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Original

Comparison of the biochemical, anthropometric and body composition variables between adolescents from 10 to 13 years old and their parents

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Abstract

Objective: **The present study had the objective of comparing the lipid profile, nutritional status and body composition of adolescents and their parents.**

Methods: **A cross-sectional study was conducted with 120 adolescents from 10 to 13 years old, public schools students from the city of Viçosa, Minas Gerais, Brazil and their respective biological parents (104 mothers and 82 fathers). Data was collected regarding weight, height, waist and hip circumference, body fat, triglycerides, total and fraction cholesterol. Besides, taking the skinfold measurements (bicipital, tricipital, subscapular and suprailiac) of the adolescents; and evaluation of sexual maturity, excluding those that were in stage 1 according to Tanner. The statistical treatment includes descriptive analysis, the use of the Student's t-test, Mann Whitney, and Pearson and Spearman correlation. An Odds Ratio was conducted with a confidence interval of 95%, considering p < 0.05 significant.**

Results: **A positive and significant correlation was seen for weight, BMI and total cholesterol between father and son; for all the variables, except body fat and wait/hip ratio between father and daughter; for weight and height between mother and son and BMI between mother and daughter. Adolescents that had both parents with hypertriglyceridemia, with inadequacies of LDL or HDL presented, respectively 19, 20 and 4 times more chances of presenting the same alterations.**

Conclusion: **This study confirmed differences in the anthropometric measurements, body composition and lipid profile between children of overweight, eutrophic and underweight parents, as well as greater chance for the adolescent to present an altered lipid profile when the parents also have presented that alteration.**

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Key words: *Nutritional status. Body composition. Adolescents. Parents. Hyperlipidemias.*

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COMPARACION DE LAS VARIABLES BIOQUIMICAS, ANTROPOMETRICAS Y COMPOSICION CORPORAL ENTRE ADOLESCENTES DE 10 A 13 ANOS Y SUS PADRES

Resumen

Objetivo: **El presente studio tenía por objeto comparar el perfil lipídico, le estado nutricional y la composición corporal de adolescentes y sus padres.**

Métodos: **Se realizó un estudio transversal en 120 adolescentes de 10 a 13 años de edad, estudiantes de escuelas públicas de la ciudad de Viçosa, Minas Gerais, Brasil y sus respectivos padres biológicos (104 madres y 82 padres). Se recogieron datos de peso, talla, circunferencia de la cintura y la cadera, la grasa corporal, los triglicéridos y el colesterol total y fraccionado. Además, se tomaron medidas de los pliegues cutáneos (bicipital, tricipital, subescapular y suprailíaco) de los adolescentes; y una evaluación de la madurez sexual, excluyendo a aquellos que estaban en el estadio 1 de Tanner. El tratamiento estadístico incluye un análisis descriptivo, el uso del test t de Student, Mann Whitney, y la correlación de Pearson y Spearman. Se realizó la razón de probabilidades con un intervalo de confianza del 95%, considerando significativa una p < 0,05.**

Resultados: **se observó una correlación positiva significativa para el peso, el IMC y el colesterol total entre padre e hijo; para todas las variables, excepto para la grasa corporal y el cociente cintura/cadera entre padre e hija; para el peso y la talla entre madre e hijo, y para el IMC entre madre e hija. Los adolescentes cuyos progenitores tenían ambos hipertrigliceridemia, con inadecuaciones entre la LDL y HDL, presentaron, respectivamente, 19, 20 y 4 veces más posibilidades de presentar las mismas alteraciones.**

Conclusión: **Este estudio confirmó diferencias en las medidas antropométricas, la composición corporal y el perfil lipídico entre los niños de padres con sobrepeso, normal y baja, así como una mayor posibilidad de que los adolescentes presentasen un perfil lipídico alterado cuando los padres también tenían esta alteración.**

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Palabras clave: *Estado nutricional. Composición corporal. Adolescentes. Padres. Hiperlipidemias.*

Abbreviations

BMI: Body mass index.
HDL: High density lipoprotein.
LDL: Low density lipoprotein.

