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# Evaluation of an obesity prevention program in adolescents of public schools

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## ABSTRACT

**OBJECTIVE:** To evaluate the effects of an obesity prevention program on the dietary practices of public school adolescents.

**METHODS:** An intervention was conducted with 331 students aged between 11 and 17 years, enrolled in the 5th and 6th grades of two state public schools in the city of Niterói, Southeastern Brazil, in 2005. These schools were categorized into "intervention schools" (IS) and "control schools" (CS) for comparison. Dietary practices were analyzed using self-administered questionnaires before and after the intervention period: fast food consumption; soft drink consumption; replacement of meals for snacks; consumption of fruits and vegetables; and type of food consumed during school breaks. Chi-square test and McNemar's test were applied to compare proportions, considering a value of  $p < 0.05$ .

**RESULTS:** In the baseline, 185 students participated in the IS (82.2% of those eligible) and 146 students participated in the CS (70.5% of those eligible). In the post-intervention phase, there was a loss of 10.3% of IS adolescents and 27.4% of CS ones. There were no significant changes in dietary practices in CS. In contrast, IS showed an increase in the proportion of students who reported not consuming snacks sold by street vendors (from 36.7% to 50.6%;  $p=0.02$ ) and adolescents who reported not replacing their lunch (from 44.5% to 65.2%;  $p<0.01$ ) and dinner (from 38.4% to 54.3%;  $p<0.01$ ) for snacks. The main favorable change was the reduction in the frequency of consumption of fast food snacks in IS, when compared to CS (from 72.7% to 54.4%;  $p=0.001$ ).

**CONCLUSIONS:** Favorable changes in the adolescents' dietary practices were found and they encourage the implementation of programs of this nature. However, long-lasting interventions need to be implemented and evaluated in terms of their effectiveness.

**DESCRIPTORS:** Adolescent. Obesity, prevention & control. School Feeding. Food and Nutrition Education. Intervention Studies.

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Received: 12/10/2009

Approved: 8/23/2010

Article available from: [www.scielo.br/rsp](http://www.scielo.br/rsp)

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## INTRODUCTION

Adolescence is a key period for the development of obesity,<sup>4</sup> particularly due to the predominance of sedentary leisure activities and inadequate dietary practices, such as consumption of high-caloric snacks, instead of main meals; consumption of sugar-rich foods and fast foods.<sup>2</sup>

A significant proportion of overweight adolescents maintain this body complexion in adulthood<sup>19</sup> and the eating habits established in childhood and adolescence,<sup>9</sup> which indicates the importance of the prevention of excessive weight gain at younger ages.

Obesity prevention programs usually focus on the nutrition education of adolescents in the school environment.<sup>18</sup> In addition to the individual's frequent contact with the school in their two first decades of life,<sup>21</sup> schools enable the inclusion of nutrition education in their curriculum and encourage regular physical activity practice.

School intervention studies conducted in the United States<sup>10,20</sup> and Europe,<sup>7</sup> reported positive changes in eating habits during adolescence. Gabriel et al<sup>5</sup> (2008) and Sichieri et al<sup>17</sup> (2008) also mentioned positive results of nutrition education programs focused on risky eating habits for the development of obesity among Brazilian adolescents.

A study with a probabilistic sample of public school students aged between 12 and 19 years, in the city of Niterói, Southeastern Brazil, pointed out significant prevalence of overweight<sup>23</sup> and metabolic abnormalities associated with cardiovascular diseases.<sup>22</sup> These data warned about the need for strategies that prevent the progression of this problem and also stimulate testing other approaches that may help to curb the obesity epidemic. Thus, the present study aimed to evaluate the effects of an obesity prevention program on the dietary practices of public school adolescents.

## METHODS

The intervention program was developed with elementary school students in the 5<sup>th</sup> and 6<sup>th</sup> grades of two state public schools of the city of Niterói, between August and November 2005. One of the schools was selected to be the intervention school (IS), while the other was the control school (CS). Pregnant women and individuals with physical disabilities that prevented the anthropometric evaluation were excluded from this study.

