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Serum Lipids and Lipoproteins in Children from Families with Early Coronary Heart Disease*

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Atherosclerotic cardiovascular diseases (ASCVD) are the major causes of morbidity and mortality both in developed and developing countries.[2, 14, 15] Several groups have proposed that the genesis of the atherosclerotic lesion is in childhood.[12, 13, 20, 24, 30, 31]

The atherosclerotic lesion progresses through a series of linked step: first; development of arterial fatty streaks (in infancy and childhood), second; formation of fibrous plaques (in the second to third decade of life), third; development of complicated fibrotic and calcified mature atherosclerotic lesions (in the fourth and later decades), and fourth; subsequent episodes of clinical atherosclerotic cardiovascular diseases. Fatty streaks can be detected in infants from 3 to 5 months of age and they increase in number and size during the first two decades of life.[10,12,17,30,31] In autopsy studies of Korean and Vietnam war casualties, Enos[7] et al and Mc Namara[21] et al reported that 45 to 77 % of the men had a considerable amount of aortic and coronary fibrous plaques in the second, third, and fourth decades of life.

Many studies have demonstrated connections between certain biochemical, physiological, and environmental factors and the development of premature coronary heart disease.[16, 25, 28] Numerous risk factors

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for coronary heart disease have been identified such as habitual diet high in saturated fats-cholesterol-calories, elevated blood lipids, hypertension, smoking, hyperglycemia obesity, lack of exercise, psycho-social tensions, and a positive family history of premature atherosclerotic disease.[3, 9, 24, 27] (Table I) Independent of each other, elevated plasma-triglycerides and cholesterol are risk factors for ischaemic heart disease, and a combined elevation of these two plasma lipids carries the highest risk for ischaemic heart disease.[16, 28, 29]

TABLE I

ASSOCIATION OF RISK FACTORS WITH ATHEROSCLEROTIC DISEASES

A-	Major Risk Factors
	Diet and Serum Lipids
	Hypertension
	Cigarette Smoking
	Combinations of Major Risk Factors
B-	Other Risk Factors
	Diabetes Mellitus and Asymptomatic Hyperglycemia
	Obesity
	Sedentary Living
	Psycho-Social Tensions
	Family History

Hyperlipoproteinaemic persons have increased risk of developing coronary heart disease at an early age, and this risk is highest for those suffering from familial hyper-Beta-lipoproteinaemia[10, 11, 22, 26, 27, 29] If therapy designed to lower serum Beta-lipoprotein concentration is to be effective in preventing or delaying coronary heart disease in these patients, the treatment should be started as early as possible.[1, 2, 5, 19, 23] Therefore, it is important to estimate serum lipids and lipoproteins of children with a family history of early coronary heart disease.[8, 19]

Several studies have shon that there are remarkable variations in cholesterol and triglyceride levels in different geographic regions and ethnic groups.[2, 3, 7, 8]

This study has been carried out to determine the plasma cholesterol and triglyceride levels of the children from families where one parent had had a myocardial infarction before age 45, and to compare the results with those from the normal group. As well it was intended to show the normal variation of the plasma cholesterol and triglyceride levels in Turkish children.

Materials and Methods

The survey was performed on 43 children whose ages ranged from, 6 to 17 years (22 girls and 21 boys) from 22 families where one parent had had a myocardial infarction before age 45 (Group A). Control group consisted of seventy five school children, aged 6 to 15 years (32 girls, 28 boys) with no family history of myocardial infarction, for the comparison with the study group.

Plasma cholesterol and triglyceride levels were quantitated by the method of Zay-Herdly and Hsia et al respectively.[18, 26] Lipoprotein electrophoresis was performed by the Davis Method.[6]

Samples of blood were obtained after 12 hours of fasting. In the study, serum cholesterol concentration greater than 240 mg/100 ml and triglyceride greater than 150 mg/100 ml were regarded as abnormal.

