International Journal of **Health Science**

EATING HABITS AND NUTRITIONAL STATUS OF ADOLESCENTS FROM SCHOOLS IN THE CITY OF SÃO PAULO

Victoria Machado
Nutrition student at Mackenzie Presbyterian University
http://lattes.cnpq.br/0763326953808114

Ana Paula Bazanelli
Prof. Dr. of the Nutrition Course at Mackenzie Presbyterian University
http://lattes.cnpq.br/0181207162033134

Renata Furlan Viebig
Prof. Dr. of the Nutrition Course at Mackenzie Presbyterian University
http://lattes.cnpq.br/2870966893264477

Marcia Nacif
Prof. Dr. of the Nutrition Course at Mackenzie Presbyterian University
http://lattes.cnpq.br/1942224028831734

Abstract: Adolescents' eating habits have been characterized by a high consumption of ready-made meals and ultra-processed foods, along with an insufficient intake of fresh, traditional foods, such as beans and vegetables. These habits are associated with an increased risk of obesity, cardiovascular disease and diabetes. This study assessed the eating habits and nutritional status of adolescents from schools in the city of São Paulo. This is a cross-sectional study carried out with adolescents of both sexes aged 14 and 15. Data was collected using an online questionnaire with questions about the participants' socio-economic characteristics, lifestyle, eating habits and anthropometric data. Thirty-six adolescents were assessed, 83.3% (n=30) of whom were female and 16.7% (n=6) male. With regard to food consumption, the average macronutrient intake was found to be adequate. The percentage contribution of macronutrients to total energy intake was 56% for carbohydrates, 14.7% for proteins and 29.2% for lipids. With regard to nutritional status, only one (n=1) girl had short stature, while the other adolescents were categorized as having adequate stature for their age. With regard to BMI for age, the majority (11.1%) of males and 66.6% of females were eutrophic. It can be concluded that adolescents are a vulnerable group and that follow-up with nutritionists is essential for the healthy development and growth of these young people.

Keywords: Adolescents. Food. Nutritional status.

INTRODUCTION

Adolescence is an evolutionary stage in which the individual's entire maturational and biopsychosocial process culminates (SILVA; TEIXEIRA; FERREIRA, 2012). It is a period of intense change, in which individuals are influenced by socioeconomic conditions, family habits, social and cultural values and rules (BARUFALDI *et al.*, 2016).

Adolescents are a nutritionally vulnerable group, considering their increased nutritional needs, their dietary pattern and lifestyle, and their susceptibility to environmental influences (LEAL *et al.*, 2010).

Adolescence is an important phase in terms of health promotion and prevention of risk factors, as eating habits acquired during this phase, as well as in childhood, tend to last throughout life (COSTA *et al.*, 2018) and can be risk factors for chronic diseases in adulthood (LEVY *et al.,* 2010).

It is known that inadequate dietary practices are increasingly common among adolescents, with their dietary pattern characterized by excessive consumption of soft drinks, sugars and fast foods and low intake of vegetables and fruit. Also worrying is the adoption of monotonous diets or new dietary fads, such as the exclusion of some daily meals (SILVA; TEIXEIRA; FERREIRA, 2012). These habits, characteristic of the contemporary nutritional transition, are associated with an increased risk of obesity, cardiovascular disease and diabetes (RODRIGUES *et al.*, 2017).

With this in mind, we propose to evaluate the eating habits and nutritional status of adolescents enrolled in schools in the city of São Paulo in order to plan actions to promote health and quality of life for these young people.

METHODOLOGY

This is a cross-sectional study carried out with adolescents of both sexes, aged 14 and 15, regularly enrolled in schools in the city of São Paulo. This study was approved by the Mackenzie Presbyterian University Research Ethics Committee under CAAE number: 2430101980000084 and all those responsible for the adolescents signed an Informed Consent Form (ICF).

Adolescents with any physical or mental condition that would prevent them from taking part in the study and pregnant and breastfeeding adolescents were not considered eligible.

The adolescents completed a standardized *online* questionnaire (*Google Forms*), inserted into *WhatsApp* and *Facebook*, with questions about their socioeconomic characteristics, lifestyle, anthropometric data, eating habits and a semi-quantitative Food Frequency Questionnaire (FFQ).

