

## Lipid profile in children with coronary artery disease in Sindh, Pakistan

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**CONCLUSION:** CAD risk factors are significant regarding abnormal lipid levels. Genetic tendency seems to be important in the development of CAD in children.

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**Key words:** Serum; Lipid profile; Coronary artery disease; Children; Sindh

**Core tip:** It is well known that cholesterol accumulates in the coronary wall and conditions of blood pressure are recurrently connected with coronary artery disease in early adult life.

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### Abstract

**AIM:** To evaluate lipid profile in children with coronary artery disease (CAD) in Hyderabad, Sindh, Pakistan.

**METHODS:** The study included 100 children (6-15 years), of which 43 were children of young parents (one or both) with recognized CAD, while the other 57 were children with no evidence of CAD (controls). All were evaluated for fasting blood lipid profile. Blood samples were collected from patients with CAD and healthy controls and analysis of the levels of lipid profile were carried out using a kit method on Microlab 300.

**RESULTS:** Children with CAD had significantly higher levels of total serum cholesterol and triglycerides and decreased levels of high density lipoprotein and low density lipoprotein compared to children in the control group. Systolic and diastolic blood pressures were significantly higher, without any significant difference.

### INTRODUCTION

Coronary artery disease (CAD) is one of the main causes of mortality and morbidity in Pakistan. It is assessed that in the future these diseases will constitute major public health problems. Propensity CAD risk factors stimulate the progression of main and conditional CAD risk factors that cause CAD. Numerous lifestyle aspects with diet, environmental factors and genetic predisposition affect the outcome and development of atherosclerosis and thrombosis<sup>[1]</sup>. The progression of risk factors and their association with the manifestation of CAD has been developed from worldwide prospective epidemiological studies. These studies have revealed a constant correlation among characteristics examined in healthy individuals with the consequent prevalence of CAD<sup>[2]</sup>. The results have drawn attention to the status of risk factors in formative outcomes<sup>[3]</sup> and heterogeneity of CAD

**Table 1** Lipid Profile in children with coronary artery disease and control group

Variables	Children with CAD	Control group
Total cholesterol	62.1 ± 41.1	44.6 ± 15
Triglycerides	45.3 ± 21.2	29.4 ± 17
HDL	15.1 ± 13	19.2 ± 22
LDL	12.3 ± 0.2	17.2 ± 12

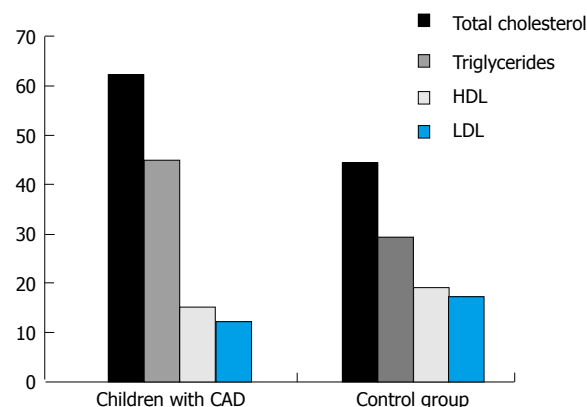
CAD: Coronary artery disease; HDL: High density lipoprotein; LDL: Low density lipoprotein.

patients. Family history of CAD is highly associated with disease occurrence<sup>[4]</sup>. Hypertension<sup>[5]</sup> frequently has a correlation with CAD. Increased serum cholesterol levels<sup>[6]</sup> are associated with the risk of CAD and decreased levels of low density lipoprotein (LDL) and high density lipoprotein (HDL) are important in the progression<sup>[7]</sup> of CAD. Hypertriglyceridemia is known<sup>[8]</sup> in the progression of CAD.

It is well known that cholesterol accumulates in the coronary wall and conditions of blood pressure are recurrently connected by CAD in early adult life. Fatty streaks can be noticed in infants by 2-3 mo of age and increase in size and number throughout the first two decades of life<sup>[9-13]</sup>. Dyslipoproteinemia with high levels of total cholesterol and LDL and low levels of HDL and family history of early CAD have been demonstrated to be predisposing factors of early CAD<sup>[9-14]</sup>. Recently, more emphasis has been laid on the role of lipoproteins than cholesterol alone<sup>[15,16]</sup>. The aim of this study is to analyze main lipid and lipoprotein cholesterol spectrum in children with respect to the CAD history of their parents with or without hypercholesterolemia. Although cardiovascular diseases do not manifest until maturity, dyslipidemia risk factors are present in children and remain into old age<sup>[17]</sup>. It was suggested that lipid profile levels should be screened in children, providing a procedure to recognize and treat those who are at risk for the progression of CAD<sup>[18,19]</sup>. Cardiovascular disease is one of the major problems in Asia but very few studies have been documented about the lipid profile and incidence of dyslipidemia in children, which prove irregular lipid profiles<sup>[20]</sup>. These studies also reported the high levels of lipid disorders in children. Therefore, the current study was carried out to detect serum lipid profiles and the prevalence CAD among children.