Schools were selected by convenience from the 13 schools that participated in the study on prevalence of overweight and obesity and cardiovascular risk factors in adolescents of public schools of Niterói conducted in 2003,<sup>22,23</sup> according to the following criteria: geographic location (schools should be distant from each other to reduce the possibility of exchange of information about intervention activities); similar number of students in the selected grades; presence of a cafeteria in the school; teachers and managers' interest in participating in the program; and similar frequency of overweight/obesity, based on the frequencies observed in a previous study and confirmed in the two selected schools, before beginning this study. The school receiving the prevention program was randomly selected. Students who were regularly enrolled in the above mentioned grades, who showed willingness to participate and who brought an Informed Consent Form signed by the parents or responsible adults participated in the study.

At baseline (pre-intervention), the frequency of overweight and obesity among adolescents was evaluated, based on the body mass index (weight/height<sup>2</sup>), according to the criterion recommended by Cole et al<sup>3</sup> (2000). Adolescents were weighed and measured barefoot, wearing light clothes and without carrying heavy objects. Weight was measured on an electronic scale, with a 150 kg capacity and 50 g accuracy, while height was measured with a portable anthropometer with a 0.1 cm accuracy. A total of two height measurements were taken. A maximum variation of 0.5 cm was allowed between measurements and the mean was calculated.

Data on dietary practices of adolescents were collected using a self-administered questionnaire with closed questions, in the pre- and post-intervention phases. Questions included the habit of eating fruits and vegetables (at least five times a week); weekly frequency of consumption of fast food snacks sold in cafeterias and by street vendors (daily/between five and six times a week/between three to four times a week/between one to two times a week/never or almost never); weekly frequency of meals (lunch and dinner) replaced by snacks; consumption of sodas (yes/no); origin and consumption of snacks during school breaks (does not eat anything/eats snacks brought from home/buys snacks in the cafeteria/eats the school meals).

Nutrition education and physical activity promotion were the basis of the intervention program. Focus groups with adolescents preceded the planning of activities, aiming to identify themes of interest related to health and diet. The "healthy eating", "physical activity", "obesity" and "fast food" themes were those most frequently mentioned by adolescents, guiding the intervention activities.

IS teachers gave opinions and suggestions about the proposed activities, with the purpose of adapting them to the school reality and routine, and some of them developed activities associated with the "healthy eating" and "physical activity" themes in their disciplines.

Integration activities, aimed at students' adherence to the program and educational activities, and those that encourage the adoption of healthy eating habits were performed. Physical activity promotion permeated all approaches to healthy eating and students were encouraged to participate in physical education classes by introducing playful activities, such as games and competitions. Changes associated with physical activity practice are not shown in this study, once the main objective was to evaluate changes in eating habits.

Table 1 details the objectives and themes approached in the intervention activities. At the end of the program, adolescents were asked to inform the activities considered most appealing in a self-administered questionnaire.

No intervention activities were conducted in the CS. The usual nutrition education and physical education contents of the school curriculum were maintained.

Data on adolescents who participated in the two phases of the study, i.e. in the pre- and post-intervention periods, were analyzed to evaluate the effects of the intervention on the frequency of dietary practices. Intra-group comparisons between the pre- and post-intervention phases were made, based on the McNemar test, and the characteristics of adolescents in the CS and IS in the baseline were compared using unpaired Student's t test and chi-square test.

The following were considered as favorable results for eating behavior: a) changes from high to low frequencies or the maintenance (one to two times a week/never or almost never) of consumption of fast foods or snacks sold by street vendors and of the practice of replacing lunches and dinners for snacks; b) increase or maintenance or consumption of foods brought from home or school meals; c) daily or almost daily consumption of fruits and vegetables; d) no consumption of sodas. The frequencies of favorable changes between IS and CS were compared, based on the chi-square test. Prevalence ratios and 95% confidence intervals were used as association measures between the intervention

and favorable changes for intervention.

The SPSS software, version 13.0, was used in the analyses. A p value < 0.05 was considered for statistical significance.

This research project was approved by the Research Ethics Committee of the Instituto de Pediatria e Puericultura Martagão Gesteira da Universidade Federal do Rio de Janeiro, on December 14th, 2004. The materials used during the intervention were made available to the IS and CS at the end of the research.