Anthropometric data (weight and height) were self-reported by the adolescents. Body mass index (BMI) was calculated by dividing weight (kg) by the square of height (m). The anthropometric indices height for age (Est-I) and BMI for age (BMI-I) were calculated using the AnthroPlus 1.0.4 program available on the World Health Organization (WHO) website.

The nutritional diagnosis was based on the Est-I Percentile and BMI-I Percentile values using the reference standards suggested by the WHO (2007), as shown in Chart 1 and Chart 2.

Critical values	Nutritional diagnosis
Percentile < 0.1	marked thinness
Percentile $\geq$ 0.1 and < 3	thinness
Percentile $\geq$ 3 and $\leq$ 85	eutrophy
Percentile > 85 and $\leq$ 97	overweight
Percentile > 97 and $\leq$ 99.9	obesity
Percentile > 99.9	severe obesity

Table 1. Body mass index cut-off points by age for adolescents.

Source: WHO (2007)

Critical values	Nutritional diagnosis
Percentile < 0.1	very short stature for age
Percentile $\geq$ 0.1 and < 3	short stature for age
Percentile $\geq$ 3	appropriate height for age

Table 2. Height-for-age cut-off points for adolescents.

Source: WHO (2007)

To assess food consumption, a Food Frequency Questionnaire for Adolescents (QFAA) was used for the last six months, developed by the Food Consumption Assessment Research Group (GAC) of the School of Public Health at the University of São Paulo (FSP/USP).

This instrument presents a list of foods made up of 65 items, whose food frequencies are categorized from 0 (never) to 10 times, and time unit varying between day, week, month and year. The food groups are organized into soups and pasta, meat and fish, milk and dairy products, pulses and eggs, rice and tubers, vegetables and legumes, sauces and dressings, fruit, drinks, bread and cookies and sweets and desserts.

In order to analyze the usual eating habits obtained from the FFQ, the frequency of consumption of each food was transformed into daily consumption using the ratio between the number of times consumed and the unit of time, with 1 being considered for a day, 7 for a week, 30 for a month and 365 for a year.

This value corresponds to the amount consumed of each food from the FFQ in one day, which was applied to the average portion size of the food, resulting in the amount in grams of the food consumed by the individual.

Based on the data collected, the results were analyzed quantitatively (by calculating the mean and standard deviation) and qualitatively (using frequencies, in numbers and percentages, in tables or graphs) for further discussion. The data was tabulated in Microsoft Excel and analyzed in SPSS version 21.

RESULTS AND DISCUSSION

Thirty-six adolescents living in the city of São Paulo were assessed, aged between 14 (n=11) and 15 (n=25) years, 83.3% (n=30) of whom were female and 16.7% (n=6) male.

Of these, 94.4% (n=34) of the participants said they lived with their parents and 2.8% (n=1) said they lived with their grandparents. All the adolescents were enrolled in a school, with 83.3% (n=30) studying in private schools and 16.7% (n=6) in public schools. As for the race of the participants, 75% (n=27) described themselves as white, 11.1% (n=4) as brown, 8.3% (n=3) said they were black and 5.6% (n=2) considered themselves yellow (Table 1).

	n	%
SEX		
Female	30	83,3
Male	6	16,7
AGE		
14 years old	11	30,6
15 years	25	69,4
RACE		
White	27	75
Brown	4	11,1
Black	3	8,3
Yellow	2	5,6
PHYSICAL ACTIVITY		
Yes	29	80,6
No	7	19,4
SMOKING		
Yes	-	-
No	36	100

Table 1 - Sociodemographic profile of study participants. São Paulo, 2024.

With regard to physical activity, 80.6% (n=29) said they practiced exercise. This data differs from that found by Ramos *et al.* (2017), who observed that 47.1% of adolescents enrolled in a school network were physically active. Condessa *et al.* (2019), when evaluating data from the 2012 National School Health Survey (PeNSE), showed that only 20.2% of the survey participants regularly practiced physical activity.

Daily physical activity (PA) during adolescence is associated with various health benefits, such as improved cardiovascular, bone and muscle health; improved academic performance; reduced risk of developing obesity, chronic diseases and depression. When evaluating the percentage of active young people in various countries, it is found that only 19.5% of adolescents practice PA regularly, which can be considered worrying, given that the habits acquired in adolescence tend to remain in adulthood (RAMOS *et al.*, 2017; PRÉCOMA *et al.*, 2019; CONDESSA *et al.*, 2019).

