Replacement of meals with snacks among adolescents

Substituição de refeições por lanches em adolescentes

Sustitución de comidas por meriendas entre adolescentes

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ABSTRACT

Objective: To verify the prevalence of replacement of lunch and dinner with snacks among adolescents and its association with gender and nutritional status, and to evaluate the food that replaces such meals.

Methods: A cross-sectional study that enrolled 106 high-school students in the city of São Paulo, Brazil. The adolescents answered questions about how often they replaced lunch and dinner with snacks, and which foods replaced those meals. Their weight and height were measured in order to calculate the body mass index, and the nutritional classification was based on the World Health Organization criteria. Data were analyzed descriptively, with a significance level of 5%.

Results: One third of the adolescents replaced lunch and half of them replaced dinner with snacks. It was observed that girls replaced meals more than boys. The prevalence of meal replacement by snacks was higher among obese adolescents, being 40% for lunch and 70% for dinner. Sandwiches, baked or fried salty pastries, pizzas and hamburgers were the snacks that mostly replaced the meals.

Conclusions: The replacement of meals, mainly dinner, with snacks was prevalent in the studied population. Most foods consumed in replacement of lunch and dinner had high energy density and low nutritional value.

Key-words: food consumption; adolescents; food preferences.

RESUMO

Objetivo: Verificar a prevalência da substituição do almoço e do jantar por lanches em adolescentes e a associação com estado nutricional e sexo, assim como avaliar os alimentos que substituem as refeições.

Métodos: Estudo transversal com 106 adolescentes do ensino médio de uma escola técnica localizada no município de São Paulo, que responderam a um questionário sobre atitudes alimentares a partir do qual foi avaliada a frequência de substituição do almoço e do jantar por lanche e os alimentos substitutos. Foram aferidos o peso e a altura para o cálculo do índice de massa corpórea por idade, e a classificação do estado nutricional de acordo com o critério da Organização Mundial da Saúde. Foi realizada análise descritiva com nível de significância de 5%.

Resultados: Um terço dos adolescentes substituiu o almoço e metade deles substituiu o jantar por lanches. Verificou-se que mais meninas costumavam substituir refeições. Observou-se maior prevalência de substituição do almoço (40%) e do jantar (70%) por lanche entre adolescentes obesos. Sanduíches, salgados, pizzas e hambúrgueres foram os principais substitutos das refeições.

Conclusões: Verificou-se prevalência elevada de substituição de refeições principais, principalmente do jantar, por lanches. Os substitutos do almoço e do jantar apresentavam, em sua maioria, alta densidade energética e baixo valor nutritivo.

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Palavras-chave: consumo de alimentos; adolescentes; preferências alimentares.

RESUMEN

Objetivos: Verificar la prevalencia de la sustitución del almuerzo y de la cena por meriendas entre adolescentes y la asociación con estado nutricional y sexo y evaluar los alimentos que sustituyen las comidas.

Métodos: Estudio transversal, con 106 adolescentes de la secundaria de una escuela técnica, ubicada en el municipio de São Paulo, que contestaron a un cuestionario sobre actitudes alimentarias, a partir del que se evaluó la frecuencia de sustitución del almuerzo y de la cena por meriendas y los alimentos sustituidos. Fueron verificados el peso y la altura para el cálculo del índice de masa corporal por edad y clasificación del estado nutricional conforme al criterio de la Organización Mundial de la Salud. Se realizó análisis descriptivo, con nivel de significancia de 5%.

Resultados: Un tercio de los adolescentes sustituyó el almuerzo y mitad de ellos la cena por meriendas. Se verificó que más muchachas solían sustituir comidas. Se observó mayor prevalencia de sustitución del almuerzo (40%) y de la cena (70%) por meriendas entre los adolescentes obesos. Sándwiches, pasteles salados, pizzas y hamburguesas fueron los principales sustitutos de las comidas.

Conclusiones: Se verificó la prevalencia elevada de sustitución de comidas principales, especialmente la cena, por meriendas. Los sustitutos del almuerzo y de la cena presentaban, en su mayoría, alta densidad energética y bajo valor nutritivo.

Palabras clave: consumo de alimentos; adolescentes; preferencias alimentarias.

