

Hábitos alimentares e prática de atividade física entre adolescentes eutróficos e com excesso de peso

Eating habits and practice of physical activity among eutrophic and overweight adolescents

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ABSTRACT

OBJECTIVES: To assess the eating habits and physical activity of adolescents enrolled in two public schools in the city of Ribeirão Preto (SP). **METHODS:** A case-control study was conducted to analyze the eating habits and practice of physical activity of a group of overweight adolescents and of a eutrophic control group matched for sex and age. The International Physical Activity Questionnaire (IPAQ short version) and a semi-quantitative food frequency questionnaire were applied and a 3-day food record was obtained. The nutritive value of the foods consumed was calculated with the Virtual Nutri® software. Body fat was estimated using the equations of Slaughter et al. Data were analyzed statistically by ANOVA and by the Fisher exact test. **RESULTS:** Fifty-one (44.7%) overweight and 63 (55.2%) eutrophic adolescents were studied. Mean BMI was 29.5 for the overweight group and 21.0 for the eutrophic group, and percent body fat was 49.4 and 29.1, respectively ($p < 0.01$ -ANOVA). The daily calorie intake of the eutrophic adolescents consisted of 56.7% carbohydrates, 15.4% proteins and 27.9% lipids and the intake of the overweight group was 52.7%, 17.1% and 30.2%, respectively. In the eutrophic group, 28.6% were considered to be very active and 60.3% active and in the overweight group these values were 23.5% and 70.6%, respectively.

CONCLUSIONS: Information about the eating and physical activity habits of adolescents is of fundamental importance for subsidizing individual and community actions. Although adolescents report apparently adequate physical activity and calorie consumption, health professional should be aware of the high rates of overweight and obesity detected in this age range.

Key-words: adolescents, food habits, motor activity, food consumption

INTRODUCTION

Adolescence is a phase of great physical, emotional and cognitive transformations experienced by all human beings. Specifically regarding the modifications in the composition of the organism, a greater proportion of lean mass and a lower proportion of fat mass are observed, as well as increased physical activity, muscle development and skeletal maturation¹. In addition, this phase is also characterized by increased necessities and by nutritional

vulnerability due to inadequate eating behaviors that may become established early²⁻⁴.

Regarding personality, the marked physical changes that occur in adolescents lead them to a deep appreciation of their body image, which often affects their eating habits⁵. The weight and the body image of an individual are factors directly related to his eating behavior since both overweight and dissatisfaction with one's body may motivate food restrictions or inadequacies, with the influence of publicity and of the media being a strong component^{6,7}.

The practice of physical activity during adolescence is of benefit to physical and mental health due to a direct influence on morbidity during adolescence itself or during adulthood⁸. The practice of physical activities should be encouraged among adolescents in view of its contribution to increased self-esteem, socialization, adequacy of body composition, and reduction of the risks of developing cardiovascular diseases³. The recommendation for adolescents is to engage in physical activity of moderate and vigorous intensity for at least 60 minutes per day, corresponding to a total of 300 minutes per week.⁹

In view of the above considerations and in order to counteract the high prevalence of overweight individuals, it is important to recommend strategies of intervention in public health such as providing better information to the public about the importance of healthy habits and reducing the exposure of the population both to the stimuli that lead to the consumption of foods with high energy levels and to the stimuli that contribute to a sedentary life style¹⁰.

The objective of the present study was to assess the eating habits and the practice of physical activities among adolescents enrolled in two public schools in the west region of the city of Ribeirão Preto (SP).

METHODS

This was a case-control study in which the eating habits of 14-19-year-old adolescents enrolled in two state schools in the West region of the city of Ribeirão Preto (SP) were analyzed according to nutritional status and practice of physical activity. All the 521 students enrolled in 2009 were invited to participate in the study and 435 of them (83.5%) accepted the invitation. In a first stage, anthropometric evaluation was performed in order to identify overweight individuals. After nutritional status was determined by calculating the body mass index (BMI), the adolescents were divided into two groups, one consisting of subjects diagnosed as overweight or obese (BMI > 85th percentile)¹¹, and the other consisting of the same number of subjects with a normal nutritional status matched for sex and age to the previous group and used as controls. Adolescents with chronic diseases that compromise nutritional status and one pregnant girl were excluded. The second phase of the study consisted of an individual interview during which the International Physical Activity Questionnaire (IPAQ)¹² and food frequency questionnaires validated for adolescents were applied⁷ and a 3-day food record was filled out. The short version of the IPAQ contains questions related to the frequency and duration of three levels of activities performed during the last week: walking, moderate physical activity and vigorous physical activity, and also contains a question about the time during which the adolescent stayed sitting during the last week and the last weekend. The set of data obtained permitted us to classify the students into levels of physical activity, as shown in