In Brazil, a study by Précoma *et al.* (2019) showed that the prevalence of physical inactivity during leisure time was 54.3%, and was more prevalent among female adolescents. According to these same authors, the ideal level of physical activity for adolescents aged 6 to 17 is 60 minutes or more per day of intense to vigorous aerobic activity. Some factors are correlated with the adoption of PA, such as the family context. The family context has been highlighted in this process, as the family adds a set of values, knowledge and attitudes that can interfere with young people's PA (RAMOS *et al.*, 2017; PRÉCOMA *et al.*, 2019; CONDESSA *et al.*, 2019).

With regard to smoking, as can be seen in Table 1, all the participants (100%) said they were not smokers. A study by Teixeira, Guimarães and Echer (2017) showed that 6.3% of the population studied had already started smoking, of which 64.8% reported smoking daily. According to these authors, there is a smoking prevalence of 9.3% among school adolescents. PeNSE showed that students from public schools tend to experiment with tobacco more intensely than those from private schools. Considering only those students who have tried cigarettes, consumption reached 30.5% in Brazil.

According to Précoma *et al.* (2019), around 18.5% of Brazilian adolescents have tried smoking some kind of cigarette. It is known that preventing smoking in childhood is the most important stage, as around 90% of people start smoking by the age of 18.

As for the stages of sexual maturation, when the boys were asked about the presence of armpit hair, all (100%) answered yes. According to a study by Oliveira (2019), boys' first development begins at around 9 and 10 years of age, with testicular development. Pubic hair begins to grow at around 11 and 12 years of age, while armpit hair and a worsening voice begin to form at around 14 and 15 years of age. Male puberty comes to an end around the ages of 15 and 16.

With regard to the girls' first menstruation (menarche), the average age was 11.6 years, with a minimum menarche age of 8 and a maximum of 13 years. In the study carried out by Costa *et al.* (2018), the average age of menarche in adolescents was 12.1 years, with a minimum age of menarche of 9 and a maximum of 15 years.

Menarche is the transition between childhood and adulthood and is one of the most important manifestations of the last events of puberty. First menstruation before the age of 8 suggests precocious puberty, while its appearance after the age of 14 may indicate a delay in development. The early age of menarche can be considered a risk factor for the development of breast cancer, obesity, metabolic syndrome, cardiovascular disease, mental illness and migraine. Studies have shown that excess weight can influence early puberty in girls, due to hormonal issues. In addition, studies have also shown a relationship between menarche and dissatisfaction with body image, with girls who menstruate later having a better body image than those who menstruate earlier (COSTA *et al.*, 2018; CUNHA *et al.*, 2017).

Regarding the eating habits of the survey participants, 61.1% (n=22) said they had not changed their eating habits or were on a diet, while 38.9% (n=14) said they had changed their eating habits (Table 2).

	N	%
MOTIVES		
Weight loss	6	42,9
Medical advice	3	21,4
Other reasons	3	21,4
Weight gain	1	7,1
Vegetarian diet or reduced meat consumption	1	7,1

Table 2 - Reason for changing eating habits or dieting. São Paulo, 2024.

A study carried out in Portugal by Pereira (2016) found that of the adolescents who were on some kind of diet, 8.6% of cases had been prescribed by a doctor, 22.2% by a nutritionist, 4.9% of cases by friends, while 19.8% of cases were advised by a family member. Furthermore, 44.4% of the diets came from the adolescents themselves, influenced by magazines and the internet. It can be seen that in this study the majority of young people said they had been on a diet with the aim of losing weight.

A lot of research into body image has intensified, mainly due to evidence that body dissatisfaction occurs at an early age and is influenced by sociocultural aspects. It has also been shown that body image, especially for females, is predominantly focused on weight reduction and is associated with the standard of thinness. This body dissatisfaction can be considered a risk factor for depressed mood, low self-esteem and suicidal intent, despite adjustment for psychological problems and other variables. As a result, adherence to diets becomes frequent. These diets are often imposed without professional supervision, which can lead to a series of organic and behavioral complications (SANTOS; POLL; MOLZ, 2016; PEREIRA, 2016; BERTIN *et al.*, 2008).