Introduction

Adolescence is a period marked by physical changes characteristic of puberty and by social and psychological changes, since adolescents begin to have independence and responsibilities and show improved cognitive skills and personality adaptations[1,2]. These changes have an effect on their eating behavior[1], which can be understood as the ways of dealing with food[3] and is influenced by internal (such as self-image, physiological needs, and preferences) and external (such habits of family and friends, culture, and the media) factors[1].

Adolescents, whose ages are between 10 and 19 years and 11 months[4], represent approximately 20% of the total world's population[5]. In Brazil, there are 34,206,010 adolescents, which represents 17.9% of the total population of the country[6]. This group can be considered at nutritional risk, because its specific nutrient needs are higher compared to those of other age groups[7,8]. In order to meet growth and development demands and to ensure the maintenance of the organism at this stage, it is essential to establish healthy eating habits[7], which can be understood as habits that promote health and need to be guided from childhood to adulthood[3]. They should be balanced, with foods of all kinds[3], but especially those with high nutritional value, such as fruits, vegetables, and fibers[9]. Considering that eating habits acquired during adolescence tend to persist into adulthood[10], establishing a healthy diet at this stage is important to ensure a life free of disease[9]. However, some factors, such as practicality[11], variety of snack bars and fast-food restaurants[8,9], and influences from the media, family and friends[2], can make healthy food choices more difficult[9].

In this context, it is increasingly frequent for adolescent to skip meals, mainly breakfast, eat out, and replace traditional meals with industrialized foods, especially of the fast-food type[7], which is composed of excessive amounts of sugar, sodium, and saturated and trans fats, and also has high energy density[12]. This habit characterizes an inadequate food consumption and can cause overweight and obesity, culminating in chronic diseases[12,13].

Obesity rates are expanding both in developed and developing countries among all age groups[14], especially among adolescents, reaching epidemic proportions[10]. The adolescent lives in an obesogenic environment[15], characterized by the great offer of tasty and inexpensive foods[16], but that are also caloric, rich in sugar and fat, and with low amount of vitamins and minerals[14,15], and by sedentary practices emerging from technological advances[17]. Obesity in adolescence is a major concern, because it is strongly associated with risk factors for cardiovascular diseases, currently the main cause of death by disease in the world[14].

The replacement of lunch and dinner with snacks among adolescents reduces the consumption of the traditional foods that are important sources of vitamins, minerals and fibers, which can lead to future health problems when these foods are replaced with foods of high energy density[18]. Therefore, surveys that identify the foods consumed in replacement of the main meals are necessary for the implementation of nutritional interventions with

adolescents. The aims of this study were to verify the prevalence of the replacement of lunch and/or dinner with snacks among adolescents from a public technical school of the city of São Paulo, Brazil, and its possible association with nutritional status and gender, and to evaluate the food that replaced such meals.

Method

This cross-sectional study is part of a more extensive research project called "Eating attitudes and their determinants among adolescents in the city of São Paulo, Brazil" and had the financial support of Fundação de Amparo à Pesquisa do Estado de São Paulo (Fapesp). The aim of this project was to evaluate the factors that influence adolescents' eating habits, determine if teenagers meet nutritional recommendations, and assess the dietary and physical activity patterns of this population.

The study population of the matrix project was obtained by simple random sampling, considering a maximum ratio of 50% for the different hypothesis to be found, with a 3% margin of error, totaling 1,067 adolescents. Considering possible sample loss, 20% additional subjects were added to the sample, and the final sample consisted of 1,168 high school students from technical schools of the city of São Paulo. The calculation of the number of students from each school to participate in the project was performed by cluster analysis, selecting one group of nearly 40 students for each grade. Data were collected in schools of Centro Paula Souza, in the second semester of 2009. Up to May of that year, there were 27 technical schools in this institution, 15 of which included high school education. Of these 15 schools, one was used in a pre-test study and two did not show interest in participating.

For the present study, the Escola Técnica (Etec) José Rocha Mendes (East area of São Paulo city) was selected, one of the 12 schools of the matrix project. In this school, one group from the 1st grade, one group from the 2nd grade, and one group from the 3rd grade of high school, all of them with classes in the morning, were selected by cluster analysis. The groups had 39, 38, and 38 students respectively, totaling 115 adolescents, aged 15 to 19 years. Of these, 106 were considered eligible for the study, after the parents/legal guardians returned a signed written consent form.