## RESULTS

A total of 432 adolescents were eligible (225 of IS and 207 of CS) and, of these, 185 of IS were evaluated in the baseline (82.2% of those eligible) and 146 of the CS (70.5% of those eligible). In the post-intervention phase, data on 166 IS adolescents and 106 CS adolescents were obtained, with a follow-up loss of 10.3%, and 27.4%, respectively.

There were no statistically significant differences between adolescents who participated and those who did not participate in the two research phases, in terms of the frequency of overweight in both schools (IS

**Table 1.** Objectives and main themes in the intervention activities. Niterói, Southeastern Brazil, 2005.

Objective of the activity	Activity	Approached themes
Integration	Slogan competition Music competition	<ul style="list-style-type: none"> <li>• Development of a slogan and song based on the "Healthy eating and physical activity" theme</li> <li>• Prizes to winning contestants</li> </ul>
	Food dynamics	<ul style="list-style-type: none"> <li>• Introduction to principles of quantity, quality and harmony, based on the food pyramid</li> <li>• Identification and correction of students' incorrect concepts of healthy and unhealthy foods</li> <li>• Encouragement of the practice of replacing foods considered to be health risks (manufactured foods, those with a high content of calories, fat and sugar) for natural healthy foods, such as fruits and vegetables</li> <li>• Encouragement of the practice of trying out healthy foods</li> <li>• Promotion of reflection on divergences between current food choices and healthy foods, and the repercussion of the maintenance of inadequate food consumption for health in the long term</li> </ul>
Dissemination of information and encouragement of adherence to healthy eating habits	Exhibition of movies of the "Fome Zero" (Zero Starvation) Program	<ul style="list-style-type: none"> <li>• Contents dealt with in the movies: The right to food consumption; Healthy eating ("to eat right and to eat wrong"); Eating in childhood; Eating at school (cafeteria versus school meals); Eating tips</li> <li>• Focus on the need to have healthy meals (rather than snacks) to meet the increased nutrient requirements during adolescence</li> <li>• Theoretical development of a "healthy snack" to identify and correct concepts of healthy eating</li> </ul>
	Exhibition and discussion about advertisements	<ul style="list-style-type: none"> <li>• Introduction to the perception of persuasive resources used by the media to stimulate the consumption of food products</li> <li>• Focus on information about high caloric content and low nutrient content of the majority of foods promoted by the media, compared to healthy foods</li> </ul>
	Diet workshop and distribution of booklets with healthy recipes	<ul style="list-style-type: none"> <li>• Making and tasting of healthy snack recipes</li> <li>• Encouragement of the use of healthy recipes at home</li> <li>• Focus on the elimination of the concept that healthy foods are expensive and not tasty</li> </ul>
	Exhibition of movie	<ul style="list-style-type: none"> <li>• Early and late harm to health, as a result of eating habits based on fast foods sold by a worldwide chain of fast food restaurants</li> </ul>
	Development of newspaper about diet and health	<ul style="list-style-type: none"> <li>• Promotion of intervention activities performed in the school</li> <li>• Writing of texts on the "healthy eating and physical activity" theme</li> </ul>

= 22.4% vs. 21.1%,  $p=0.88$ ; CS= 15.3% vs. 21.6%;  $p=0.38$ ). IS adolescents who did not participate in the post-follow-up evaluation were older (13.9 SD 1.3 vs. 13.2 SD 1.3 years;  $p<0.01$ ) and showed higher means of weight (52.2 SD 13.7 kg vs. 45.7 SD 11.3 kg;  $p=0.01$ ) and height (160.7 SD 8.56 cm vs. 154.5 SD 9.7 cm;  $p<0.001$ ) than those of participants.

There were no statistically significant differences between IS and CS in terms of the proportion of overweight adolescents in the baseline (Table 2), when comparing those who participated in the two phases of the study exclusively. With regard to eating habits, also in the baseline, differences were observed in the practice of replacing lunch for a snack once a week, which was three times more frequent among IS adolescents (25.0 vs 8.6%), and in the eating behavior during school breaks, when a higher proportion of CS adolescents (15.4%) reported consuming school meals, when compared to those in IS (3.0%) (Table 3). Consumption of fast food snacks in cafeterias and from street vendors was reported by approximately 70% of adolescents of both schools.

