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PRÁTICA ALIMENTAR E DE ATIVIDADE FÍSICA EM ADOLESCENTES OBESOS DE ESCOLAS PÚBLICAS E PRIVADAS

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# FEEDING BEHAVIOR AND PHYSICAL ACTIVITY IN OBESE ADOLESCENTS OF PUBLIC AND PRIVATE SCHOOLS

*Prática alimentar e de atividade física em adolescentes obesos de escolas públicas e privadas*

*Práctica alimentaria y de actividad física en adolescentes obesos de escuelas públicas y privadas*

Original Article

## ABSTRACT

**Objective:** To evaluate the feeding behavior and level of physical activity in obese adolescents from public (PuS) and private (PrS) schools of Fortaleza-CE. **Methods:** Cross-sectional study held with 272 adolescents from PuS and PrS in the period from April 2007 to May 2009. A questionnaire was applied containing identification (age, gender) and anthropometric (weight and height) data, school situation, feeding behavior and physical activity level. **Results:** It was observed that 160 (58.8%) of the adolescents were female with a mean age of 16.5 years ( $\pm 1.31$ ). There was prevalence of moderate obesity, with 85.5% (n=171) in PuS and 76.4% (n=55) in PrS. No difference was found between the obesity degree and the school network. Regarding feeding behavior, 70.2% (n=190) consumed less than five meals a day and 56.3% (n=153) had no breakfast, without differences between the school networks. The consumption of fruits (10%, n=27) and vegetables (14.1%, n=38) was low. Students of PrS consumed more soft drinks (41.7%, n=30) than those of the PuS (28.5%, n=57,  $p=0.03$ ). Among students of the PuS and PrS, those who did not consume fast food represented 47% (n=93) and 32.4% (n=27), respectively ( $p=0.02$ ). It was identified that the PuS adolescents were more active than those of PrS (77%, n=153 versus 54.2%, n=40;  $p=0.0002$ ), but this difference was not associated with the degree of obesity ( $p=0.88$ ). **Conclusion:** The adolescents of both the PuS and PrS had inadequate feeding behavior, with little differences between them. The adolescents of the PuS were more active than the ones of PrS, although this level of physical activity did not influence the obesity degree.

**Descriptors:** Obesity; Teens; Feeding Behavior; Motor activity.

## RESUMO

**Objetivo:** Avaliar a prática alimentar e o nível de atividade física em adolescentes obesos de escolas públicas (EPu) e privadas (EPr) de Fortaleza-CE. **Métodos:** Estudo transversal realizado com 272 adolescentes de EPu e EPr, no período de abril de 2007 a maio de 2009. Aplicou-se um questionário contendo dados de identificação (idade, sexo), antropométricos (peso e altura), situação escolar, prática alimentar e nível de atividade física. **Resultados:** Dos avaliados, observou-se que 160 (58,8%) eram do sexo feminino, com idade média de 16,5 anos ( $\pm 1,31$ ). Houve prevalência da obesidade moderada, com 85,5%, (n=171) na EPu e 76,4%, (n=55) na EPr. Não se constatou diferença entre o grau de obesidade e a rede escolar. Sobre a prática alimentar, 70,2% (n=190) consumiam menos de cinco refeições ao dia e 56,3% (n=153) não faziam o café da manhã, não tendo diferença entre as redes escolares. O consumo de frutas (10%; n=27) e vegetais (14,1%; n=38) foi baixo. Os estudantes das EPr consumiam mais refrigerantes (41,7%; n=30) do que os da EPu (28,5%; n=57;  $p=0,03$ ). Constatou-se, que 47% (n=93) dos alunos da EPu e que 32,4% (n=27) da EPr não consumiam fast-food ( $p=0,02$ ). Identificou-se que os adolescentes das EPu eram mais ativos do que os das EPr (77%; n=153 versus 54,2%; n=40;  $p=0,0002$ ), mas essa diferença não mostrou associação com o grau de obesidade ( $p=0,88$ ). **Conclusão:** Os adolescentes das escolas públicas e particulares apresentavam prática alimentar inadequada, havendo poucas diferenças entre eles. Os jovens das EPu apresentaram-se mais ativos que os das EPr, entretanto, este nível de atividade física não influenciou no grau de obesidade.

