greater assessment of lipid profiles.

RECOMMENDATION

It can be concluded that a regular screening of lipid profile be conducted to detect and manage coronary heart disease early in its development based on the results of this research. Education of people on the significance of a healthy lifestyle such as eating a balanced diet, engaging in physical exercise, and quitting smoking should be carried out through public awareness programs. Medics need to focus on periodic checking and managing lipid levels, particularly in people who are at high risk. Moreover, it is suggested that big and longitudinal research should be conducted to gain more insight into the correlation between lipid abnormalities and coronary heart disease among the local population.

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CONFLICTS OF INTEREST

The authors declare no conflicts of interest

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