Significant changes were observed in IS after intervention (Table 3). The proportion of adolescents who reported "never or almost never" consuming snacks sold by street vendors increased from 36.7% to 50.6%, and the weekly frequency of consumption of snacks decreased. The weekly practice of replacing lunch or dinner for a snack also decreased, and the proportion of adolescents who reported "never or almost never" doing this rose from 44.5% to 65.2% for lunch and from 38.4% to 54.3% for dinner. In addition, eating habits during school breaks also changed, with a significant reduction in the consumption of school meals (from 3% to 0.6%) and that of snacks prepared at home (from 10.8% to 6.0%).

A statistically significant change was found in the CS after the follow-up period (Table 3) in terms of the consumption of fruits and/or vegetables, with a reduction from 82.7% to 74% of adolescents who reported consuming such foods daily or almost daily ( $p=0.02$ ). There was no significant change in such practice in the IS, once 79.8% and 81.6% of adolescents reported consuming such foods daily or almost daily ( $p=0.70$ ), in the pre- and post-intervention phases, respectively.

The analysis of proportions of favorable changes (reduction in inadequate habits and increase or maintenance of adequate habits) between IS and CS (Table 4) shows that, in general, favorable changes were high in the IS and significantly differed from the CS when it came to the habit of consuming fast food snacks (72.7% vs 53.4%,  $p = 0.001$ ) and reduction in the practice of replacing lunch for snacks (83.5% vs 75.2%,  $p = 0.09$ ). There was one adolescent who reported not consuming sodas after the follow-up period.

Adolescents considered that the movie about harms to health caused by the consumption of fast foods was the favorite activity (17.6%), followed by the diet workshop (14.1%) and changes in Physical Education classes (12.7%).

## DISCUSSION

Dietary practices considered to be unhealthy underwent changes among adolescents evaluated, suggesting that eating behaviors that are characteristic of this age group can be changed, even with short-duration interventions.

The adolescents' favorite activity was the exhibition of a documentary-movie about food consumption at a famous chain of fast food restaurants. After its

**Table 2.** Frequency of adolescents according to presence/absence of overweight and means and standard deviations of age and anthropometric measures, in the intervention and control schools, in the pre-intervention period. Niterói, Southeastern Brazil, 2005.

Variable	Intervention <sup>c</sup>		Control <sup>c</sup>		p <sup>a</sup>
	n	%	n	%	
Nutritional status					
Without overweight	128	77.6	83	84.7	0.16
With overweight	37	22.4	15	15.3	
Total <sup>c</sup>	165		98		
	n <sup>c</sup>	Mean (SD)	n <sup>c</sup>	Mean (SD)	p <sup>b</sup>
Age (years)	166	13.0 (0.92)	106	13.2 (1.27)	0.25
Weight (kg)	165	47.8 (10.54)	98	45.7 (11.29)	0.14
Height (cm)	165	156.1 (8.27)	98	154.5 (9.69)	0.16
BMI (kg/m <sup>2</sup> )	165	19.5 (3.36)	98	18.9 (3.18)	0.18

<sup>a</sup> Chi-square test

<sup>b</sup> Student's t test for independent samples

<sup>c</sup> No information about weight and height could be obtained for one adolescent of the intervention school and eight of the control school