Introduction

The excess in body weight has taken a status of concern in all ages.[1] It is a nutritional disorder that involves the interaction of multiple factors, including genetic, metabolic, physiological, environmental, behavioral and social conditions.[2,3] The parents' obesity is considered a relevant risk factor for this ailment in their children, besides the genetic cause added to the family environmental influences.[4,5] However, it is hard to define how much the genetic influence is responsible or the family environment where the adolescent is inserted and has great influence in the eating habits and life style.[6]

The genetic factors play an important role in the determination of susceptibility of the individual for weight gain, however, the environmental factors and life styles are the ones that usually lead to a positive energetic balance, favoring obesity.[7] It can be expected that parents and their children, when sharing similar social, environmental and cultural conditions, are associated in relation to the nutritional status.

Besides the nutritional status, the same occurs with the lipid profile. Hyperlipidemias can be due to genetic and/or environmental factors, being that those alterations might result, among other causes, repercussion in the vascular system.[8,9] Still during adolescence the presence of hyperlipidemia is seen associated with family history of premature coronary disease.[10]

Epidemiological studies has documented the relation between excess weight and lipid alterations during adolescence resulting in coronary diseases, in this stage and later in life, making of upmost importance to identify the factors related to its genesis, a way to intervene and reduce future complications.

Within this context, this study had the objective to analyze the biochemical, anthropometric and body composition variables in adolescents and compare them to the lipid profile, nutritional status and body composition of their respective biological parents.

Methods

It is an epidemiologic cross-sectional study, in which adolescents from 10 to 13 years old, of both genders, coming from public schools in urban zone in the city of Viçosa-Minas Gerais, Brazil and their respective biological parents.

The sample size was calculated based in the excess weight frequency of 10%,[11] with an acceptable margin in the variability of this frequency of 2% and a confidence interval of 99%. Foreseeing the possible sample losses that could jeopardize the statistical force results a percentage 20% was added over the calculated sample, and thus estimating a minimum sample of 110 adolescents.

The following inclusion criteria were considered in the study: adolescents with at least one living biological parent and resided with them in the urban zone of the city, did not present any chronic diseases and/or taking medication that could alter the lipid metabolism and were in puberty. The inclusion criteria were met by 120 adolescents.

According to the Anisio Teixeira National Institute of Study and Research (INEP) the urban zone in the city of Viçosa has 25 schools (19 public and 6 private) that cater to students between 10 and 13 years old.[12] Adolescent of this age range have participated of the study, coming from 18 public schools in the city, being that one of them did not participate due to non-consent by the principal's office.

The adolescents were invited to participate in the study by invitation delivered in the classrooms, which was filled out and handed back for random selection. After the draw, the parents were contacted, in case they were interested in participating in the biochemical, anthropometric and body composition evaluations were scheduled, for the parents as well as the adolescents. Weight, height, waist and hip circumferences, body fat, triglycerides, total and fractions of the cholesterol were investigated in the parents and children. Besides, skinfold test measurements were affered in the adolescents along with a sexual maturity evaluation. The evaluations took place at the Health Division of the Federal University of Viçosa, in the period from August of 2008 to February of 2009.

For the anthropometric measurements, the subjects wore light clothes. The height was determined using a stadiometer fixed in the wall, with an extension of 220 cm and subdivision of 0.1 cm. The weight was affered in an electronic digital scale positioned in a plain surface, with a maximum capacity of 200 kg and sensibility of 100g. Both measurements made according to the techniques preconized by Jelliffe.[13] With the weight and height values the body mass index (BMI) was calculated, classifying it according to the WHO, 1998[14] for the parents. The teenagers on the other hand, were evaluated using the *WHO AnthroPlus software* and classified in Z score, according to the cut-off points of the WHO, 2007.[15] For a better analysis of the results, the obese and overweight groups were put together in only one group called excess weight.