**Descritores:** Obesidade; Adolescentes; Comportamento alimentar; Atividade motora.

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## RESUMEN

**Objetivo:** Evaluar la práctica alimentaria y el nivel de actividad física en adolescentes obesos de escuelas públicas (EPu) y privadas (EPr) de Fortaleza-CE. **Métodos:** Estudio trasversal realizado con 272 adolescentes de EPu y EPr entre abril de 2007 y mayo de 2009. Se aplicó un cuestionario con datos de identificación (edad y sexo), antropométricos (peso y altura), situación en la escuela, práctica alimentaria y nivel de actividad física. **Resultados:** De los adolescentes evaluados se observó que 160 (58,8%) eran del sexo femenino con edad media de 16,5 años ( $\pm 1,31$ ). Hubo prevalencia de obesidad moderada en el 85,5% ( $n=171$ ) de la EPu y el 76,4% ( $n=55$ ) de la EPr. No se constató diferencia en el grado de obesidad y la red escolar. Respecto la práctica alimentaria, el 70,2% ( $n=190$ ) consumía menos de cinco comidas al día y el 56,3% ( $n=153$ ) no desayunaba, no habiendo diferencia en las redes escolares. Fue bajo el consumo de frutas (10%;  $n=27$ ) y vegetales (14,1%;  $n=38$ ). Los estudiantes de las EPr consumían más refrescos (41,7%;  $n=30$ ) que los de la EPu (28,5%;  $n=57$ ;  $p=0,03$ ). Se constató que el 47% ( $n=93$ ) de los alumnos de la EPu y el 32,4% ( $n=27$ ) de la EPr no consumían fast-food ( $p=0,02$ ). Se identificó que los adolescentes de las EPu eran más activos que los de las EPr (77%;  $n=153$  versus 54,2%;  $n=40$ ;  $p=0,0002$ ), pero esa diferencia no mostró asociación con el grado de obesidad ( $p=0,88$ ). **Conclusión:** Los adolescentes de las escuelas públicas y privadas presentaron hábitos alimentarios inadecuados con poca diferencia entre ellos. Los jóvenes de las EPu se presentaron más activos que los de las EPr; sin embargo, este nivel de actividad física no ha influenciado en el grado de la obesidad.

**Descriptores:** Obesidad, Adolescente, Conducta Alimentaria, Actividad Motora.

## INTRODUCTION

Obesity is a chronic disease characterized by an abnormal or excessive fat accumulation in the body, which can lead to several harmful consequences, such as cardiovascular disease, diabetes mellitus, metabolic and endocrine disorders, sleep apnea, osteoarthritis, certain types of cancer, and various psychological problems<sup>(1,2)</sup>. It is currently considered a major public health problem in both developed and developing countries, being a universal disease of growing prevalence<sup>(3,4)</sup>.

Social, behavioural, environmental, cultural, psychological, metabolic, and genetic factors may cause an excessive accumulation of body fat, as a result of a long-term energy imbalance<sup>(5)</sup>. Among the environmental factors, the excessive energy intake and decreased physical activity stand out, these being the most prevalent etiologic factors for obesity, likely to start at any time in life<sup>(6)</sup>.

Obesity becomes even more problematic when it appears or aggravates during the adolescence, a stage of life where profound transformations occur in growth and development process, particularly in view of the predominance of sedentary leisure activities and inadequate feeding practices, such as consumption of high-calorie snacks for substitution of the main meals, and high intake of foods rich in refined carbohydrates and saturated fat, i.e., fast foods<sup>(7)</sup>. Furthermore, adolescence is a critical period for the development of adiposity since the risk of becoming overweight or obese adults increases with age<sup>(8)</sup>.

In Brazil, the results of the *Pesquisa de Orçamentos Familiares - POF* (Household Budget Survey) conducted by the *Instituto Brasileiro de Geografia e Estatística - IBGE* (Brazilian Institute of Geography and Statistics) in the years 2008-2009 indicate changes in the Brazilian's feeding behavior, where it was visualized a growing trend in purchasing foods rich in lipids and elevation of simple carbohydrates, accompanied by a reduction in purchasing food source of complex carbohydrates<sup>(9)</sup>.

Comparing data from the *Estudo Nacional da Despesa Familiar - ENDEF* (National Survey of Family Expenditure) (1974-1975) to the one from POF (2008-2009), the prevalence of overweight found in the group aged ten to nineteen years rose from 3.7% to 21.7% among men, whereas in women, overweight increased from 7.6% to 19.4%. Regarding obesity, there was also an increase of 0.4% to 5.9% in males, and 0.7% to 4% in females, with upward growth. In the same period, weight deficit decreased from 10.1% to 3.7% in men, and from 5.1% to 3.0% in women<sup>(9)</sup>.

The analysis of these results can thus prove the nutritional transition and the magnitude of the problem, showing deficiencies still ongoing, and ascending excesses<sup>(10)</sup>. It is important to emphasize how the nutritional transition is happening in Brazil. A warning must be issued, since the youth are more likely to be obese in places where the nutrition transition occurred rapidly<sup>(11)</sup>.