When asked about their consumption of dietary supplements, 88.9% (n=32) of the participants reported not using any type of product, while 8.3% (n=3) said they used them regularly. The most commonly used supplements were iron, vitamin D, vitamin C and functional fiber.

When assessing the adolescents' food consumption, the average macronutrient intake was found to be adequate. The percentage contribution of macronutrients to total energy intake was 56% for carbohydrates, 14.7% for proteins and 29.2% for lipids (Table 3).

Macronutrient	% VCT	Recom-mendation	Classification
Carbohydrates	56	**45 - 65 %**	Suitable
Protein	14,7	**10 - 35 %**	Suitable
Lipid	29,2	**20 - 35 %**	Suitable

Table 3 - Average macronutrient intake of adolescents. São Paulo, 2024.

Macronutrient	Average (g)	Kcal	Standard Deviation
Carbohydrate (g)	334,18	1336,72	140,81
Protein (g)	79,84	319,36	23,98
Lipid (g)	81,63	734,67	38,25

Table 4 - Quantitative analysis of adolescents' macronutrients. São Paulo, 2024.

Souza *et al.* (2016) conducted a study using data from the Study of Cardiovascular Risks in Adolescents (ERICA) carried out in 2013 and 2014. ERICA is a national school-based survey whose aim is to assess the prevalence of cardiovascular risk factors and metabolic syndrome in adolescents aged 12 to 17 attending public and private schools located in 124 Brazilian cities. In this study, the authors observed that the percentage contribution of carbohydrates, proteins and lipids to total energy intake was similar in the different gender and age groups, as well as between macro-regions. The average caloric contribution of carbohydrates, proteins and lipids was 54.0%, 15.0% and 31.0% respectively among girls and 53.0%, 16.0% and 30.0% respectively among boys. Results similar to ours were also found in the study by Veiga et al. (2013), which used data from the National Dietary Survey (INA). The adolescents interviewed were aged between 10 and 18 and were divided into two groups (10 to 13 years and 14 to 18 years). The average consumption of the groups for the percentage contribution of macronutrients to total energy intake was approximately 57% for carbohydrates, 16% for proteins and 27% for lipids. The average consumption in grams was 279.5 g for carbohydrates, 77.3 g for proteins and 61.5 g for lipids.

Adolescents are a nutritionally vulnerable group. It is important that their energy needs are met. Assessing the adequacy of adolescents' energy intake is a complex task, as their energy needs are established using equations that take into account variables such as gender, age, height, body weight and physical activity. Access to information on food and nutrition and monitoring their food consumption are extremely important in order to identify any risk behavior and monitor their growth and development. In this age group, some eating habits are inadequate, such as excessive consumption of soft drinks, sugars and snacks like fast food, low consumption of fruit and vegetables, as well as dairy foods (LEAL *et al.*, 2010; VEIGA *et al.*, 2013).

Adolescents aged 14 to 18 have the highest average fat intake compared to adults and the elderly, which goes some way to explaining the higher absolute consumption of carbohydrates and lipids, with a consequent increase in energy for this age group. Studies carried out with Brazilian adolescents have shown a high consumption of lipids and consumption of carbohydrates and proteins at or above the recommended levels. This eating habit is somewhat worrying, as it can lead to excess weight and a greater risk of developing chronic non-communicable diseases (CNCDs) during adulthood (LEAL *et al.,* 2010; VEIGA *et al.*, 2013).

When the young people were asked about their habit of consuming visible fat from beef or pork, 47.2% (n=17) of the adolescents reported never or rarely eating the fat, 27.8% (n=10) said they sometimes consume it, 22.2% (n=8) always consume the visible fat and only 2.8% (n=1) reported not eating beef or pork.

Regarding the consumption of chicken or turkey skin, 33.3% (n=12) of the participants reported eating the skin, 33.3% (n=12) never or rarely consume it and 30.6% (n=11) reported sporadic consumption.

Commonly consumed meats, especially red meats, which have a high bioavailability of iron compared to the iron present in vegetable protein, are an important source of high biological value protein and B vitamins. However, they can contain significant amounts of saturated fats, mainly palmitic acid and, to a lesser extent, stearic acid, depending on the type of animal, its breeding and where the meat is cut (SANTOS *et al.*, 2013).

Table 5 shows the nutritional status of adolescents according to the reference suggested by the WHO (2007).