**Table 3.** Distribution of study participants, according to dietary practices. Niterói, Southeastern Brazil, 2005.

Dietary practices	IS <sup>a</sup>					CS <sup>b</sup>				
	Pre		Post		p <sup>c</sup>	Pre		Post		p <sup>c</sup>
	n	%	n	%		n	%	n	%	
Frequency of consumption of fast foods in cafeterias										
5 or more times a week	34	20.6	26	15.8	0.06	16	15.5	17	16.5	0.31
3 to 4 times a week	18	10.9	16	9.7		15	14.6	22	21.4	
1 to 2 times a week	60	36.4	50	30.3		39	37.9	33	32	
Never or almost never	53	32.1	73	44.2		33	32	31	30.1	
Total <sup>d</sup>	165					103				
Frequency of consumption of snacks sold by street vendors										
5 or more times a week	32	19.3	28	16.9	0.02	20	19	16	15.2	0.11
3 to 4 times a week	24	14.5	11	6.6		12	11.4	10	9.5	
1 to 2 times a week	49	29.5	43	25.9		37	35.2	34	32.4	
Never or almost never	61	36.7	84	50.6		36	34.3	45	42.9	
Total <sup>e</sup>	166					105				
Frequency of the practice of replacing lunch for a snack										
3 or more times a week	41	25	10	6.1	<0.01	9	8.6	15	14.3	0.1
1 to 2 times a week	50	30.5	47	28.7		44	41.9	30	28.6	
Never or almost never	73	44.5	107	65.2		52	49.5	60	57.1	
Total <sup>f</sup>	164					105				
Frequency of the practice of replacing dinner for a snack										
3 or more times a week	45	27.4	21	12.8	<0.01	17	16.5	16	15.5	0.06
1 to 2 times a week	56	34.1	54	32.9		38	36.9	29	28.2	
Never or almost never	63	38.4	89	54.3		48	46.6	58	56.3	
Total <sup>g</sup>	164					103				
Habit of eating during school breaks										
Does not eat anything	49	29.5	62	37.3	0.04	31	29.8	31	29.8	0.06
Eats snacks prepared at home	18	10.8	10	6		8	7.7	1	1	
Buys snacks in the school cafeteria	94	56.6	93	56		49	47.1	60	57.7	
Eats school meals	5	3	1	0.6		16	15.4	12	11.5	
Total <sup>h</sup>	166					104				
Daily or almost daily consumption of fruits and/or vegetables										
Total <sup>i</sup>	130				0.7	86				0.02
Soda consumption	166				1	105				1
Total	166					106				

<sup>a</sup> Intervention school<sup>b</sup> Control school<sup>c</sup> McNemar's test<sup>d</sup> Loss of one adolescent in the IS and 3 in the CS<sup>e</sup> Loss of 1 adolescent in the CS<sup>f</sup> Loss of 2 adolescents in the IS and 1 in the CS <sup>g</sup> Loss of 2 adolescents in the IS and 3 in the CS<sup>h</sup> Loss of 2 adolescents in the CS <sup>i</sup> Loss of 3 adolescents in the IS and 2 in the CSIS vs CS pre-intervention phase: Replacing lunch for snack p = 0.004; Eating during school breaks p = 0.002  
Comparison of the remaining variables in the baseline p > 0.05

exhibition, short- and long-term harmful effects on health caused by regular consumption of fast foods were discussed. Students' concern about the possibility of developing diseases as a result of consumption of this type of snacks, revealed during the discussion, could indicate their understanding about the theme. There was a reduction in the frequency of consumption of snacks and also in the practice of replacing lunch and dinner for snacks in the IS students, compared to those in the CS. These reported changes could be attributed to the educational actions promoted by the obesity prevention program. This assumption is emphasized by the fact that there were no significant changes in such practices after the follow-up period, in the CS.

Approximately half of the CS adolescents showed favorable changes towards the habit of eating fast food snacks; however, this proportion was lower than that observed in the IS. These results differ from the findings of Neumark-Sztainer et al<sup>13</sup> (2003), a 16-week program with a main focus on physical activity, but including eating habit changes, where no significant differences in the frequency of consumption of fast foods were found, when comparing intervention and control groups.

The positive changes observed in the intervention performed in this study may be due to reporting bias. Considering the fact that the evaluation of changes was based on the application of self-administered questionnaires in the two phases of the study (pre- and post-intervention), rather than on the direct observation of such behaviors, the possibility that, in the post-intervention phase, students responded more accordingly to what they had learned from the activities developed in the program, instead of their own practices, cannot be discarded. However, the impact caused by the exhibition of the movie about the harms of fast food consumption leads one to assume that, in fact, there was a favorable change in behavior towards this aspect.