It is important that, in adolescence, obesity prevention occurs through physical activity practice and food control. Such measures can contribute to the improvement of lipid and metabolic profile<sup>(12)</sup>. Because obesity has multifactorial causes, the efficacy in the prevention and treatment is also complex, not based on one single method, being necessary a more comprehensive intervention, with a multidisciplinary team, in order to promote a negative energy balance by decreasing caloric intake and increasing physical activity to achieve a gradual weight loss<sup>(8)</sup>.

The present study thus aimed to evaluate the feeding behavior and level of physical activity in obese adolescents of public (PuS) and private (PrS) schools of Fortaleza.

## METHODS

This is an observational study of cross-sectional and analytical character<sup>(13)</sup>, carried out from April 2007 to May 2009.

The survey was representative of the population aged between 15 and 19 years, considering that the gross enrollment ratio in high school level in the city of Fortaleza, corresponding to the age range of the survey, was approximately 90%<sup>(14)</sup>. The number of students assessed in each *Secretaria Executiva Regional - SER* (Regional Executive Secretariat) was established by the proportionality of the population in that SER to the number of students previously determined to comprise the sample.

It is worth mentioning that this age group of adolescents was chosen because they have already undergone the remarkable changes of adolescence, being in the postpubertal period. The anthropometric parameters of body composition are thus more stable, providing a more uniform evaluation<sup>(15)</sup>.

For the accomplishment of sample calculation, the Epi Info software version 6.04 was used, being considered a prevalence in obese adolescents with metabolic syndrome of 32%<sup>(16)</sup>. The significance level was set at 5%, and an absolute sampling error at 6%. The estimate of obese adolescents was set at 7,187, based on the students enrolled in high school<sup>(14)</sup> and with support of a population-based study on obesity prevalence among Brazilian adolescents<sup>(17)</sup>.

With those values, the sample size was determined at 232, to which approximately 17% was added for any eventual loss of information. In total, 272 adolescents were assessed, 73.5% of whom were in public schools, and 26.5% in private ones, thus maintaining similar proportion to Fortaleza's distribution of students, being surveyed all six regional administrative units that compose the municipality, highlighting the selection of 47 public schools and 17 private schools.

The schools, randomly selected, received the necessary guidance, being the anthropometric assessment of students held by qualified members of the research team. In case of non-acceptance by the students or occurrence of a small number of obese adolescents, new schools were sorted in that SER, for completion of the number of students proposed for the region. Otherwise, if the quantity of obese exceeded the number determined to the assessed SER, simple randomisation was employed for allocation of the research participants.

Were used as criteria for exclusion of the students: prepubertal and pubertal adolescents, users of medications that could cause obesity, disabled people with limitations in standing erect, pregnant women, people with genetic and chronic diseases, with alteration in weight gain, or with

limitation in posture, as well as malnourished or eutrophic individuals.

A semi-structured questionnaire was applied to the obese adolescents in public and private schools, including identification data, anthropometric data (weight and height), school situation, feeding behavior and level of physical activity. The exposure variables studied were divided into sociodemographic (age, sex and type of school), food profile (period of breastfeeding, regular mealtimes, having breakfast, weekly frequency of consumption of fried foods, fast food, fat meat, sweets, soft drinks, fruits and vegetables).

Anthropometric data, height and weight, was collected in one take, using a digital scale, *Plena* model, with 180 kg capacity and 100 g precision. The verification of the measure followed the procedure in which the evaluated individual stands in the orthostatic position, gently ascends the scale and positions at its center. The student was weighed barefoot and wearing the uniform, and should be emphasized that the uniform was deducted according to each school, because of the inexistent standardization. Height was also assessed by single take with portable stadiometer of KaWe brand, one person-check type, with a precision of 1 cm, wall-mounted with zero point at ground level. The subject remained standing in the orthostatic position, barefoot, feet together, the tape keeping contact with the heels and the occipital region<sup>(18)</sup>.

Measures of weight and height were used to calculate the Body Mass Index (BMI), when the weight in kilograms was divided by the square of height in meters ( $BMI = \text{weight}/\text{height}^2$ ). BMI was evaluated considering the age of the adolescent, having as parameter the one adopted by WHO<sup>(19)</sup>, which considers obese the person with a BMI > 97 percentile. As regards to the degree of obesity, it was considered severe obesity the BMI z-score > 3, and moderate between  $\geq 2$  and  $\leq 3$ , according to the WHO<sup>(20)</sup>.

The feeding behavior evaluation was carried out by means of a simplified inquiry with the aim of characterizing the feeding habits of obese adolescents in this study. It is worth stressing the use of the simplified inquiry, for this is an extensive investigation, addressing various risk factors for metabolic syndrome, thus hindering a more specific evaluation. This kind of approach, however, is allowed in epidemiological studies.

