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Comparison of Lipoprotein (a) and Apolipoproteins in Children with and without Familial History of Premature Coronary Artery Disease

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Abstract

Objective: The importance of cardiovascular risk factors like hypertension, obesity and dyslipidemia in prediction of later coronary artery disease (CAD) in offspring of high-risk family is well known. This study was performed to compare the level of lipoprotein (a) and apolipoproteins as new risk factors in children and adolescents with and without a family history of premature CAD.

Material & Methods: This case-control study was performed from November 2004 until September 2005. All patients with premature myocardial infarction hospitalized in the coronary care units (CCU) of Vali-e-Asr hospital, who survived and had children between 2-14 years old, were defined as parents of the case group. 86 of them were chosen with simple non-random method. Only one child from each family was selected randomly. The control group consisted of children with nearest age and sex to children of the case group from the neighbors with equivalent socioeconomic status, without a family history of premature myocardial infarction. Subjects had been instructed to fast for 12 to 14 hours. Venous blood was analyzed for lipoprotein (a) and Apolipoprotein A1 and B100.

Findings: The level of lipoprotein (a) was significantly higher in the case group. There was not a significant difference of lipoprotein levels between the two groups.

Conclusion: Measurement of lipoprotein (a) is recommended in screening programs in offspring of high-risk families.

Key Words: Premature Myocardial Infarction, Risk factors, Children, Lipoprotein (a), Apolipoproteins.

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Introduction

Cardiovascular disease aggregates in families. This is probably due in part to familial aggregation of important cardiovascular risk factors[1,2]. So early screening and control of its risk factors in offspring of high-risk families will help in the preventive works from cardiovascular disease[3]. This is especially important for those having a family history of premature coronary artery disease (CAD) (defined as onset before the age of 55 years in a parent)[4]. The importance of cardiovascular risk factors like hypertension, obesity and dyslipidemia in prediction of latest CAD in these offspring are well known[5,6,7].

New risk factors, such as fibrinogen, apo-lipoproteins, homocystein and lipoprotein (a) have been identified and are under further investigation[6,8,9].

This study was performed in the city of Birjand, Northeastern Iran, to compare the level of lipoprotein (a), apolipoprotein A1 and B100 in children with and without a positive familial history of premature myocardial infarction (MI). The Research and Ethic Committee of Birjand University of Medical Sciences approved this study protocol.

Material & Methods

This case-control study was performed from November 2004 until September 2005. All patients with premature myocardial infarction hospitalized in the coronary care units (CCU) of the Vali-e-Asr hospital of the Birjand University of Medical Sciences, survived and had children between 2-14 years old, weredefined as parents of the case group. 86 of them were chosen with simple non-random method. Only one child from each family was selected randomly.

The control group consisted of children with nearest age and sex to the children of the case group from the neighbors with equivalent socioeconomic status without a family history of premature myocardial infarction. Subjects had been instructed to fast for 12 to 14 hours. Antecubital venous blood was collected. Biochemical tests including measurement of lipoprotein (a) and apolipoprotein were carried out. An Elan outoanalyzer was utilized for the determination of lipoprotein (a). Apolipoproteins (Apo A1, Apo B100) were measured by spectrophotometery using the turbidometry method.

Statistical analyses were performed by the SPSS statistical package using independent t-test and chi-square. *P*-values less than 0.05 were considered as significant.

Findings

The populations of the case group and the control group were equal (86 subjects). The mean age (SD) of case and control group were 11.5 (2.5) and 11.8 (2.4) years respectively with no significant difference. Forty four girls and 42 boys were in case group and 46 girls and 40 boys in control group with no significant difference.

Laboratory data are listed in table 1. Only lipoprotein (a) level was significantly higher in case group than in control group (*P*=0.005). The difference between boys and girls was not significant (table 2). Apolipoprotein B100 was significantly higher in the girls of the case group (*P*=0.01).

Table 1- Laboratory data in the case and control group

Variable (Mg/dl)	Cases Mean (SD)	Controls Mean (SD)	*P value*
Lipoprotein (a)	30.8 (22.9)	22 (17.2)	0.005
Apo A1	104.5 (18.8)	108.6 (15.5)	NS*
Apo B100	71.2 (14.8)	70.9 (14.6)	NS

*NS: Not significant

Table 2- Laboratory data in the case and control groups according to sex

Variable (Mg/dl)	Cases [Mean (SD)]			Controls [Mean (SD)]		
	Girls	Boys	*P value*	Girls	Boys	*P value*
Lipoprotein (a)	31.2 (25.80)	30.4 (19.8)	*NS	22.3 (14.3)	21.6 (20.2)	NS
Apo A1	103.7 (19.5)	105.4 (18.2)	NS	106 (13.3)	111.5 (17.3)	NS
Apo B100	75.2 (17.1)	67.1 (10.6)	0.01	71.3 (15.2)	70.3 (14.1)	NS

* NS: Not significant

Discussion

Atherosclerosis begins in childhood and progresses to coronary artery disease (CAD) in adults. So it is important to pay more attention to its risk factors from an early age. Several studies have showed that the offspring of patients with premature coronary disease are at increased risk for atherosclerosis[4,7,8]. Familial aggregation of cardiovascular risk factors including hyper-tension, obesity and dislipidemia have been extensively investigated[1,2]. It has been demonstrated that both genetic and environmental factors contribute to the variability of risk factors and their familial aggregation[10,11].

The aim of our study was to compare the level of Lipoprotein (a), Apo A_1 and Apo B_{100} in children with and without family history of premature MI. Our study showed that lipoprotein (a) was significantly higher in the case group. This supports the findings reported by some others [14,15,16], but contradict the conclusions reached by Barth et al[17].

Regarding apolipoproteins, Sniderman et al[12], reported a higher Apo B_{100} level in the children of high-risk families for CAD. Other studies[8,10] showed a higher level of Apo B_{100} and lower of Apo A_1 in the children of patients with premature MI. Our study did not find any significant difference in the concentrations of Apo B_{100} and Apo A_1 between children of high-risk families and controls, but Apo B_{100} was higher in the girls of high-risk families. Islam et al[17] showed that a high Apo B_{100} level was associated with a positive family history of CAD only in white girls.

Our study had some limitations. We did not measure serum lipid profile and the effect of serum lipid value and Lipoprotein (a) level on each other. We could not study the effect of age on serum level of Apo A_1 and Apo B_{100} and Lipoprotein (a) in children with and without family history of premature MI because we had limitation in the number of subjects in the case and control group.

Conclusion

According to our findings, Lipoprotein (a) is a strong lipid variable predisposing to coronary artery disease, so measurement of lipoprotein (a) is recommended in screening programs for offspring (children and adolescents) with a positive history of premature myocardial infarction.

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