This study used the Adolescent Eating Attitudes Questionnaire (AEAQ) from the matrix project, which was developed based on the translation and adaptation to the Brazilian context of the questionnaire developed in Minnesota for the project Eating Among Teens (EAT). The AEAQ was back translated, approved by the EAT team, and the final version comprised 72 questions. Adolescents answered "Yes" or "No" to replacement of lunch and dinner with snacks, and those who answered "Yes" listed the foods that replaced these meals, this being the question used in this study. Database was double entered and descriptive analyses were performed using the Statistical Package for the Social Sciences (SPSS), version 13.0. The chi-square test (significance level of 5%) was applied to verify possible associations of the variables with gender and nutritional status. The body mass index (BMI), obtained by the division of body weight (kg) by height squared, was calculated in order to classify adolescents using the indicator BMI for age, based on the cutoff points in percentiles developed by the World Health Organization (WHO)[4]. Adolescents who were below the 3rd percentile were considered thin; those who were between 3rd and 85th percentiles, eutrophic; those between 85th and 97th percentiles, overweight; and those above the 97th percentile, obese. The snacks mentioned were grouped into categories for analysis.

The project was approved by the Research Ethic Committee (REC) of the School of Public Health, Universidade de São Paulo, Brazil, no. 09/07224-6, and is in accordance with resolution 186 of October 10th, 1996, of the National Health Council.

Results

Thirty-seven students from the 1st grade of high school, 35 from the 2nd grade, and 34 from the 3rd grade were

Table 1 - Distribution of adolescents regarding replacement of lunch and dinner with snacks, according to gender

	Lunch				Dinner			
	Boys	Girls	Total	*p*-value	Boys	Girls	Total	*p*-value
	n (%)	n (%)	n (%)		n (%)	n (%)	n (%)	
Replace with snacks	14 (26.4)	22 (41.5)	36 (34.0)	0.101	24 (46.2)	30 (56.6)	54 (51.4)	0.284
Do not replace with snacks	39 (73.6)	31 (58.5)	70 (66.0)		28 (53.8)	23 (43.4)	51 (48.6)	
Total	53 (100)	53 (100)	106 (100)		53 (100)	53 (100)	106 (100)	

investigated, of which 53 were boys and 53 were girls; 66.1% were aged between 15 and 16 years and 33.9% between 17 and 19 years. With regard to nutritional status, 1.9% were thin; 73.6%, eutrophic; 15.1%, overweight; and 9.4%, obese.

It was seen that more than a half (51.4%) of adolescents reported to replace dinner and 34% to replace lunch (Table 1) with snacks. Although no significant difference was found between genders, a greater proportion of girls replaced the main meals with a snack.

There was no report of lunch replacement among low-weight adolescents, and this habit showed low prevalence among eutrophic and overweight adolescents (35.9 and 25.0% respectively) (Table 2). A higher percentage of replacement of lunch with snacks was observed in obese adolescents (40%), with no statistically significant difference (p=0.595). A high frequency of replacement of dinner with snacks was noted among obese adolescents (70%), and half of thin teenagers showed the same behavior (Table 2). Among eutrophic and overweight individuals, the frequency was 52.6% and 37.5% respectively.

With regard to the foods described by the adolescents as replacements for the main meals (Figures 1 and 2), the answers "snack", "bread with cold cuts, or cheese, or meat, or chicken", and "natural sandwich" were considered as 'sandwich'. Fried and baked salty pastries were grouped as 'salty pastries'. The answers fast-food and hamburger

Table 2 - Distribution of adolescents regarding replacement of lunch and dinner with snacks, according to nutritional status

	Thinness	Eutrophy	Overweight	Obesity	*p*-value
	n (%)	n (%)	n (%)	n (%)	
Replacement of lunch with snacks					
Yes	-	28 (35.9)	4 (25.0)	4 (40.0)	0.595
No	2 (100.0)	50 (64.1)	12 (75.0)	6 (60.0)	
Total	2 (100)	78 (100)	16 (100)	10 (100)	
Replacement of dinner with snacks					
Yes	1 (50.0)	41 (52.6)	6 (37.5)	7 (70.0)	0.447
No	1 (50.0)	37 (47.4)	10 (62.5)	3 (30.0)	
Total	2 (100)	78 (100)	16 (100)	10 (100)	