For analysis of the feeding behavior involving foods and food groups, the guidelines recommended by the *Guia Alimentar para População Brasileira*<sup>(21)</sup> (Food Guidance for the Brazilian Population) were used as a parameter, besides two studies<sup>(22,23)</sup>.

In order to estimate the level of physical activity, an international questionnaire was used - International Physical Activity Questionnaire - IPAQ, proposed by the World

Health Organization, validated for use in adolescents in the age range of this survey<sup>(24)</sup>, consisting in a questionnaire assessment of physical activity used in many countries and validated for use in adolescents. For a more simplified analysis, the physical activity level was converted to a dichotomous variable, where sedentary and insufficiently active was considered “little activity”, while active and very active was “a lot of activity”.

The descriptive analysis was conducted to characterize the distribution of the occurrence of the events studied, using the chi-square test to assess the differences of prevalence observed in the various groups, employing the Epi Info version 6.04. A value of  $p \leq 0.05$  was considered statistically significant.

The Ethics Committee of the Hospital Complex of Federal University of Ceará (COMPE Protocol No. 259/06. Opinion No. 96/07) approved the study, and school principals authorized the assessment. Previous written consent was obtained from the adolescents above 18 years and from parents or guardians of underage teens.

## RESULTS

It was observed that out of 272 obese students who composed the study, 112 (41.2%) were male and 160 (58.8%) were female, with mean age of 16.5 years ( $\pm 1.31$ ). Regarding the school situation, 73.5% ( $n = 200$ ) were in public schools, and 26.5% ( $n = 72$ ) in private schools.

There was no significant difference between the degree of obesity of adolescents in public and private schools ( $p > 0.05$ ). Higher prevalence of moderate obesity was observed in public schools (85.5%,  $n=171$ ) and private schools (76.4%,  $n=55$ ) (Figure 1).

There was no significant difference between being exclusively breastfed until six months of age and the degree of obesity across the population assessed. This association was not observed either when evaluating students of public ( $p=0.71$ ) and private colleges ( $p=0.96$ ) (Figure 2).

Regarding the feeding behavior, it was found that 70.2% ( $n = 192$ ) of the adolescents reported fewer than five meals a day. There was no difference between students of PuS (71%,  $n=142$ ) and PrS (68.1%,  $n=49$ ) ( $p=0.63$ ). The breakfast is not a common practice among the adolescents assessed, especially considering that 56.3% ( $n=153$ ) did not have this meal daily. It should be noted that no difference was found in the presence of that meal among teens of PuS (56%,  $n=112$ ) and PrS (56.9%,  $n=41$ ;  $p = 0.88$ ).

Of the studied adolescents, 70.0% ( $n=190$ ) did not have meals at the same time as their family members. No significant difference ( $p=0.61$ ) was pointed out in relation

to this attitude among young people evaluated in PuS (69%,  $n=138$ ) and PrS (72.2%,  $n=52$ ).

It was observed that 30% ( $n=82$ ) of the adolescents had daily family meals on the dinner table. There was a significant difference in the study groups ( $p=0.02$ ), for it was found that students of private schools (47.2%,  $n=34$ ) had meals more frequently with their family than with the public (32%,  $n=64$ ). No association between the habit of not making meals with the family and the degree of obesity ( $p=0.52$ ) was observed.

It was verified that 56.9% ( $n=41$ ) of PrS students consumed more soft drinks ( $\geq 3$  days per week) compared

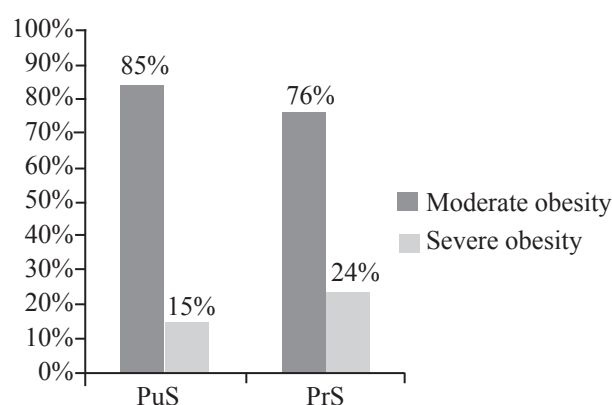


Figure 1 - Evaluation of the degree of obesity among adolescents of public schools (PuS) and private schools (PrS). Fortaleza-CE, 2007-2009.