Table 1. The semi-quantitative frequency questionnaire validated for adolescents contains 76 food items divided into nine groups: 1) sweets, snacks and goodies; 2) salty snacks and preparations; 3) milk and dairy products; 4) cereals, breads and root vegetables; 5) vegetables and legumes; 6) fruit; 7) meat and eggs; 8) beans; 9) beverages. The adolescent had to choose between the seven options of consumption frequency: never, less than once a month, one to three times a month, once a week, two to four times a week, once a day, two or more times a day. Food photographs were used to help the respondent to provide the correct information about the size of the portions reported. Other information was obtained from the 3-day food recall, considering two week days and one day during the weekend, in which the adolescent recorded the food eaten throughout the day both at home and outside. Specific instructions about the type of information to be provided were given before the adolescents filled out the questionnaire, and food photographs were used to help them regarding the size of the utensils and home measures.

All the anthropometric measurements were made according to standardized techniques using a digital Acqua model Plenna[®] electronic scale with a maximum capacity of 150 kg and a minimum graduation of 100 g for weight, and an Alturaexata[®] stadiometer with a cm scale and 1 mm precision for height. Weight and height data were inserted into the EpiInfo software version 3.3.2 to generate a data bank and for the calculation of BMI by the formula: BMI (kg/m²) = weight (kg)/height² (m). The results were plotted on the BMI curve according to age, which defined the classification of nutritional status⁸.

For qualitative analysis of eating habits, food groups were compared to the recommendations proposed by the Food Guide for the Brazilian Population⁹ with guidelines directed at the Brazilian population older than two years. The Virtual Nutri[®] software¹³ was used to calculate the nutritive values of the foods consumed and recorded for the three days. The anthropometric assessment data were used to estimate body fat using the equations of Slaughter et al¹⁴ recommended for individuals aged 8 to 17 years. For the analysis of calorie intake, records of a consumption of less than 500 kcal or of more than 5000 kcal were not considered since they might have been under- or overestimated, without reflecting reality⁵. Regarding food intake, total values and macro and micronutrient adequacy were calculated according to the recommendations of the Dietary Reference Intake (DRI)¹⁵. Associations between variables were calculated by ANOVA, Fisher's exact test, the non-parametric Wilcoxon test, and a mixed-effects model. The level of significance adopted was 0.05.

The study was approved by the Research Ethics Committee of the University Hospital, Faculty of Medicine of Ribeirão Preto, USP, and all participants or persons responsible for them gave written informed consent to participate.

RESULTS

Two groups of adolescents were studied, one consisting of subjects with excess weight, 38 of them (8.3%) overweight and 42 (9.7%) obese, and a control group of 78 subjects with BMI below the 85th percentile matched for sex and age to the study group. After the beginning of the second phase of the study, due to refusal to continue to participate, to incompletely filled out IPAQ questionnaires and to pregnancy in one case, the number of adolescents who effectively participated in the study was 114, corresponding to 51 (44%) overweight adolescents and 63 (55.2%) eutrophic adolescents.

Mean BMI was 29.5 for overweight subjects and 21.0 for eutrophic subjects and percent body fat was 49.4% and 29.1%, respectively ($p < 0.01$ -ANOVA).

The groups of foods most present in the diet of the two groups were determined on the basis of the food frequency questionnaires according to the mean daily portions consumed, as shown in Table 1.

After analysis of three records using the Virtual Nutri software, it was possible to determine the mean intake of each nutrient according to nutritional status, as presented in Table 2.

Table 3 lists the levels of physical activity and the nutritional status of the adolescents.