Results and Discussion

In study group the average plasma cholesterol values were significantly higher than those of control group ($p < 0.01$). Group A showed 188.7 mg/100 ml; group B 168.0 mg/100 ml (Table II).

TABLE II

THE AVERAGE PLASMA CHOLESTEROL AND TRIGLYCERIDE VALUES

Groups	Cholesterol		Triglycerides	
	Mean	S.E.	Mean	S.E.
A	187.7*	∓ 36.1 mg/100 ml	238*	∓ 62.8 mg/100 ml
B	168.0	∓ 31.1 mg/100 ml	193.6	∓ 37.1 mg/100 ml

* Significantly Higher than Control Group.

The average plasma triglyceride values were also found to be significantly higher than the control group's.

39.3 percent of the children in the first group had increased plasma cholesterol levels. Among the normal children, 17.3 percent had increased levels; the difference was significant ($p < 0.05$) (Table III).

In study group the number of children with increased plasma triglyceride levels was also higher than in the control group. The difference was significant (Table IV).

The results of lipoprotein electrophoresis are shown in Table V. Almost half of the cases in the first group had pre beta band in the lipoprotein electrophoresis.

TABLE III

DISTRIBUTION OF CHOLESTEROL LEVEL IN GROUP A AND B

	Normal	Increased	Total
Group A	26 (60.7 %)	17 (39.3 %)	43 (100)
Group B	61 (86.7 %)	13 (17.3 %)	74 (100)

$p < 0.05$

TABLE IV

DISTRIBUTION OF TRIGLYCERIDE LEVEL IN GROUP A AND B

	Normal	Increased	Total
Group A	18 (41.9 %)	25 (58.1 %)	43 (100 %)
Group B	51 (69.0 %)	23 (31.0 %)	74 (100 %)

$p < 0,01$

TABLE V

THE RESULT OF LIPOPROTEIN ELECTROPHORESIS

Group	Presence of the Pre-Beta-Band (+)	(–)	Total
A	20 (46.5 %)	23 (53.5 %)	43 (100 %)
B	8 (8.1 %)	68 (91.9 %)	74 (100 %)

$P < 0.005$

Only 8.1 percent of the cases in the second group had the pre beta band. The difference was significant ($p < 0.005$).

Significantly increased plasma cholesterol and triglyceride levels in the first group may be the result of dietary habits; on the other hand higher prevalance of the presence of pre beta band in this group may indicate the importance of genetic factors in coronary heart disease.

Tamir et colleagues studied serum lipid and lipoprotein levels in 64 men who had a myocardial infarction before age 41. "Thirty of the 85 children whose fathers had abnormal lipoproteins were found to have type II hyperlipoproteinemia regardless of the class of hyperlipemia found in the father". Glueck et al[10] studied 223 children from 70 fa-

milies where one parent had a myocardial infarction before age 50 to asses the frequency of hyperlipemia in children prone to atherosclerosis on the basis of family history. Familial hyperlipoproteinemia was documented in 69 of 223 (31 %) children from families where one parenthad had a myocardial infarction. Our findings were comparable to those reported by Glueck and Tamir.

In summary this study confirms the importance of lipid and lipoprotein assays in children whose parents, have a history of premature myocardial infarction as an approach to early identification of children who may develop premature coronary heart disease later in life.

Summary

This study has been carried out to determine the plasma cholesterol and triglyceride levels of the children from families where one parent had had a myocardial infarction before age 45 (Group A), and to compare the results with those from the normal group (Group B). There were 43 children whose ages ranged from 6 to 17 years in the group A. Control group consisted of seventy five school children, aged 6 to 15 years, with no family history of myocardial infarction. The average cholesterol and triglyceride values were significantly higher than those of control group's ($p < 0.01$). Almost half of the cases in the first group had pre beta band in the lipoprotein electrophoresis. Only 8.1 percent of the cases in the second group had the pre beta band. The difference was significant ($p < 0.005$).

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