## MATERIALS AND METHODS

The study included 100 children (6-15 years), of which 43 were children with recognized coronary artery disease (CAD) and 57 children with no confirmation of CAD (healthy controls). The case group was selected from patients admitted or visiting the pediatric unit at LUMHS City and Jamshoro Hospital for angiography or medical treatment. The inclusion criterion for the case group was structural CAD diagnosed by echocardiography or angiography, and the inclusion criteria for both groups were



**Figure 1** Total cholesterol, triglyceride high density lipoprotein and low density lipoprotein levels in children with coronary artery disease compared to the control group. HDL: High density lipoprotein; LDL: Low density lipoprotein; CAD: Coronary artery disease.

not having chronic liver or kidney disease which may disturb lipid profile levels. The children and their parents received complete justifications about the study (including procedural details and sampling) and informed consent was obtained from the parents before the beginning of the study. The echocardiographic studies comprised using an echocardiographic machine. All the measurements were performed by one pediatric cardiologist. Ten mL blood samples from coronary artery disease patients and healthy control subjects were collected and serum was separated and immediately levels of the lipid profile were analyzed using a kit method on Microlab 300. Excel and SPSS.15 were used for data analysis.

## RESULTS

Table 1 and Figure 1 show mean serum levels of lipid profile in the CAD and control groups. The results showed a significant increased level of total cholesterol and triglycerides and a decreased level of HDL and LDL compared to the controls, with  $P < 0.001$ .

## DISCUSSION

The genetic factor is supposed to be the leading factor when CAD presents early in life. Several studies have documented the association between cholesterol levels and prevalence of CAD<sup>[21,22]</sup>. The association between CAD and levels of cholesterol is complex to estimate in children because clinically significant CAD does not happen. In the current study, the children of parents with CAD have a significant occurrence of hyperlipidemia and there is an association between lipid profile levels of children<sup>[23-26]</sup>. It was reported<sup>[27]</sup> that 72 children whose ancestors had myocardial infarction had increased levels of cholesterol; however, there was no significant difference in levels of triglyceride. It was reported that there was an association among lipid profile levels of parents and their children with total cholesterol levels. This study is similar to other studies<sup>[27]</sup>.

Increased levels of serum cholesterol, triglycerides and LDL are several of the significant factors in these patients. It was reported that hypercholesterolemia is common in children of parents with recognized hypercholesterolemia and symptomatic coronary artery disease. An increased total cholesterol along with HDL ratio influences primary coronary artery disease<sup>[28]</sup>. This ratio in the current study of high risk children was significantly more increased than the ratio given by earlier workers<sup>[29]</sup>. It has been revealed that the entire risk factor separately enhances the risk of coronary artery disease by 5 to 10 times compared with having no risk factors.

The present study observed the lipid profile in children with CAD compared to the control group. High levels of cholesterol and triglyceride and low levels of HDL and LDL in children with CAD were found. Our results conclude that it is useful to monitor the lipid profile of children of parents with coronary artery disease. Children of parents with CAD and hyperlipidemia are at high risk of progression to premature atherosclerosis and need lipid profile assessment monitoring.

The lipid profile of children diagnosed with intermittent major risks can be taken to reduce these risks. Further studies with greater sample numbers are necessary to confirm these findings.

## COMMENTS

### Background

Coronary artery disease (CAD) patients are at risk for poor nutritional status. The entire measures lead to life intimidating problems and are predictive factors.

### Research frontiers

Lipid profile disturbances between the patients were compared with healthy subjects. This study is designed with the objective of investigating the similarities and differences in patients with CAD, clinically and metabolically.

### Innovations and breakthroughs

Children with CAD had significantly higher levels of total serum cholesterol and triglycerides and decreased levels of high density lipoprotein and low density lipoprotein compared to the control group. Systolic and diastolic blood pressures were significantly higher, without any significant difference.

### Applications

By understanding the lipid profile in CAD patients and controls for the progression of future remedial guidelines, this study may need to be sustained in a further extensive manner at different nursing homes.

### Peer review

The authors made a good effort to analyze the lipid profile in children whose parents are known to have coronary artery disease.

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