FAMILIAL RELATIONSHIPS OF BODY MASS INDEX AND SERUM LIPIDS

Azita Fesharak Nia [(1)]

Abstract

INTRODUCTION: This study was conducted to assess the relation of body mass index, serum lipids and dyslipidemia in parents and their children.

METHODS: This descriptive study was conducted on 211 students from Birjand junior high schools and their parents (211 mothers, 211 fathers) in 2007. The students were selected by multistage random sampling. Body mass index, total cholesterol, triglyceride, low-density lipoprotein cholesterol (LDL-C), and high-density lipoprotein cholesterol (HDL-C) were measured in students and their parents.

RESULTS: There was a significant relation of BMI in parents and children. Fathers' BMI had a significant relation with those of both boys and girls. There was a significant relation of total cholesterol and triglyceride between fathers and children in both in girls and boys. There was a significant relation of LDL-C between fathers and boys. In both parents HDL-C had significant relation with that in children, both in girls and boys. There was significant relation between hypercholesterolemia in fathers and low HDL-C in mothers and children (both boys and girls).

CONCLUSION: There was significant relation of BMI and serum lipids and some forms of dyslipidemia in parents (especially fathers) and children. Hence, screening programs in children of high-risk parents are recommended.

Keywords: Serum lipids, Body Mass Index, Dyslipidemia, Familial.

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Introduction

The prevalence of childhood obesity has been increasing in world.[1] According to some studies in Iran, child obesity has been increasing since 1990.[2,3] Obesity is a risk factor for cardiovascular disease and some chronic diseases like dyslipidemia, hypertension and premature atherosclerosis.[4] According to some non-Iranian studies,[5-7] childhood obesity is affected by parental obesity. Adult dyslipidemia may reveal familial and therefore, offspring dyslipidemia.[8] The present study was carried out to investigate the relation of parents' body mass index, serum lipids and dyslipidemia with those in their children.

Materials and Methods

The studied population consisted of 211 students (119 girls, 92 boys) and their parents (211 mothers, 211 fathers). The students were selected by multistage random sampling from junior height schools of Birjand city. Parents taking anti-lipid drugs at the time of examination were excluded. Height and weight were measured in light clothing and no shoes to the nearest 0.1 kg and 0.1 cm, respectively, using Seca balance and Seca stadiometer. Body mass index (BMI) was measured as weight (kg) divided by the square of height (m^2).[9] Parents with 25≤ BMI≤29.9 and BMI≥ 30 were considered as overweight and obese, respectively.[10] Children with BMI ≥95th percentile and 85th percentile ≤BMI <95th percentile were considered as obese and overweight, respectively.[9] Subjects had been instructed to fast for 12-14 hours. Antecubital venous blood was collected. Biochemical tests, including measurement of total cholesterol (TC), triglyceride (TG), high-density lipoprotein cholesterol (HDL-C) and low-density lipoprotein cholesterol (LDL-C) were

1) MD. Assistant Professor of Pediatric Nephrology, Birjand University of Medical Sciences, Birjand, Iran.
E-mail: fesharakinia@yahoo.com

Corresponding author: Azita Fesharak Nia

carried out. TC and TG were measured by German-made Ependrof Elan 2000 autoanalyzer using the enzymatic method.

HDL-C was measured using heparin-manganese precipitation method.[11] LDL-C was measured using the Friedwald formula.[12] Parents with TG ≥ 200 mg/dl, TC ≥ 240 mg/dl, HDL-C ≤40 mg/dl, or LDL >100 mg/dl were considered as dyslipidemic.[10] In children, high levels of TC and LDL-C were defined as >200 mg/dl and >130 mg/dl, respectively.[13] TG level ≥130 mg/dl was considered as high and HDL-C level <35 mg/dl was considered as low.[14,15] Statistical analysis was performed by the SPSS statistical package using partial Pearson correlation coefficients.

Results

Fathers, mothers and children had mean ages of 41.47±4.32, 38.66±4.21 and 12.7±0.96 years, respectively. Table 1 shows the distribution of parents and their children according to their BMI. There was a significant and positive relation of BMI between fathers and children in both boys and girls. Although there was a significant and positive relation of BMI between mothers and children in all children, it was not significant according to sex (Table 2). Table 3 shows the mean level of serum lipid in parents and children. There was a positive and significant relation of serum cholesterol level between fathers and children in all and according to sex; it was not significant between mothers and children. There was a positive and significant relation of triglyceride level between fathers and their children in all and in boys. There was not any relation of TG level between mothers and their children (Table 4). There was only a positive and significant relation of LDL level between fathers and boys (Table 4). There was a positive and significant relation of HDL level between parents with their children in all and according to sex. There was significant relation of hypercholesterolemia between fathers with children in all (P= 0.001) and according to sex: in girls (P=0.01) and boys (P=0.05). There was a significant relation of low HDL-C in mothers with children in all (P=0.001) and according to sex: in girls (P= 0.02) and in boys (P=0.005).