Nutritional Diagnosis	Men		Women	
	n	%	n	%
HEIGHT FOR AGE				
Short stature for age	-	-	1	2,7
Appropriate height for age	6	16,6	29	80,5
BMI FOR AGE				
Thinness	-	-	1	2,7
Eutrophy	4	11,1	24	66,6
Overweight	-	-	5	13,8
Obesity	2	5,5	-	-

Table 5 - Nutritional status of study participants. São Paulo, 2024.

It can be seen that only one (n=1) girl had short stature, while the other adolescents were categorized as having adequate stature for their age. With regard to BMI for age, the majority (11.1%) of males and 66.6% of females were eutrophic.

These data were similar to those found by Santos and Ribas (2018) when they assessed 100 adolescents with an average age of 16.9 years. The authors observed that in relation to the height-for-age index, 98% of the girls and 96% of the boys had adequate height-for-age, while only 2% and 4% of the girls and boys, respectively, had low height-for-age. With regard to BMI for age, the majority of both sexes were eutrophic. We found that 24% of girls and 15% of boys were overweight and 15% and 9% of girls and boys respectively were obese.

According to the Brazilian Obesity Guidelines (ABESO, 2016), during a child's development and growth, there are numerous factors that lead to the onset of obesity, such as a sedentary lifestyle, high birth weight, lack of breastfeeding, inadequate complementary feeding, and even overweight parents. The association between child obesity and parental BMI is significant from the age of 3 and continues into adulthood. The child's BMI between the ages of 5 and 20 can also be correlated with the mother's obesity, even before pregnancy.

Around 50% of a person's weight and 20-25% of their height are acquired during adolescence. Nutrition therefore serves as a significant determinant of the variability of this process. The secretion of gonadal hormones can be altered due to inadequate nutrient intake, which can delay the onset of puberty and compromise statural gain. Therefore, monitoring adolescent growth and development is an important tool for actions aimed at this group (SIGULEM; DEVINCENZI; LESSA, 2000).

In Brazil, the 2015 PeNSE identified a prevalence of overweight and obesity of 23.3% and 8.5%, respectively, in schoolchildren aged 13 to 17 (PRÉCOMA *et al.,* 2019). According to Alves *et al.* (2018), in Brazil, the prevalence of obesity among adolescents is 5.9% for males and 4.0% for females.

CONCLUSION

When analyzing the results obtained in this study, it was found that the majority of adolescents, of both sexes, had adequate height for their age and eutrophy in relation to BMI for age.

Although adolescents are a nutritionally vulnerable group, as they have some inappropriate habits, such as excess sugar and soft drinks and a low intake of fruit and vegetables, the average macronutrient intake of the participants in the study was found to be adequate. However, constant monitoring by nutritionists is extremely important for the healthy development and growth of these young people.

REFERENCES

ALVES, M.F.C. et al. Intervenção nutricional em adolescentes com obesidade grave: relato de caso. **Revista Brasileira de Obesidade, Nutrição e Emagrecimento**, São Paulo, v. 12, n. 69, p. 118-125, 2018.

ASSOCIAÇÃO BRASILEIRA PARA O ESTUDO DA OBESIDADE E DA SÍNDROME METABÓLICA – ABESO. Diretrizes brasileiras de obesidade, 2016. São Paulo. https://portaldeboaspraticas.iff.fiocruz.br/

BARUFALDI, L.A. et al. ERICA: prevalência de comportamentos alimentares saudáveis em adolescentes brasileiros. **Rev. Saúde Publica**, v.50, p.1-6, 2016. DOI:10.1590/S01518-8787.2016050006678 1

BERTIN, R.L. et al. Estado nutricional e consumo alimentar de adolescentes da rede pública de ensino da cidade de São Mateus do Sul, Paraná , Brasil. **Rev. Bras. Saúde Matern. Infant.,** Recife, v. 8, n. 4, p. 435-443, 2008.

CONDESSA, L.A. et al. Fatores socioculturais associados à atividade física de meninos e meninas: PeNSE 2012. **Rev. Saúde Pública**, v. 53, n. 25, p.1-13, 2019.

COSTA, C.S. et al. Comportamento sedentário e consumo de alimentos ultraprocessados entre adolescentes brasileiros: Pesquisa Nacional de Saúde do Escolar (PeNSE), 2015. **Cad. Saúde Pública**, v. 34, n. 3, p.1-12, 2018.