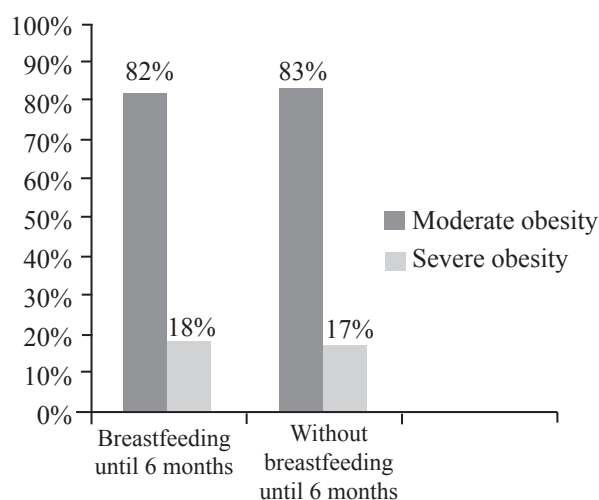


Figure 2 - Association of exclusive breastfeeding (EBF) until age 6 months and the degree of obesity in obese adolescents. Fortaleza-CE, 2007-2009.



to 41.5% (n=83) of those in PuS ( $p=0.03$ ), but without association between soft drink consumption and degree of obesity ( $p=0.19$ ).

Only 10% (n=27) of the adolescents assessed ate fruit daily. No difference was found between the PuS (9.5%, n=19) and PrS (11.3%, n=8;  $p=0.67$ ).

It was evidenced that 14.1% (n=38) consumed vegetables daily, no significant difference being observed between the students of public (15.1%, n=30) and private schools (11.4%, n=8;  $p=0.45$ ).

With regard to the consumption of fried food in a week, there was difference between those with low consumption of such food. In this group, there were 12.5% (n=25) of public school students, and 4.2% (n=3) of private school students, with a significant difference ( $p=0.04$ ). The lack of association between low consumption of fried foods by students of PrS and PuS and their degree of obesity is noteworthy ( $p=0.45$ ).

The high consumption of fried foods (over 5 days per week) was detected in 23.5% (n=47) of PuS students and 20.8% (n=15) of PrS students, no significant relationship being found between this consumption and the degree of obesity ( $p=0.64$ ).

Of the adolescents studied, 47% (n=94) of PuS students and 32.4% (n=23) of PrS students did not consume fast food, showing significant difference ( $p=0.02$ ). It is worth considering that, among the students who did not eat fast food, no significant difference between those of public and private schools with the degree of obesity ( $p=0.64$ ).

As for the elevated consumption (over 5 days a week) it was proved that 7% (n=14) of the students of the PuS and 7% (n=5) of the PrS had this inadequate practice, without statistically significant difference ( $p=0.98$ ).

It is worth noting that there was no significant difference in the weekly frequency of consumption of sweets ( $p=0.43$ ),

chocolates ( $p=0.95$ ) and fatty meats ( $p=0.68$ ) between students of public and private schools. Furthermore, the over-consumption of such foods by most adolescents was not observed (Figure 3).

Regarding physical activity, it was found that 71% (n=193) practiced a lot of physical activity (active and very active) and 29% (n=79) did little physical activity (sedentary and insufficiently active), according to the IPAQ. Table I shows the association of physical activity practice between the students of the educational networks. The fact that obese adolescents of public schools are more active than those of private schools ( $p=0.0002$ ) was identified. It should be stressed that no significant difference was observed between the level of physical activity and the degree of obesity ( $p=0.88$ ).

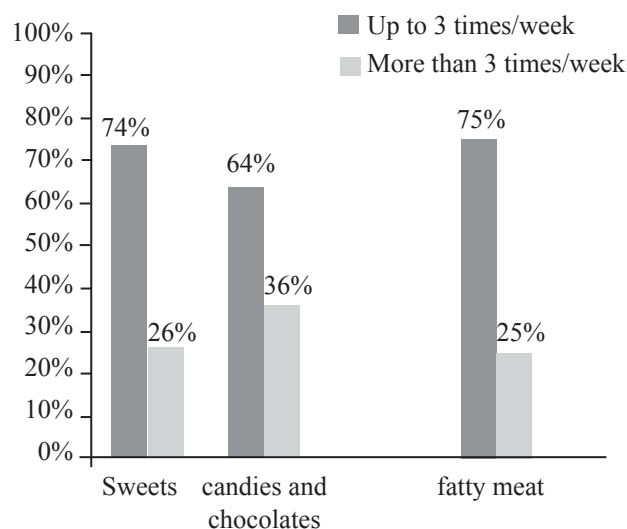


Figure 3 - Frequency of weekly consumption of sweets, candies and chocolates, and fatty meats, in the studied population. Fortaleza-CE, 2007-2009.

Table I - Comparison of obese adolescents in public and private schools regarding the level of physical activity (PA) practiced. Fortaleza-CE, 2007-2009.