The waist and hip circumference was affered with a flexible and inelastic metric tape, with a 0.1 cm subdivision, making sure there is no tissue compression. The values obtained for the adults were compared with the cut-off points established by the WHO.[14]

The body composition was estimated by means of electrical tetrapolar bioimpedance and the percentage of total body fat classified according to Lohman,[16] for the adolescents as well as the parents.

Bicipital, tricipital, subscapular and suprailiac skinfold measurements were taken in the adolescents, using the equipment *Lange Skinfold Caliper*, on the right side of the body, and in three repetitions for each measurement, accepting the average of the two closest values.

For the biochemical exams, blood samples were drawn by means of venous puncture, with the patient fasting for 12 hours. Triglycerides, total cholesterol, LDL (low density lipoprotein) and HDL (high density lipoprotein) were measured, and the lipid profile in adolescents classified according to the I Prevention Directive of Arteriosclerosis in Children and Adolescents[17] and the parents according to the III Brazilian Directives on Dyslipidemy.[18]

For the evaluation of the sexual maturity stage the method proposed by Marshall and Tanner were used.[19,20] It was established as one of the exclusion criterion the adolescents that were in the first stage of sexual maturity, in which corresponds to a pre-pubescent phase. All of the adolescents with a sample that presented the typical secondary sexual characteristics of adolescence. The exam was conducted by a single pediatrician, who evaluated the development of pubic pilosity for both genders, and the genital and breasts for boys and girls, respectively.

The data was analyzed using the programs EPI-INFO version 6.0 and SIGMA STAT version 3.1. First, the variable distribution was verified through the Kolmogorov-Smirnov test. The t´Student test and Pearson correlation (parametric variables) or Mann Whitney and Spearman correlation (non-parametric variables). For the categorical variables (presence or non-presence of excess weight and dyslipidemies between parents and children) the Odds Ratio was calculated with the respective confidence interval. The probability inferior to 5% was considered as level of statistical significance.

This research was approved by the Ethics Committee in Human Research of Federal University of Viçosa and all of the volunteers were only evaluated after signing consent at their own will, as for the adolescents this consent was also signed by the parents.

Results

Participated in the study 120 adolescents from 10 to 13 years old, in which 51.7% (n = 62) males. The parents totaled 186, being 104 mothers (55.9%) and 82 fathers (44.1%), with ages between 30 and 62 years old for males and 27 to 53 years old for females.

Regarding the nutritional status, 8.4% (n = 10) of the adolescents were underweight, 70.0% (n = 84) euthrophy, 18.3% (n = 22) overweight and 3.3% (n = 4) obesity. Elevated body fat percentage was seen in 17.5% (n = 21) of the adolescents.

The total cholesterol was the lipid variable that presented the highest percentage of inadequacy (54.2%), followed by the fractions, LDL (26.7%) and HDL (25.8%). The level of triglycerides was at threshold or increased in 20.0% of the studied adolescents.

As for the nutritional status of the parents, according to the BMI values, 54.8% (n = 102) presented excess of body weight and 25.8% (n = 48) had an elevated body fat percentage. The excess weight in both genders was similar (male: 52.4% *vs.* females: 56.7%, p = 0.5), however, the prevalence of elevated body fat in females was more than double the one found in males (34.6% *vs.* 14.6%, $p < 0.05$). Increased values of waist circumference in 50.96% (n = 53) females and 10.97% (n = 9) in males, while altered hip/waist circumference was seen in 72.1% (n = 75) and 13.4% (n = 11), respectively.

Increased values of triglycerides, LDL and cholesterol were observed, respectively, in 25.3, 35 and 38.2% of the parents and the level of HDL was below the desired levels in 44.1% of the subjects.