COSTA T.S. et al. Idade da menarca em adolescentes comparado a de suas mães: um estudo transversal em São Luíz-MA. **Rev. Pesq. Saúde**, v. 19, n. 2, p. 71-73, 2018.

CUNHA, S.G.P. et al. A relação entre a idade da menarca e o índice de massa corpórea em adolescentes. **Rev. Unilus Ensino e Pesquisa**, v. 14, n. 35, 2017.

INSTITUTO BRASILEIRO DE GEOGRAFIA E ESTATÍSTICAS - IBGE. Pesquisa de Orçamentos Familiares no Brasil, 2008/2009. Análise do Consumo Alimentar Pessoal no Brasil. Rio de Janeiro: **IBGE**; 2011.

LEAL, G.V.S. et al. Consumo alimentar e padrão de refeições de adolescentes, São Paulo, Brasil. **Rev Bras Epidemiol**, v.13, n. 3, p. 1-10, 2010.

LEVY, R.B. et al. Consumo e comportamento alimentar entre adolescentes brasileiros: Pesquisa Nacional de Saúde do Escolar (PeNSE), 2009. **Ciência & Saúde Coletiva**, v. 15, n. 2, p. 3085-3097, 2010.

OLIVEIRA, M.P.S. Desenvolvimento motor e habilidades motoras: análise corporativa entre meninos e meninas. **Revista de Educação, Saúde** e Ciências do Xingu, v. 1, n. 1, 2019.

PEREIRA, A.M.G.R. Preocupação com o peso e prática de dietas por adolescentes. **Acta Portuguesa de Nutrição**, p14-16, 2016.

PRÉCOMA, D.B. et al. Atualização da Diretriz de Prevenção Cardiovascular da Sociedade Brasileira de Cardiologia. **Arq Bras Cardiol.**, v.113, n.4, p.787-89, 2019.

RAMOS, C.G.C. et al. Contexto familiar e atividade física de adolescentes: cotejando diferenças. **Rev. Bras. Epidemiol.**, v. 20, n. 3, p. 537-548, 2017.

RODRIGUES, P.R.M. et al. Viabilidade do uso de pergunta simplificada na avaliação da qualidade da dieta de adolescentes. **Ciência & Saúde Coletiva**, v. 22, n. 5, p. 1565-1578, 2017.

SANTOS, C.C.; POLL, F.A.; MOLZ, P. Relação entre o estado nutricional, comportamento alimentar e satisfação corporal de escolares adolescentes de Santa Cruz do Sul, RS. **Cinergis**, Santa Cruz do Sul, v. 17, n. 4, p. 330-335, 2016.

SANTOS, D.M.G.; RIBAS, S.A. Dieta e fatores de risco para doença cardiovascular em escolares adolescentes: estudo transversal. **Adolesc. Saude**, Rio de Janeiro, v. 15, n. 2, p. 56-64, 2018.

SANTOS, R.D. et al. I Diretriz sobre o consumo de gorduras e saúde cardiovascular. **Sociedade Brasileira de Cardiologia**, v.100, n.1, supl.3, 2013.

SIGULEM, D.M.; DEVINCENZI, M.U.; LESSA, A.C. Diagnóstico do estado nutricional da criança e do adolescente. **Jornal de Pediatria**, v. 76, supl. 3, 2000.

SILVA, J.G.; TEIXEIRA, M.L.O.; FERREIRA, M. A. Alimentação e saúde: sentidos atribuídos por adolescentes. **Esc Anna Nery**, v. 16, n. 1, p. 88-95, 2012.

SOUZA, A.M. et al. ERICA: Ingestão de macro e micronutrientes em adolescentes brasileiros. **Rev. Saúde Pública**, v. 50, supl. 1, 2016.

TEIXEIRA, C.C.; GUIMARÃES, L.S.P.; ECHER, I.C. Fatores associados à iniciação tabágica em adolescentes escolares. **Rev. Gaúcha Enferm.**, v. 38, n. 1, p.1-9, 2017.

VEIGA, G.V.; et al. Inadequação do consumo de nutrientes entre adolescentes brasileiros. **Rev. Saúde Pública**, v. 47, supl.1, p.212S-21S, 2013.