Variable	Level of physical activity		p
	Low active adolescent (n; %)	Very active adolescent (n; %)	
School			
Private	55 (77.0%)	17 (23.0%)	0.0002
Public	108 (54.2%)	92 (45.8%)	

## DISCUSSION

In Brazil, there are few population-based studies on feeding behavior and physical activity, particularly among adolescents<sup>(25)</sup>. This study is one of the few related to obesity in this age group. Furthermore, it represents a probabilistic sample, since the study population was randomly taken, representing the various social classes and all regions of the city of Fortaleza.

The fact that there is no difference between obese adolescents in public and private schools in relation to the degree of obesity (moderate and severe) was observed, thus presenting a greater prevalence of moderate obesity, both in public and private schools. This finding shows that social differences do not influence the severity of obesity.

A study carried out in Recife, comparing the prevalence of obesity in adolescents from different socioeconomic conditions, observed that, in relation to obesity, a higher prevalence in adolescents of high income<sup>(26)</sup>. It is important to highlight that most studies evaluate the prevalence of obesity among adolescents between the various social classes, not being investigated in these groups the degree of obesity, as it was done in this study.

Encouraging breastfeeding is one of the preventive and protective factors against obesity, because researches show that children who were not breastfed or with shorter breastfeeding period have increased risk of becoming obese throughout life<sup>(27)</sup>. This research made the comparison of obese adolescents and cannot be compared with most studies in the literature that compare normal adolescents to the obese, with regard to breastfeeding<sup>(27)</sup>. It was noted in this survey that exclusive breastfeeding until six months had no association with the degree of obesity.

It is worth stressing that teenagers are often considered an exposed group to nutritional risk, due to improper eating habits. In this study, it could be observed that obese adolescents have the habit of skipping breakfast, and the same result was observed in other analysis<sup>(28)</sup>. Consistent with this finding, children without the habit of eating breakfast are more susceptible to obesity, and this fact can be associated with multiple causes<sup>(29)</sup>.

Consumption of breakfast exerts control over hunger, appetite and some hormones, providing adequate glycemic and lipid control. The food usually consumed at this meal (fruits, dairy and whole grains) are sources of dietary fibers that control the absorption of other foods, and thus the mechanisms of hunger and satiety. Another important factor to note is that the absence of this meal can hinder blood glucose elevation, proper to the morning activities, and cause a calcium deficiency<sup>(29)</sup>.

Most of the youth examined in this study had no regularity in mealtimes. No difference was evidenced

between the students of public and private system. The lack of regularity at mealtime is a contributing factor to the development of obesity<sup>(30)</sup>.

It was observed that the majority of the analysed young people did not have their meals with the family. Studies show a positive association between making meals with family and eating healthy foods, this behavior being a protective factor for overweight<sup>(31)</sup>. In the population studied, it was evidenced the habit of not performing meals with family was more common in public school students, however, this difference did not affect the degree of obesity between the groups.

With regard to the consumption of soft drinks, the obese of private schools had higher consumption compared to the ones of public schools, as corroborated by other studies<sup>(32,33)</sup>. It is important to report the high energy density of soft drinks resulting from high sugar content, thus providing empty calories. Moreover, for being products in liquid form, they do not trigger the satiety centers, causing the subject to have greater energy intake. Therefore, soft drinks can be considered co-responsible for the weight gain<sup>(34)</sup>.

Corroborating this study, other studies have demonstrated that reduced intake of fruits and vegetables is common among adolescents<sup>(4,32,33)</sup>. Previously conducted research showed an association of the reduced consumption of vegetables with the presence of overweight and obesity in youth of B economy class<sup>(33)</sup>. Those results, however, are different from data found in this study since no difference was observed in this food habit among obese adolescents in public and private schools.

Insufficient consumption of fruits, vegetables, and leguminous plants is a risk factor related to the cause of non-communicable chronic diseases in the population. These foods are important for a healthy diet, as they are sources of micronutrients, fiber, and other components with functional properties. Fruits and vegetables are low in energy density, which helps maintain a healthy body weight. Thus it is very important that adolescents have an adequate intake of these foods<sup>(35)</sup>. Study carried out with adolescents in São Paulo<sup>(4)</sup> corroborates the results found in this study, when stressed that the feeding behavior of the adolescents is characterized by low intake of fruits and vegetables. Therefore, the current trend displayed by the adolescents in food consumption is a concern.

According to researches, the consumption of fast foods increases the development of obesity and associated comorbidities, being this meal high in calories, saturated fats and salt; and also deficient in vitamins, minerals and fibers. When fast food is part of the routine, it will cause weight gain and inadequate nutrition<sup>(36)</sup>. In this article, we can observe that the prevalence of obese adolescents of

public schools who consume fast food even once a week is higher than that of private schools.

Most studies<sup>(1,37)</sup> suggest that adolescents, both the obese and normal-weight, over-consume foods of low nutritional value and high caloric density, such as sweets, candies, and chocolates, while the present study found that the obese adolescents of public and private schools consume a moderate amount of these foods.