Table I presents the correlation coefficients between the anthropometric, body composition and lipid vari-

Table I

Correlation coefficient for anthropometric and biochemical variables between parents and adolescents from 10 to 13 years old, in the city of Viçosa, Minas Gerais, Brazil, 2009

	Father-son	*Father-daugther*	*Mother-son*	*Mother-daughter*
Weight	0.306[a]*	0.408[a]*	0.263[b]*	0.239[a]
Height	0.241*	0.351[a]*	0.274[a]*	-0.0649[a]
BMI	0.301[a]*	0.275[a]*	0.202[b]	0.349[a]*
BF	0.289[a]	0.196[a]	0.00191[b]	-0.0878[a]
WC	0.271[b]	0.308[a]*	-0.0796[b]	-0.222[b]
HC	0.227[a]	0.328[a]*	-0.202[a]	-0.123[b]
WHR	0.0430[b]	0.181[b]	0.0840[b]	-0.0337[b]
TC	0.324[b]*	0.462[b]*	-0.0212[b]	0.120[a]
TG	0.247[b]	0.380[b]*	-0.0769[b]	-0.02867[b]
HDL	0.262[b]	0.475[b]*	0.0508[a]	0.214[b]
LDL	0.0763[b]	0.311[b]*	-0.0657[b]	0.0110[b]

BMI: Body mass index; BF: Body fat percentage; WC: Waist circumference; HC: Hip circumference; WHR: Waist/hip ratio; TC: Total cholesterol; TG: Triglycerides; HDL: High density lipoprotein; LDL: Low density lipoprotein; [a]Pearson correlation; [b]Spearman correlation: *$p < 0.05$.

Table II
Odds ratio and confidence interval for lipid alterations in adolescents from 10 to 13 years old, according to the same alterations in parents

Variable	Odds ratio (confidence interval)		
	Adolescent/Mother	*Adolescent/Father*	*Adolescent/Both (mother and father)*
Triglycerides	5.16 (1.60-16.86)	2.91 (1.00-9.70)	19.16 (1.83-47.08)
Total cholesterol	1.89 (0.82-4.42)	1.94 (0.78-4.83)	3.91 (0.94-17.56)
LDL	2.99 (1.17-7.72)	4.34 (1.52-12.64)	20.4 (3.33-148.16)
HDL	2.81 (1.10-7.24)	2.65 (1.00-7.76)	4.00 (1.22-13.25)

HDL: High density lipoprotein; LDL: Low density lipoprotein.

ables between parents and children. A positive and significant correlation was found for weight, BMI and total cholesterol between father and son; for all of the variables, except body fat and waist/hip ratio between father and daughter; for weight and height between mother and son and BMI between mother and daughter.

Lipid alterations found in the parents were considered predictive of the same alterations in their children. The chance of a teenager present hypertriglyceridemia was 19.16 times higher when both parents, father and mother are hypertriglyceridemics, and a chance of 5.16 when only the mother and 2.91 only the father. Considering the LDL, the teenagers presented 2.99, 4.34 and 20.4 times higher when the mother, the father and both had the alteration, respectively. For the HDL, low values were seen for this lipid fraction, in the mother or fathers alone the chances of alterations in their children would practically triple, with an increase in 4 times if, both father and mother presented the same alteration (table II).

In analyzing the nutritional status, there was no association between the excess weight and body fat in the parents and the adolescents (*Odds Ratio* = 1.11; Confidence Intervals of 95% 0.23 – 5.63; p=0,8 and *Odds Ratio* = 3.71; Confidence Intervals of 95% 0.57-23.30; p = 0.09, respectively). However, higher average values of body fat and tricipital skinfold was seen for the daughters of euthrophic women when compared to

Table III
Average and median distribution of BMI and body composition variables of adolescents according to the mother's nutritional status