Fast food snacks are the main form to replace meals during adolescence<sup>15</sup> and, in the case of low-income populations, snacks sold by street vendors characterize this practice. A greater proportion of IS adolescents reported not eating snacks sold by street vendors, compared to the pre-intervention period, something that was not observed in the CS. Results may suggest that the program favored the change of this eating habit, although favorable changes related to this practice did not show statistically significant differences between schools.

**Table 4.** Favorable changes in eating habits after the intervention period. Niterói, Southeastern Brazil, 2005.

Variable	N	n	%	PR	95%CI	p
Frequency of consumption of fast foods in the school cafeteria <sup>a</sup>						
CS	103	55	53.4	1	1.11;1.67	0.001
IS	165	120	72.7	1.36		
Frequency of consumption of snacks sold by street vendors <sup>b</sup>						
CS	105	73	69.5	1	0.87;1.20	0.78
IS	166	118	71.1	1.02		
Frequency of the practice of replacing lunch for a snack <sup>c</sup>						
CS	105	79	75.2	1	0.98;1.26	0.09
IS	164	137	83.5	1.1		
Frequency of the practice of replacing dinner for a snack <sup>d</sup>						
CS	103	81	78.6	1	0.86;1.11	0.73
IS	164	126	76.8	0.98		
Eating habit during school breaks <sup>e</sup>						
CS	104	19	18.3	1	0.50;1.47	0.58
IS	166	26	15.7	0.86		
Daily or almost daily consumption of fruits and/or vegetables <sup>f</sup>						
CS	104	77	74	1	0.96;1.26	0.14
IS	163	133	81.6	1.1		

CS: Control school; IS: Intervention school; PR Prevalence ratio

<sup>a</sup> Loss of 1 adolescent in the IS and 3 in the CS

<sup>b</sup> Loss of 1 adolescent in the CS

<sup>c</sup> Loss of 2 adolescents in the IS and 1 in the CS

<sup>d</sup> Loss of 2 adolescents in the IS and 3 in the CS

<sup>e</sup> Loss of 2 adolescents in the CS

<sup>f</sup> Loss of 3 adolescents in the IS and 2 in the CS

Reduction in the consumption of sodas as a result of the intervention was not achieved in the present study. These findings are in agreement with those observed by Neumark-Sztainer et al<sup>13</sup> (2003), although in disagreement with James et al<sup>7</sup> (2004) and Sichieri et al<sup>17</sup> (2008), who found a decrease in the consumption of sodas or fizzy/sweetened drinks in the intervention group, when compared to the control group, after an intervention period of one year and another of seven months, respectively. However, a limitation in the present study was the yes/no question that evaluated consumption of sodas, which only enabled the identification of great changes in beverage drinking.

Consumption of such drinks in Brazil has been increasing<sup>12</sup> and this could be mainly attributed to the reduction in the price of these products, more accessible to populations with a lower socioeconomic level, such as the adolescents evaluated in this study. The trend towards an increase in the consumption of sodas and other manufactured products with a high caloric content and low nutritional value was recently observed in low-income families, based on the financial aid program known as Bolsa-Família (Family Allowance).<sup>a</sup> It is possible that family consumption of sodas directly influence this habit in adolescents, thus hindering their change, when the family is not included in the intervention program, as in this study.

Unexpected and undesirable results were found after the intervention, such as the reduction in the number of students who consumed good quality foods provided in the school meals. Favorable changes of consumption of foods brought from home or school meals were observed in only approximately 15% of IS adolescents, not differing from CS adolescents. Sahota et al<sup>16</sup> (2001), in a study conducted with children aged from seven to 11 years, also reported a significant increase in the consumption of sugar-rich foods and drinks and a decrease in the consumption of fruits among overweight and obese students in the intervention group, when compared to the control group, such as inadequate and unexpected change after the intervention period.

Ochsenhofer et al<sup>14</sup> (2006) also observed a preference for foods sold in school cafeterias, to the detriment of those freely provided by the Programa Nacional de Alimentação Escolar (Brazilian School Food Program) among adolescents of a public school of the city of São Paulo.<sup>b</sup> The adolescents of the present study reported that foods and products sold in the school cafeterias are “tastier” than those provided in the school meals.<sup>c</sup> In addition, the possibility of choosing foods is a

synonym of the exercise of “independence”, so value by adolescents.<sup>12</sup> Changes in these eating habits may require intervention with longer duration.