DISCUSSION

Excess body weight may contribute to the development of chronic-degenerative diseases even in individuals with an adequate BMI. In addition to the concern about the possibility that an adolescent will become an obese adult it should also be considered that obesity during adolescence already involves health problems¹⁶.

Mean body fat was 29.15% among eutrophic students. However, when considered according to sex, 95.2% of the girls and 47.6% of the boys had a body fat percentage exceeding the cut-off points of normality¹⁷. On the other hand, among the overweight adolescents, 11.1% had less than 20% body fat, showing that their high weight was due to excess muscle mass rather than to excess fat mass. Statistical analysis by ANOVA showed association between percent fat and nutritional status with $p < 0.01$, with a difference being observed between groups. This can be explained by the fact that, even though there are eutrophic adolescents with a high percentage of fat, this value increases with increasing BMI.

No significant difference in energy intake was detected between groups. It is possible that overweight students under-reported their real consumption either because they did not feel comfortable in reporting their real eating habits in detail, knowing that they were faulty, or

because they were not aware of the amount of food consumed as a consequence of their mechanical way of eating. The nature of the investigation may also have influenced these responses since in transverse studies individuals with weight above their mean may restrict food consumption in order to lose weight, declaring a reduced energy consumption at the time of data collection.

Similar results were obtained by Manios et al¹⁸ in a study with 12- and 13-year-old adolescents in which energy consumption was evaluated by means of the 24-hour food recall for three consecutive days. Overweight adolescents did not show a difference in energy or macronutrient consumption compared to their eutrophic controls. In addition, overweight students presented a lower calorie intake than the eutrophic ones. Santos et al.¹⁹ in a study of 96 adolescents with a mean age of 16 years compared intake evaluated by a 3-day food record to the basal metabolic rate and observed that 64.6% of the subjects interviewed under-notified their food consumption, with obese adolescents having a five-fold higher probability of under-notifying their energy intake than normal weight subjects.

As shown in Table 3, the group of overweight adolescents consumed less carbohydrate and more protein and fat than the eutrophic group although the difference between groups was not significant. Studies on diet composition have shown that intake is highly variable, as observed in the United States, where the consumption of nutrient-poor foods represents more than 30% of the daily intake. Among the main foods included in this proportion are soft drinks, candy, added sugar and desserts²⁰. Excess intake of carbohydrates was also observed by Samuelson among 14- to 19-year-old Danish adolescents, with 75% of the subjects interviewed consuming amounts of added sugars above the 10% limit recommended by northern countries²¹. In Madrid, Spain, sugars were found to correspond to approximately 16% of the total energy consumed by adolescents².

Studies conducted in Brazil, such as that by Andrade et al²² in Rio de Janeiro involving 387 individuals aged 12 to 18 years, showed that the high energy density foods that most contributed to total energy consumption were sugar, french fries and soft drinks. Garcia et al²³ identified daily consumption of candy, carbonated drinks, chewing gum, packaged snacks, oreo cookies and candy bars among 70% of 153 adolescents aged 10 to 14 years. Dalla Costa et al²⁴ reported that sugar was the food most consumed, with daily frequency reported by 78.2% of the subjects interviewed, followed by candy, sweets and chocolate beverages.

Regarding the percentage of energy provided by lipids, the present study detected a 30.2% value for overweight adolescents and a 27.9% value for eutrophic adolescents, with no significant difference between groups. According to NHANES III, food consumption data for North American subjects aged 2 to 19 years showed a mean percentage of dietary fat of 33.5% of the calorie value²⁵.

This value was 34% for Danish adolescents aged 14 to 19 years. In Sweden, several dietary studies showed alteration in the diet of individuals aged 14 to 17 years, with the caloric contribution of lipids being reduced from 44% in 1967 to 33% in 1993 as explained by increased cereal consumption and by the use of skim milk²¹.

In Brazil, Levy-Costa et al.²⁶ reported that calories from fat increase with income, with a more intense increase regarding saturated fats. According to these investigators, the calorie distribution of lipids in the Southeast region of Brazil, where Ribeirão Preto is located, corresponds to 30.2% of the total calories, a value similar to the 31.3% one reported by Garcia et al.²³ in a study of food consumption among adolescents from the state of São Paulo.