Characteristics	Maternal nutritional status					
	Low weight		Eutrophy		Excess weight	
	X ± SD	Md (min-max)	X ± SD	Md (min-max)	X ± SD	Md (min-max)
Daughters						
BMI	15.2 ± 2.0	14.6 (13.5-17.4)	18.8 ± 2.9	18.8 (14.7-23.6)	19.2 ± 3.2[b]*	19.0 (13.9-27.4)
BF%	11.7 ± 6.4	10.1 (6.2-18.8)	19.8 ± 5.4[a]*	18.5 (10.0-29.5)	19.5 ± 5.9[b]*	20.3 (7.3-32.1)
WC	62.3 ± 2.2	62.6 (59.9-64.3)	68.4 ± 8.3	67.9 (56.1-84.6)	69.0 ± 8.5	67.2 (55.2-87.6)
TSF	10.7 ± 4.7	9.0 (7.0-16.0)	17.1 ± 4.9[a]*	17.9 (7.0-27.0)	18.1 ± 5.5	17.0 (10.0-29.0)
BSF	4.5 ± 1.8	4.0 (3.0-6.5)	8.5 ± 3.3	8.0 (4.0-15.5)	9.0 ± 4.1	8.0 (4.5-17.7)[b]*
SupSF	9.2 ± 5.0	7.7 (5.0-14.7)	19.0 ± 11.3	15.0 (6.0-50.5)	18.1 ± 7.9	16.7 (6.0-36.0)
SubSF	7.2 ± 2.4	6.7 (5.0-9.7)	10.8 ± 4.4	9.5 (5.2-21.7)	11.1 ± 4.4	10.0 (5.0-25.5)
Sons						
BMI	–	–	17.1 ± 2.4	16.9 (13.4-22.2)	18.6 ± 3.4	17.9 (13.9-30.1)
BF%	–	–	12.6 ± 6.4	13.1 (3.1-28.8)	15.6 ± 8.2	13.5 (3.1-35.2)
WC	–	–	64.4 ± 7.1	62.5 (53.9-80.7)	68.9 ± 9.3	66.2 (57.0-94.3)[c]*
TSF	–	–	11.7 ± 4.5	10.7 (7.0-29.0)	14.7 ± 6.1	12.0 (7.5-26.2)
BSF	–	–	5.5 ± 2.5	5.0 (3.0-14.5)	7.6 ± 4.3	6.0 (3.0-21.5)[c]*
SupSF	–	–	9.5 ± 6.1	7.7 (3.5-33.0)	13.6 ± 9.4	8.7 (39.0-5.0)
SubSF	–	–	7.3 ± 2.2	7.0 (4.0-12.5)	9.3 ± 4.2	7.7 (5.0-21.5)

[a]Difference between low weight and euthropy; [b]Difference between low weight and excess weight: [c]Difference between euthrophy and excess weight; *p < 0.05; t Test: parametric variables; Mann Whitney: non-parametric variables; SD: Standard deviation; Md: Median; min: Minimum value; max: Maximum value; BMI: Body mass index; BF%: Body fat percentage; WC: Waist circumference; TSF: Tricipital skinfold; BSF: Bicipital skinfold; SupSF: Suprailiac skinfold; SubSF: Subscapular skinfold.

Table IV
Average and median distribution of BMI and body composition variables of adolescents according to the father's nutritional status