With regard to the consumption of fruits and vegetables, the proportion of adolescents who reported, in the baseline, daily or almost daily consumption of such foods was high in both schools and remained high in the IS, with a significant reduction in the CS, in the post-follow-up period. These results are similar to the findings of Neumark-Sztainer et al<sup>13</sup> (2003), who observed the maintenance of frequencies of consumption of fruits and vegetables described in the baseline, after the intervention. However, this is in disagreement with Gortmaker et al<sup>6</sup> (1999), who found an increase in the consumption of such foods among female adolescents of the intervention group, compared to the control group, and with Sahota et al<sup>16</sup> (2001), who reported an increase in the consumption of portions of vegetables by obese adolescents who had undergone an intervention, even with the reduction in the number of portions of fruits consumed. The high consumption found in the present study at baseline could justify the differences with the studies mentioned, which showed low consumption at baseline. However, by comparing IC and CS, there were no significant differences in favorable changes for eating fruits and/or vegetables daily. Nonetheless, this result indicates that the absence of stimulus to the consumption of healthy foods in the CS, differently from what was performed in the IS, could imply abandonment of such practices by adolescents who are more susceptible to the appeal of the media towards unhealthy foods.

The search for group acceptance and identity construction with peers, typical of adolescence,<sup>11</sup> has an important role in the formation and maintenance of group eating habits.

Family eating habits, especially those of parents, are determinants both in the acquisition of healthy eating habits in the first years of life, and in the achievement and maintenance of new habits.<sup>1</sup> Although authors in this study invited all families in the IS to participate in meetings and discussions, few accepted to participate, thus indicating the parents’ distance from the adolescents’ school life.

The short period of intervention, another limitation to this study, is justified by the need to follow the entire program in only one school semester, because the period of school vacation could imply change of students and loss of follow-up. The maintenance of long-term programs is key to implement changes in

<sup>a</sup> Segall-Correa AM, Salles-Costa R. Novas possibilidades de alimentação a caminho? *Democracia Viva*. 2008;(39):68-73.

<sup>b</sup> Ministério da Educação. Resolução nº32 de 10 de agosto de 2006. Estabelece as normas para execução do Programa Nacional de Alimentação Escolar. *Diário Oficial Uniao*. 11 ago 2006. Seção1:22-7.

<sup>c</sup> Silva ACA. Comportamento alimentar de adolescentes em uma escola pública de Niterói, RJ [Master’s dissertation]. Rio de Janeiro: Instituto de Nutrição Josué de Castro da UFRJ; 2009.

dietary practices and, consequently, in the frequencies of overweight and obesity. An intervention study performed with children and adolescents in England showed that positive changes with an impact on body mass index is not maintained after the end of the intervention, which focused on healthy eating habits and reduction in soda consumption.<sup>8</sup>

In conclusion, the favorable changes achieved in the IS in terms of certain key eating behaviors encourage the maintenance of efforts to implement programs of such nature. Data from this study indicate that longer duration programs should be conducted, because it is not known whether healthy practices will be maintained

in the absence of a stimulus. If the minor changes observed were maintained in the long term, they could contribute to better health of adolescents and to the prevention of chronic diseases in adulthood.

#### **ACKNOWLEDGEMENTS**

Authors would like to thank Ana Carolina Abreu Silva, Eliz de Oliveira Celestrini, Luana Silva Monteiro, Raquel Veloso Maranhão and Valesca Barbosa Scofano – Master's degree students of the Programa de Pós-Graduação em Nutrição do Instituto de Nutrição Josué de Castro da Universidade Federal do Rio de Janeiro for their support in the field work.

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Article based on Master's degree dissertation by Vargas ICS, presented to the Programa de Pós Graduação do Instituto de Nutrição Josué de Castro in 2007.

This research project was funded by the Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) (Process 205524/2004-0).

The authors declare that there are no conflicts of interest.