In the present study there was no association between nutritional status and level of physical activity (Fisher exact test, $p = 0.38$), and large part of overweight adolescents (70.6%) and 60.3% of eutrophic adolescents were classified as active. A possible explanation for this finding may be related to the instrument used, since in order to be classified as active by the IPAQ, an adolescent must walk a total of 150 minutes per week. Since many students walk to school, this limit is easily reached.

Some studies have detected an association between nutritional status and the practice of physical activities. In the US, Patrick et al.²⁷ studied 878 adolescents aged 11 to 15 years and observed that the prevalence of overweight was higher among girls (20.2%) than among boys (15.8%) and that overweight was associated with a lower caloric value of the diet, explained by the tendency of adolescents with a high BMI to under-report calorie consumption and to spend less time in vigorous physical activity.

Manios et al.¹⁸ conducted a study on 510 adolescents from public and private schools in Istanbul in which they used a diary filled out by the students once a week for two consecutive weeks to determine their physical activity. The results showed no significant differences between overweight and eutrophic children in terms of the level of sedentary and light activities or moderate and vigorous activities. Other studies have attributed the lack of association between physical activity and nutritional status to a possible information bias since overweight adolescents may overestimate their level of physical activity, thus reporting a level of activity equal to or higher than that of eutrophic subjects²⁸. In addition to biased information, another possible explanation is the so-called reverse causality since adolescents with a higher BMI, worried about their excess body weight, try to engage in more physical activity in order to lose weight, presenting the same level of physical activity as subjects with a lower BMI²⁸. Another fact to be considered is that nutritional status does not only depend on physical activity, but also on factors such as eating habits. Thus, even in the presence of a high energy expenditure by means of physical activity, if the intake of energy exceeds consumption the tendency will be to gain weight²⁹.

The present data help us to understand that the eating habits of adolescents are going through modifications, with the increasing presence of foods that make a small contribution in terms of nutrient content. The excessive availability of industrialized products and of ready-made foods has resulted in a diet rich in simple sugars, saturated fats, trans fats, cholesterol, and sodium. Despite apparently adequate physical activity and calorie consumption, one should consider the possibility that these data do not faithfully correspond to reality. This hypothesis is justified by the high rate of overweight and obesity detected in the age range studied and also by the onset of diseases such as arterial hypertension and dyslipidemia in increasingly younger individuals. Thus, we should emphasize the importance and the need of the involvement of health professionals in terms of providing guidelines and correcting deviations of life style, eating habits and physical activity among adolescents, in an attempt to sensitize them to the importance of measure that will contribute to the adoption of a healthy life style.

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Table 1 - Mean consumption of daily portions obtained with the frequency questionnaire

Food groups	Overweight	Eutrophy
	Mean	Mean
Cereals, tubercles and roots	4.46	5.48*
Fruit	2.26	2.44
Legumes and vegetables	3.08	3.1
Beans	1.77	2.12
Milk and dairy products	1.75	1.93
Meat, fish, eggs	2.57	2.4
Sweets	4.28	4.79
Fat	1.79	1.88

* p<0.01 (Wilcoxon)

Table 2 - Dietary nutrients according to nutritional status

Nutrient	Overweight		Eutrophy		p value*
	quantity	% of the diet	quantity	% of the diet	
Energy (kcal)	1761.8		1915.5		0.48
Carbohydrate (g)	230.4	52.7	270.0	56.7	0.10
Protein (g)	74.8	17.1	73.6	15.4	0.98
Lipids (g)	58.8	30.2	59.1	27.9	0.92
Total		100		100	

* ANOVA

Table 3 - Subject distribution according to level of physical activity and nutritional status

Variables	Overweight		Eutrophy		P value*
	n	%	n	%	
Level of physical activity					
Very active	12	23.5	18	28.6	0.38
Active	36	70.6	38	60.3	
Irregularly active A	1	2.0	3	4.8	
Irregularly active B	2	3.9	4	6.3	
Sedentary	0	0.0	0	0.0	

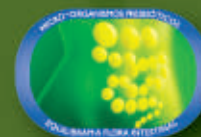
* Fisher exact test

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