Characteristics	Paternal nutritional status					
	Low weight		Eutrophy		Excess weight	
	X ± SD	Md (min-max)	X ± SD	Md (min-max)	X ± SD	Md (min-max)
Daughters						
BMI	16.3 ± 3.1	16.3 (14.1-18.5)	17.5 ± 5.8	18.4 (6.2-29.5)	20.9 ± 5.3c*	20.5 (9.8-32.1)
BF%	16.4 ± 0.1	16.4 (16.3-16.5)	17.8 ± 2.9	17.2 (13.5-23.6)	19.7 ± 2.9c*	19.1 (13.9-27.4)
WC	62.7 ± 2.4	62.7 (61.0-64.4)	65.0 ± 6.9	62.8 (55.2-84.6)	71.1 ± 8.0	70.6 (56.1-87.6)
TSF	13.7 ± 6.7	13.7 (9.0-18.5)	16.2 ± 5.5	15.8 (7.0-27.0)	18.6 ± 5.2c*	18.1 (11.0-29.0)
BSF	7.9 ± 4.1	7.9 (5.0-10.7)	7.9 ± 3.2	7.6 (3.0-15.5)	8.9 ± 3.9	7.9 (4.7-17.7)
SupSF	12.0 ± 0.0	12.0 (12.0-12.0)	16.1 ± 10.7	13.0 (5.0-50.5)	19.4 ± 7.5	18.0 (8.0-34.0)c*
SubSF	8.0 ± 1.4	8.0 (7.0-9.0)	9.3 ± 3.6	8.0 (5.0-21.7)	11.7 ± 4.0	10.4 (6.0-20.0)c*
Sons						
BMI	–	–	16.6 ± 2.2	16.2 (13.4-22.2)	18.3 ± 2.8c*	17.8 (14.4-25.5)
BF%	–	–	11.9 ± 5.3	11.7 (3.1-25.7)	13.5 ± 8.1	11.7 (3.1-27.1)
WC	–	–	62.6 ± 5.7	61.7 (53.9-75.6)	67.4 ± 7.3	65.9 (58.2-86.5)c*
TSF	–	–	11.2 ± 3.9	10.0 (7.0-20.5)	13.7 ± 5.2	8.0 (12.0-26.2)
BSF	–	–	5.3 ± 1.9	5.0 (3.0-10.0)	6.5 ± 3.5	5.7 (3.0-16.0)
SupSF	–	–	8.6 ± 5.1	6.0 (4.0-21.7)	13.4 ± 9.1	9.5 (3.5-39.0)c*
SubSF	–	–	6.8 ± 2.1	6.0 (5.0-12.2)	8.7 ± 3.4	7.5 (4.0-16.7)c*

[a]Difference between low weight and euthropy; [b]Difference between low weight and excess weight: [c]Difference between euthrophy and excess weight; *p < 0.05; t Test: parametric variables; Mann Whitney: non-parametric variables; SD: Standard deviation; Md: Median; min: Minimum value; max: Maximum value; BMI: Body mass index; BF%: Body fat percentage; WC: Waist circumference; TSF: Tricipital skinfold; BSF: Bicipital skinfold; SupSF: Suprailiac skinfold; SubSF: Subscapular skinfold.

the low weight mothers. Thus, higher values of BMI, body fat and bicipital skinfold were seen when comparing the daughters of mothers with excess weight with the low weight ones. It was found that sons of mothers with excess weight presented more elevated median values of waist circumference and bicipital skinfold in relation to sons of euthrophic mothers (table III).

It was also observed that the daughters with excess weight fathers presented superior values of BMI, body fat and tricipital, subscapular and suprailiac skinfolds when compared to the daughters of euthrophic fathers. The boys showed higher values of BMI, waist circumference and subscapular and suprailiac skinfolds (table IV).

Regarding the lipid profile, it was seen that daughters of mothers with excess weight presented lower values of HDL when compared to the mothers with low weight (median: 49.0; range: 24.0-115.0 *vs.* median: 62.0; range: 59.0-69.0; p = 0.03). It was seen that the daughters of euthrophic fathers demonstrated different values, when compared with the fathers with low weight, for triglycerides (median: 67.5; range: 30.0-161.0 *vs.* median: 33.5; range: 31.0-36.0; p = 0.03), HDL (average: 49.0; standard deviation: 13.1 *vs.* average: 69.0; standard deviation: 14.1; p = 0.05) and VLDL (median: 13.5; range: 6.0 – 32.2 *vs.* median: 6.7; range: 6.2-7.2; p=0.03) (data not presented on the table).

Discussion

The non-transmittable chronic diseases, giving emphasis to obesity and lipid abnormalities, has caused irreparable damage on the population, as risk factors for other alterations as well as financial burden for the healthcare system. Thus, the early detection of these nutritional disturbances will provide a great impact in improving people's quality of life and the current healthcare scenario in Brazil and the world.