TABLE 1. Distribution of subjects according to BMI level

		BMI					
		Normal		Overweight		Obese	
		N	%	N	%	N	%
Subject	Father	52	24.6	106	50.2	53	25.1
	Mother	67	31.8	95	45	49	23.2
	Child	180	85.3	21	10	10	4.7

TABLE 2. Relation of parents BMI with children in all and according to sex

		Girls	Boys	All
Parent	Father	r= 0.46 P= 0.001	r= 0.31 P= 0.003	r= 0.41 P= 0.001
	Mother	r= 0.17 P= 0.06	r= 0.16 P= 0.12	r= 0.18 P= 0.01

TABLE 3. the mean level of serum lipid in parents and children.

		Variable (mg/dl)			
		Cholesterol Mean ± SD	TG Mean ± SD	LDL Mean ± SD	HDL Mean ± SD
Subject	Father	220.2 ± 48.5	197.6 ± 98.8	130.2 ± 47.1	50.2 ± 21.2
	Mother	202.4 ± 61.3	165.5 ± 91.9	120.1 ± 48.3	48.9 ± 12.9
	Child	168.3 ± 34.4	119.5 ± 52.4	100.4 ± 52.7	46.7 ± 9.8

TABLE 4. Lipid profile relationships between parents and children

		Children		
		Girls	Boys	**Total**
Total Cholesterol	Father	r= 0.31 P= 0.001	r= 0.43 P= 0.001	r= 0.35 P= 0.001
	Mother	r= 0.03 P= 0.72	r= 0.03 P= 0.76	r= 0.04 P= 0.55
Serum Triglyceride	Father	r= 0.14 P= 0.13	r= 0.24 P= 0.03	r= 0.18 P= 0.001
	Mother	r= 0.13 P= 0.15	r= 0.04 P= 0.7	r= 0.08 P= 0.25
LDL-Cholesterol	Father	r= 0.10 P= 0.28	r= 0.26 P= 0.01	r= 0.13 P= 0.16
	Mother	r= - 0.08 P= 0.39	r= - 0.01 P= 0.93	r= 0.04 P= - 0.53
HDL-Cholesterol	Father	r= 0.44 P= 0.001	r= 0.27 P= 0.01	r= 0.37 P= 0.001
	Mother	**r= 0.34 P= 0.001**	**r= 0.39 P= 0.001**	**r= 0.37 P= 0.001**

Discussion

We found a significant relation of BMI between parents and their children. In a study in Bogalusa, the most significant relationships between parents and their children were for height and weight.[16] In another study, there was a significant association of BMI between Hispanic mothers and their children, but not in other ethnic groups.[17] The present study showed a significant relation of BMI between fathers and both boys and girls. In a study in Tehran,[18] there was significant relation of BMI in 10-17-year-old children between fathers with girls and mothers with boys. It seems that the effect of parental BMI may be a results of shared genes[19] or shared environmental effects[20] or both. Our study showed significant relations of all serum lipids between fathers and children. In mothers, only HDL-C had significant relation with that of children. Jago et al. found that HDL-C and LDL-C levels were significantly associated between African American mothers and their children but not in other ethnic groups.[17] Parent-child associations of serum cholesterol were observed in a Cohort of 440 children with their parents in Bogalusa.[16] In the Tehran study,[18] there was a positive and significant relation of total cholesterol between fathers and boys. HDL-C had a positive relation between fathers with girls and mothers with both boys and girls. LDL-C both in boys and girls had a positive relation with that of mothers. Our study showed a significant relation of hypercholesterolemia in fathers and low HDL-C level in mothers with children in all and in both sexes. A study by Uiterwall et al.[21] showed that increased parental lipid levels are associated with persistently and substantially higher lipid levels in their children. The effect of parental serum lipid on child serum lipid may be a result of genetic factors, nutritional factors, level of physical activity, and socioeconomic factors.[22] There was a significant relation of BMI and serum lipids and some forms of dyslipidemia between parents (especially fathers) and children. Hence, screening programs in children of high-risk parents is recommended.

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