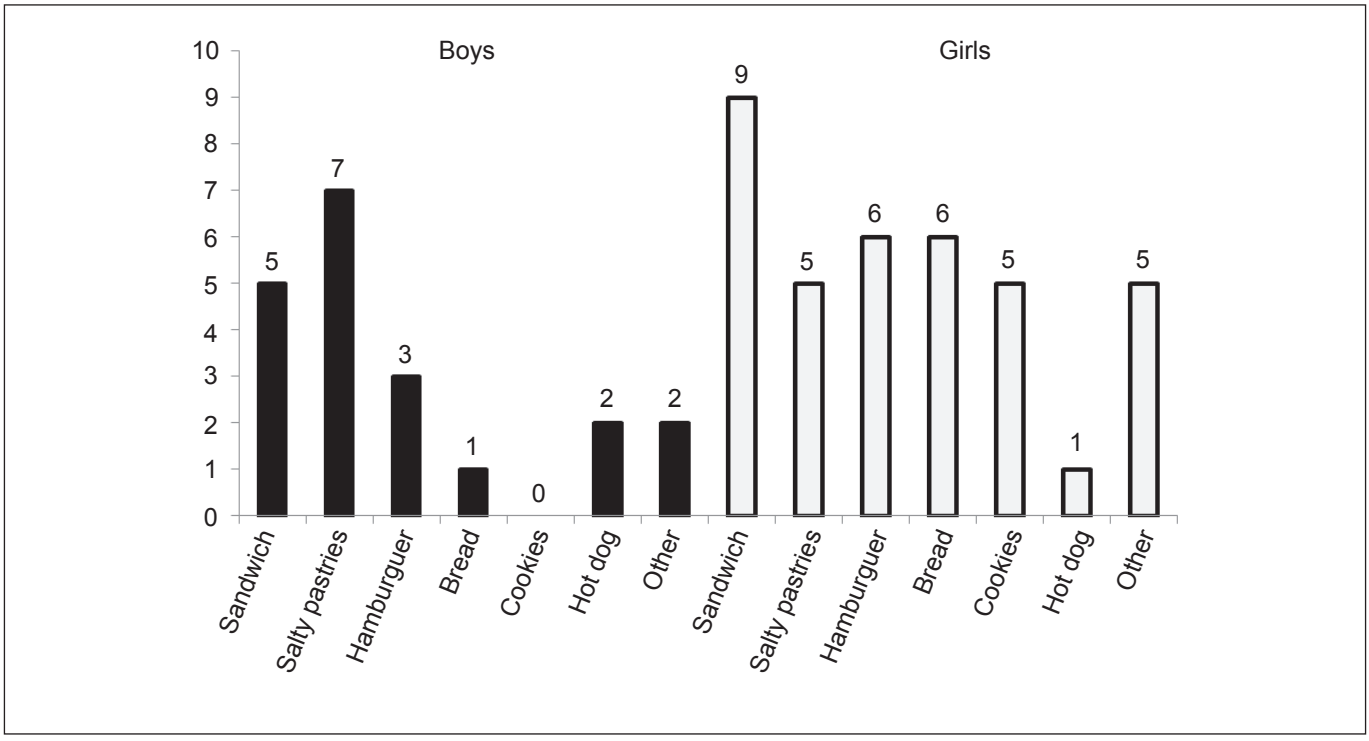

Figure 1 - Snacks reported by adolescents as replacements for lunch

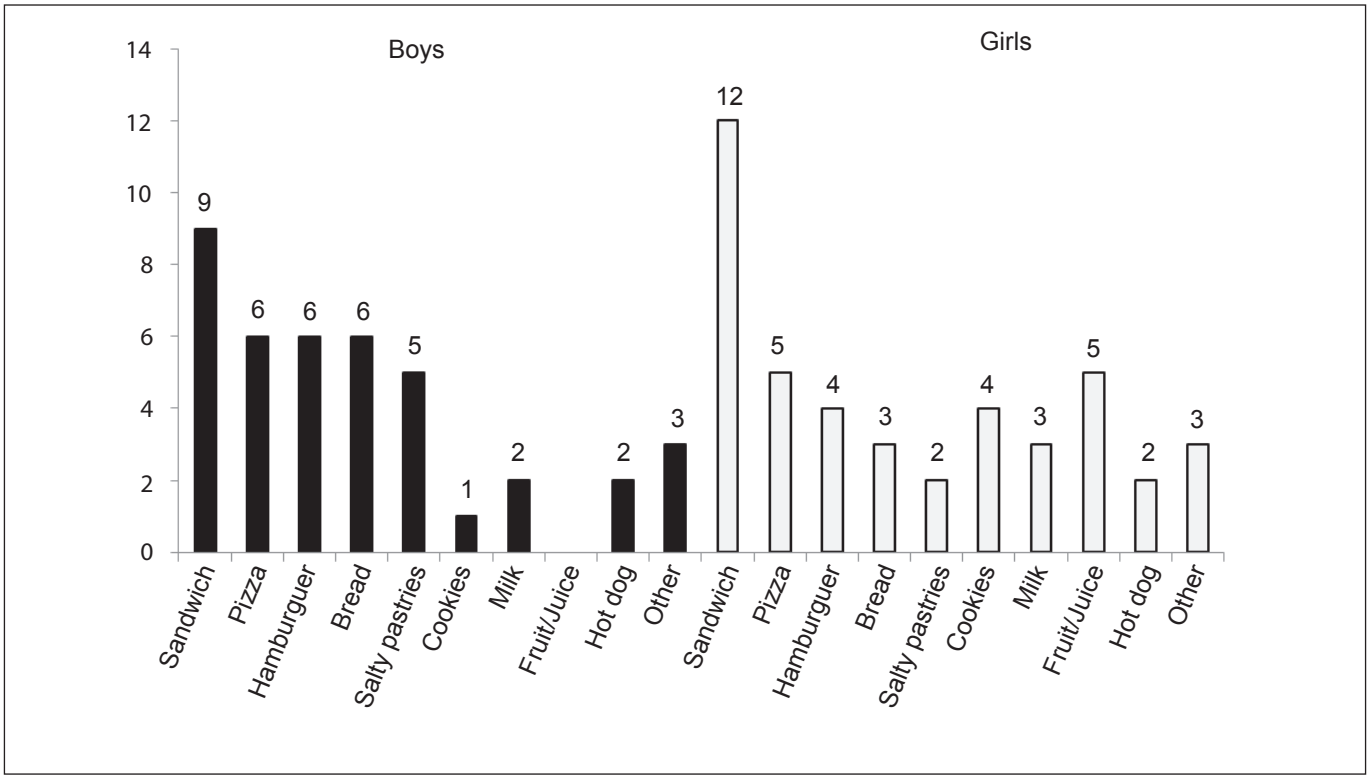

Figure 2 - Snacks reported by adolescents as replacements for dinner

sandwiches were included in the category 'hamburger'. The category "Other" encompassed foods reported by only one student, such as "cake, sweets, nuggets, fried savories, packaged snacks, and soft drinks". Some adolescents described more than one kind of snack in replacement of each meal. Sandwich was the most consumed food by adolescents instead of lunch, followed by salty pastries and hamburger. Sandwich and hamburger were more mentioned by girls and salty pastries by boys (Figure 1). The most frequently consumed snack by adolescents instead of dinner was sandwich, followed by pizza and hamburger. It can be noted that more girls replaced dinner with sandwich, as it happened for lunch, but hamburger was more reported by boys as a replacement for dinner, as well as pizza (Figure 2).

Discussion

The majority of adolescents reported to replace the main meals with snacks, with more than a half (51.4%) replacing dinner and 34% replacing lunch, higher proportions than those found by Leal *et al*[7] among adolescents from São Paulo (24.6% replaced dinner and 6.2% replaced lunch with snacks), and by Chermont Prochnik Estima *et al*[19] among adolescents from Rio de Janeiro (approximately 40% for lunch and 19% for dinner).

The most frequently replaced meal was dinner, and this habit was more present among girls. Koritar *et al*[20] inferred that this habit may be related to a greater concern of girls with their body image. Many of them consider dinner a meal that "puts on weight" and, by replacing it with snacks, because they believe these snacks have less calories than the traditional dinner, they do it inappropriately[20].