It is believed that, regardless of the socioeconomic class, sports practice in leisure time shows no association with the presence of overweight and obesity<sup>(33)</sup>. This fact was found in this study and other reports in the literature<sup>(4,38)</sup>.

Study with 1,229 adolescents in public and private schools, who were classified as insufficiently active (22.3%) and very active (77.7%), noted that public school students are more active compared to the private network. No significant difference between the level of physical activity and body mass index was evidenced<sup>(39)</sup>. Such conclusions are similar to this study, although that sample of evaluated youth comprised only obese individuals.

The habit of physical activity in adolescence has several health benefits such as the control and maintenance of body weight and reduction of cardiovascular risk. Data suggests that most obese adolescents were active, not being in line with studies in the literature<sup>(40)</sup>. This might be explained by the characteristics of the study design, which, being cross-sectional, makes it likely that there is reverse causality, in which obese adolescents could have acquired the habit of physical activity for weight reduction.

Therefore, educational and informative measures should be undertaken, regarding the encouragement to the acquisition of healthy eating habits, such as the inclusion of fresh food, especially fruits and vegetables, and reduction of simple sugars, actions that must be practiced. Since a few differences were found between the feeding behavior of students in public and private schools, an immediate intervention is required, with a dietary reeducation for the adolescents, regardless of the socioeconomic class to which these young people belong, but considering the individuality and reality of each group.

It should be emphasized the fact that the main limitation of the study was the small number of scientific papers with similar evaluations, thus hindering comparisons. However, this study presents little studied issues that are important in the evaluation of obese youth. It was also observed the use of a simplified feeding inquiry with low precision in the analysis, which, despite being poorly adequate, was the most suitable for this type of evaluation. The recall bias may also have occurred, particularly regarding early life data, such as breastfeeding.

## CONCLUSION

Obese adolescents have improper feeding behavior, and there are few differences between students in public and private schools, concerning such habits. Regarding physical activity, young people evaluated in the public schools are more active than those in the private system, but this difference did not influence the degree of obesity in the assessed groups.

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## REFERENCES

1. Marchi-Alves LM, Yagui CM, Rodrigues CS, Mazzo A, Rangel EML, Girão FB. Obesidade infantil ontem e hoje: importância da avaliação antropométrica pelo enfermeiro. *Esc Anna Nery*. 2011;15(2):238-44.
2. Azevedo FR, Brito BC. Influência das variáveis nutricionais e da obesidade sobre a saúde e o metabolismo. *Rev Assoc Med Bras*. 2012;58(6):714-23.
3. Cavalcanti CBS, Carvalho SBCE, Barros MVG. Indicadores antropométricos de obesidade abdominal: revisão dos artigos indexados na biblioteca SciELO. *Rev Bras Cineantropom Desempenho Hum*. 2009;11(2):217-25.
4. Murillo OO, Rey MCPA. Panorama de práticas de alimentação de adolescentes escolarizados. *Av Enferm*. 2009;27(2):43-56.
5. Wanderley EM, Ferreira VA. Obesidade: uma perspectiva plural. *Ciênc Saúde Coletiva*. 2010;15(1):185-94.
6. Cardoso CBMA, D'abreu HCC, Ribeiro MG, Bouzas RI. Obesidade na adolescência: reflexões e abordagem. *Adolesc Saude*. 2010;7(1):12-8.
7. Lamounier JA, Welford VRS, Parizzi MR, Lamounier FB. Obesidade na Adolescência. In: Priore SE, Oliveira RMS, Faria ER, Franceschini SCC, Pereira PF. *Nutrição e Saúde na Adolescência*. Rio de Janeiro: Editora Rubio; 2010. p. 75-92.
8. Suplicy HL. Obesidade: tratamento dietético. In: *Associação Brasileira para o Estudo da Obesidade*