Regarding the BMI, 30% of the evaluated adolescents in this study had an altered nutritional status, with a predomination of excess weight (21.6%). This age group follows the nutritional transition that happens in the country, that is, at the same time in which present alterations related to nutrition depravation, also live with alterations from excess weight.

The results observed are a cause for concern, seen that the excess weight found in adolescence is correlated to risk factors for diseases in this phase[21,22] and later on in life.[23] Besides, if it starts in the beginning of life, it has the tendency of remaining or getting worse as the years go by.[24]

It was found, during adolescence, presence of other important alterations, like the excess in body fat and dyslipidemies, highlighting that more than half of the subjects already had alterations in the total cholesterol levels. Such results suggest that these adolescents, although asymptomatic, would be more predisposed to the development of arteriosclerosis disease, with the necessary development of therapeutic and preventive measures.

In the present study, positive correlations were found between the anthropometric and lipid variables of parents and their children. The obtained correlations, although significant, were weak ($r < 0.5$), however, they suggest that the presence of these alterations in the parents is relevant for their development in teenager children.

Congruent with these findings, Reis et al.[25] observed significant correlations in evaluating risk factors for cardiovascular diseases among children and adolescents (11.7 ± 1.8 years) and their parents. Correlations were seen for BMI (r: 0.35; p: 0.0001), waist circumference (r: 0.39; p 0.0001), triglycerides (r: 0.39; p: 0.0001), total cholesterol (r: 0.30; p: 0.0001) and HDL (r: 0.25; p: 0.01).

Lipid abnormalities found in parents were considered as predictive for them in children, being that, inadequate values of triglycerides, LDL and HDL when present in the father and mother separately increased the chances of alterations in the children, being more elevated when both parents presented the dyslipidemy. It is suggested that this result might be due to genetic and environmental influences, such as inadequate eating habits and life style developed by the adolescents with the family.

Mendes et al.[10] confirmed the presence, still during adolescence, the dyslipidemy associated to the family history of premature coronary disease. Besides, it shows the effectiveness of nutritional intervention in improving the lipid profile found in these young teens.

Jago et al.[26] conducted a study with American children of European, African and Hispanic descent; and it was verified that the levels of LDL and HDL were significantly associated between mothers and children of African origin, but not for the other ethnic groups. These associations were not influenced by the BMI or physical activity and the authors suggest that the possible explanation would be the type of food eaten by the family and genetic factors.

Studies have shown that the excess weight in both parents increased the chance that the child would present excess weight, when compared to those that had one or none of the parents with the alteration.[27,28] Ramos de Marins et al.[29] observed that the maternal BMI (> 25 kg/m^2) was risk factor for obesity in children and the paternal BMI did not present any association. Contrary to these results, Terres et al.[30] observed that children of obese fathers presented to be overweight and obesity in relation to normal parents ($p < 0.05$), situation not seen with the mother's physical appearance.

Despite the controversial results, it is important to point out the strong influence of eating habits and physical activities of the parents on the behavior of their children, which are contributing factors for obesity.[31] Parents with excess weight have the tendency of exercising less and to consume greater energetic percentage in the form of fat, this way, families with greater predisposition for obesity must be identified with the objective of predicting the risk of excess weight in children or adolescents.[32,33]

In the present study, the odds ratio values found for excess weight between parents and their children were not significant; however, differences were seen in the comparison of the anthropometric variable and body composition values in adolescents according to the parents' nutritional status, confirming the family's influence in obesity.

In conclusion, this study witnessed differences in the anthropometric measurements, body composition and lipid profile between children of parents with excess weight, euthophy and low weight, as well as higher chances that the adolescent will present an altered lipid profile when the parents also present the abnormality. Thus, it becomes of great importance to put in play strategies that seek the control and prevention of these alterations in adolescents, especially when the parents also present the same nutritional disturbances. These results highlight the importance of working on a healthier life style with the family. When the diagnosis is early, causes and factors can be corrected in contributing to the reduction of future problems.

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