It is increasingly more common for adolescents to replace nutritious meals with snacks consisting of foods with high energy density and low nutritional value, which can compromise energy balance and lead to overweight[7]. The frequent replacement of lunch and/or dinner with snacks is probably due to factors related to changes in adolescents' lifestyle, such as lack of time, need of practicality[11], influence of the media, and preference for the taste[13], together with the habit of eating out and the consumption of increasingly large food portions[8].

Vargas *et al*[13] verified that the increase in the consumption of foods with low nutritional value among adolescents from Rio de Janeiro is associated with the susceptibility of youngsters to the appeal of the media and with the lack of

stimulus to the consumption of foods considered healthy. These habits are usually consequence of the search for group acceptance and of the preference for the taste, and adolescents who state that they like foods such as fruits and vegetables are sometimes contested by their peers, who give preference to the consumption of unhealthy food because they consider it tastier[13].

Nicklas *et al*[21] observed that American adolescents eat 27 to 30% of their meals out of home, 50% of which comprised fast-food. It was found that the portions served in fast-food restaurants and even the portions of popcorn in movie theaters are increasingly larger, which contributes to the growing worldwide prevalence of obesity.

In the United States, approximately 34% of adolescents aged between 12 and 19 years are overweight or obese[22]. In Brazil, overweight was diagnosed in 20.5% of adolescents, with a proportion of 21.5% of boys and 19.4% of girls[23]. The prevalence of obesity was 4.9%, reaching 5.8% of boys and 4.0% of girls[23]. The prevalence of obese and overweight adolescents found in the present study was 9.4 and 15.1% respectively. A higher frequency of replacement of lunch and dinner with snacks was observed in obese adolescents. This result indicates that the habit of replacing the traditional meals with snacks may be associated with obesity among adolescents. However, there was no significant difference relative to nutritional status, and the frequency of replacement of meals was higher in eutrophic adolescents than in overweight adolescents. A possible justification for this result is the size of the study population. Additionally, many adolescents replace meals only on weekends, which does not lead to significant changes in weight and BMI. Although some adolescents who replace lunch and dinner with snacks were not overweight or obese, such habit is a cause of concern, because this inadequate diet will probably be kept into adulthood, increasing the possibility that these adolescents become obese in the future[10].

Considering the lack of time for adolescents to have lunch and the need of practicality[11], a sandwich ends up being more consumed in replacement of lunch. Besides being a low-cost option, it is easy to prepare at home and is consumed faster. Salty pastries and hamburger probably replace the meals of adolescents who eat out, especially of those who work. Thus, due to easy access and faster eating, the purchase of these foods in fast-food restaurants, cafeterias and street food stands becomes more frequent[13].

The habit of eating out at dinner is common among adolescents (particularly on weekends) and, even when they eat at home, they usually end up replacing this meal with snacks, for practicality reasons[24]. With the entrance of women into the labor market, mothers, who are generally responsible for purchasing and preparing food, work all day long, and thus do not have time nor willingness to prepare dinner[24]. Such factors may justify the habit of replacing this meal with sandwich, pizza, and hamburger[24].

The current increasing offer of industrialized foods, the easy access to these foods and often their lower prices[25] can justify this consumption. In a sample of 106 adolescents from Rio de Janeiro[26], 50% reported to replace rice and beans with industrialized foods, such as frozen lasagna, and with snacks, such as pizza and hot dog. Among adolescents from Saudi Arabia[27], 87% reported to eat snacks with high amounts of sugar, sodium, and fat, such as French fries, fried chicken, hamburger, and pizza, on a daily basis, usually in replacement of meals, and this diet was positively correlated with obesity or overweight. Leal *et al*[7] observed that adolescents from São Paulo consumed milk and bread instead of most main meals. In the present study, bread was mentioned by seven adolescents as a replacement for lunch, and by nine as a replacement for dinner. Milk was reported as a replacement for dinner by five adolescents. Although these foods contribute with some important nutrients, they do not provide the nutrients of a complete meal[12].

Hamburger, pizza, hot dog, salty pastries, and some kinds of sandwiches and cookies, reported as the main foods that replaced meals in the present study, in most cases have high energy density, great amount of sodium and fat, and low content of fibers, vitamins, and minerals[28]. High consumption of these foods leads to an increase in the risk of developing non-communicable chronic diseases, which in the last decades became the leading cause of death in Brazil[28].

After assessing some processed foods, the Brazilian National Health Surveillance Agency (Agência Nacional de Vigilância Sanitária, Anvisa)[28] found high amounts of sodium in samples of foods like beef hamburger, hot dog sausage, and salty cookies. The highest value of sodium found in the portions of beef hamburger was 825mg, which represents almost half of the recommended daily sodium intake (maximum of 2000mg)[28]. High consumption of sodium can lead to increased blood pressure, in adults, children, and adolescents[28]. Hypertension is the main risk factor for death in the world, followed by heart diseases, stroke, and kidney failure[18]. In the same study[28], some samples of stuffed cookies reached 4.4g of saturated fat per portion, value that is more than twice as high as the maximum

allowed value for trans fat-free foods (2g of saturated fat per serving). Moreover, higher amounts of trans fat than those established by Anvisa (maximum of 0.2g per serving) were found in beef hamburger and in salty cookies[28].

The consumption of snacks reported by the adolescents of the present study in replacement of traditional healthy meals leads to a reduction in the consumption of rice, beans, fruits, and vegetables. According to the WHO[18], the low consumption of these foods is one of the main factors associated with disease in the world, because these foods are important sources of fibers, vitamins, and minerals, and also show low calorie content. Although no association was found between replacement of meals with snacks and nutritional status, this study was important to raise the hypothesis that the replacement of the main meals, prevalent among adolescents, is a risk factor for the development of non-communicable chronic diseases, both in the present and in the future.

An intervention measure that would prevent the development of these diseases, mainly in adulthood, would be the implementation of programs in schools that relied, for example, on multidisciplinary care, including dietitians, to follow and guide students, parents, and guardians, with the purpose of changing adolescent's behavior towards food.

Among the limitations of the present work, it should be pointed out that, in the questionnaire, the words "drinks" and "desserts" were not used in the question on foods that replaced meals, causing a probable omission of foods such as milk, juices, soft drinks, and sweets in adolescents' answers. There is also the possibility of information bias, due to the application of the questionnaire among adolescents. Because it is a cross-sectional study, it was not possible to establish causal relationships; thus, new studies are necessary, with other methodologies, to confirm the hypotheses generated[29]. Sample size allowed to verify a high consumption of foods with high caloric density and low nutritional value in replacement of the main meals, but did not allow to find a statistically significant difference according to gender and nutritional status.

It can be concluded that adolescents showed high frequency of replacement of the main meals, especially dinner, with snacks. No statistically significant difference was found according to gender, but in general this habit was more prevalent among girls. There was a higher frequency of replacement of meals among obese adolescents, but with no significant association according to nutritional status. Most foods that replaced lunch and dinner had high energy density and low nutritional value.

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References

1. Gambardella AM, Frutuoso MF, Franch C. Adolescents feeding practices. Rev Nutr 1999;12:5-19.
2. Neumark-Sztainer D, Larson NI, Fulkerson JA, Eisenberg ME, Story M. Family meals and adolescents: what have we learned from Project EAT (Eating Among Teens)? Public Health Nutr 2010;13:1113-21.
3. Philippi ST. Pirâmide dos alimentos - fundamentos básicos da nutrição. Barueri: Manole; 2008.
4. World Health Organization. Physical status: use and interpretation of antropometry. Report of WHO Expert Committee. [WHO Technical Report Series, 854]. Geneva: WHO; 1995.
5. World Health Organization. Nutrition in adolescence – issues and challenges for the health sector. Geneva: WHO; 2005.
6. Brasil. Ministério do Planejamento, Orçamento e Gestão; Instituto Brasileiro de Geografia e Estatística. Síntese de indicadores sociais: uma análise das condições de vida da população brasileira - 2010. Informação demográfica e socioeconômica. Rio de Janeiro: Estudos & Pesquisas; 2010.
7. Leal GV, Philippi ST, Matsudo SM, Toassa EC. Food intake and meal patterns of adolescents, São Paulo, Brazil. Rev Bras Epidemiol 2010;13:457-67.
8. Enes CC, Slater B. Obesity in adolescence and its main determinants. Rev Bras Epidemiol 2010;13:163-71.
9. Neutzling MB, Assunção MC, Malcon MC, Hallal PC, Menezes AM. Food habits of adolescent students from Pelotas, Brazil. Rev Nutr 2010;23:379-88.
10. Carvalho AP, Oliveira VB, Santos LC. Food habits and nutritional education practices: warning for children of a municipal school of Belo Horizonte, Minas Gerais. Pediatria (São Paulo) 2010;32:20-7.
11. Toral N, Conti MA, Slater B. Healthy eating according to teenagers: perceptions, barriers, and expected characteristics of teaching materials. Cad Saude Publica 2009;25:2386-94.
12. USDA [homepage on the Internet]. Dietary Guidelines for Americans - 2010 [cited 2011 March 16]. Available from: www.dietaryguidelines.gov
13. Vargas IC, Sichieri R, Sandre-Pereira G, da Veiga GV. Evaluation of an obesity prevention program in adolescents of public schools. Rev Saude Publica 2011;45:59-68.
14. World Health Organization [homepage on the Internet]. Geneva: What are overwheight and obesity? [cited 2010 Dec 07]. Available from: http://www.who.int/mediacentre/factsheets/fs311/en/
15. Reedy J, Krebs-Smith SM. Dietary sources of energy, solid fats, and added sugars among children and adolescents in the United States. J Am Diet Assoc 2010;110:1477-84.
16. Vieira VC, Priore SE, Ribeiro SM, Franceschini SC. Alterations in the feeding patterns of adolescents with weight-height adequacy and high body fat percentage. Rev Bras Saude Mater Infant 2005;5:93-102.
17. Celestrino JO, Costa AS. A prática de atividade física entre escolares com sobrepeso e obesidade. RMEFE 2006;5:47-54.

18. World Health Organization. The world health report 2002: reducing risks, promoting healthy life. Geneva: WHO; 2002.
19. Chermont Prochnik Estima C, da Costa RS, Sichieri R, Pereira RA, da Veiga GV. Meal consumption patterns and anthropometric measurements in adolescents from a low socioeconomic neighborhood in the metropolitan area of Rio de Janeiro, Brazil. Appetite 2009;52:735-9.
20. Koritar P, Alvarenga M, Philippi ST. Consumo adequado de alimentos: qual o conceito das universitárias brasileiras? Rev Bras Nutr Clin 2010;25:93-101.
21. Nicklas TA, Baranowski T, Cullen KW, Berenson G. Eating patterns, dietary quality and obesity. J Am Coll Nutr 2001;20:599-608.
22. Cromley T, Neumark-Sztainer D, Story M, Boutelle KN. Parent and family associations with weight-related behaviors and cognitions among overweight adolescents. J Adolesc Health 2010;47:263-9.
23. Brasil. Ministério do Planejamento, Orçamento e Gestão; Instituto Brasileiro de Geografia e Estatística. Pesquisa de Orçamentos Familiares 2008-2009: antropometria e estado nutricional de crianças, adolescentes e adultos no Brasil. Rio de Janeiro: IBGE; 2010.
24. Araki EL, Philippi ST, Martinez MF, Estima CC, Leal GV, Alvarenga MS. Pattern of meals eaten by adolescents from technical schools of São Paulo, SP, Brazil. Rev Paul Pediatr 2011;29:164-70.
25. Mendonça MR, Silva MA da, Rivera IR, Moura AA. Prevalência de sobrepeso e obesidade em crianças e adolescentes da cidade de Maceió. Rev Assoc Med Bras 2010;56:192-6.
26. Padilha A, Oliveira GL, Perini TA, Fernandes J [homepage on the Internet]. Composição corporal e estado nutricional de adolescentes de escola pública e particular do Rio de Janeiro [cited 2011 Jan 27]. Available from: http://www.revista.ulbrajp.edu.br/ojs/index.php/actabrasileira/article/view/285/21
27. Washi SA, Ageib MB. Poor diet quality and food habits are related to impaired nutritional status in 13- to 18-year-old adolescents in Jeddah. Nutr Res 2010;30:527-34.
28. Brasil. Associação Nacional de Vigilância Sanitária. Perfil nutricional dos alimentos processados – programa exploratório [Informe Técnico n. 42/2010]. Brasília: ANVISA; 2010.
29. Grimes DA, Schulz KF. Descriptive studies: what they can and cannot do. Lancet 2002;359:145-9.