- e Síndrome Metabólica. Diretrizes brasileiras de obesidade 2009/2010 / ABESO. 3ª ed. São Paulo: AC Farmacêutica; 2009. p. 33-41.
9. Instituto Brasileiro de Geografia e Estatística - IBGE. Pesquisa de Orçamento Familiar. Análise de Disponibilidade Domiciliar de Alimentos e do Estado Nutricional no Brasil: 2008-2009. Rio de Janeiro: IBGE; 2010. p. 1-7.
  10. Souza EB. Transição nutricional no Brasil: análise dos principais fatores. Cad Unifoa [periódico na internet]. 2010 [acesso em 2012 Set 8];5(13):49-53. Disponível em: <http://web.unifoa.edu.br/cadernos/edicao/13/49.pdf>.
  11. Mathus-Vliegen L, Toouli J, Fried M, Khan AG, Garisch J, Hunt R, et al. Obesity. World Gastroenterology Organization Global Guidelines [periódico na internet]. 2011 [acesso em 2012 Set 8]:1-17. Disponível em: <http://www.worldgastroenterology.org/assets/export/userfiles/Obesity-Master%20Document%20for%20Website.pdf>.
  12. Casazza K, Dulin-Keita A, Gower BA, Fernandez JR. Differential influence of diet and physical activity on components of metabolic syndrome in a multiethnic sample of children. J Am Diet Assoc. 2009;109(2):236-44.
  13. Campos LA. Prevalência e Fatores Associados à Síndrome Metabólica em Adolescentes Escolares Obesos do Município de Fortaleza [tese]. Fortaleza: Universidade Federal do Ceará Faculdade de Medicina; 2011.
  14. Governo do Estado do Ceará (BR), Secretaria de Educação. Estatísticas da Educação Básica nos Municípios do Ceará [acesso em 2010 Jan 20]. Disponível em: <http://download.seduc.ce.gov.br/indicadores/fortaleza.pdf>.
  15. Siervogel RM, Demerath EW, Schubert C, Remsberg KE, Chumlea WC, Sun S, et al. Puberty and body composition. Horm Res. 2003;60(Suppl 1):36-45.
  16. Duncan GE, Li SM, Zhou XH. Prevalence and trends of a metabolic syndrome phenotype among U.S. Adolescents, 1999-2000. Diabetes Care. 2004;27(10):2438-43.
  17. Terres NG, Pinheiro RT, Horta BL, Pinheiro KAT, Horta LL. Prevalence and factors associated to overweight and obesity in adolescents. Rev Saúde Pública. 2006;40(4):627-33.
  18. Waitzberg DL, Ferrini MT. Exame Físico e Antropometria. In: Waitzberg DL. Nutrição oral, enteral e parenteral na prática clínica. 3ª ed. São Paulo: Atheneu; 2000. p. 255-78.
  19. World Health Organization. Obesity: preventing and managing the global epidemic. Geneva: World Health Organization; 2000.
  20. Onis M, Onyango AW, Borghi E, Siyam A, Nishida C, Siekmann J. Development of a WHO growth reference for school-aged children and adolescents. Bull World Health Organ. 2007;85(9):660-7.
  21. Ministério da Saúde (BR), Secretaria de Atenção à Saúde, Coordenação Geral da Política de Alimentação e Nutrição. Guia Alimentar para população brasileira: promovendo a alimentação saudável. Brasília: Ministério da Saúde; 2008.
  22. Silveira D, Taddei JA, Escrivão MA, Oliveira FL, Ancona-Lopez F. Risk factors for overweight among Brazilian adolescents of low-income families: a case-control study. Public Health Nutr. 2006;9(4):421-8.
  23. Neutzling MB, Taddei JA, Gigante DP. Risk factors of obesity among Brazilian adolescents: a case-control study. Public Health Nutr. 2003;6(8):743-49.
  24. Hagströmer M, Bergman P, De Bourdeaudhuij I, Ortega FB, Ruiz JR, Manios Y, et al. Concurrent validity of a modified version of the International Physical Activity Questionnaire (IPAQ-A) in European adolescents: The HELENA Study. Int J Obes. 2008;32(Suppl 5):S42-8.
  25. Neutzling MB, Araújo CLP, Vieira MFA, Hallal PC, Menezes AMB. Frequência de consumo de dietas ricas em gordura e pobres em fibra entre adolescentes. Rev Saúde Pública. 2007;41(3):336-42.
  26. Silva GAP, Balaban G, Motta MEFA. Prevalência de sobrepeso e obesidade em crianças e adolescentes de diferentes condições socioeconômicas. Rev Bras Saúde Matern Infant. 2005;5(1):53-9.
  27. Siqueira RS, Monteiro CA. Amamentação na infância e obesidade na idade escolar em famílias de alto nível socioeconômico. Rev Saúde Pública. 2007;41(1):5-12.
  28. Binn Zaal AA, Musaiger AO, D'Souza R. Dietary habits associated with obesity among adolescents in Dubai, United Arab Emirates. Nutr Hosp. 2009;24(4):437-44.
  29. Höfelmann DA, Momm N. Breakfast: omission and associated factors in schoolchildren from Itajaí, Santa Catarina state, Brazil. Nutrire Rev Soc Bras Aliment Nutr. 2014;39(1):40-55.
  30. Ministério da Saúde (BR), Secretaria de Atenção à Saúde, Departamento de Atenção Básica. Obesidade. Brasília: Ministério da Saúde; 2006. (Cadernos de Atenção Básica, n. 12).

31. Cardoso LO, Engstrom EM, Leite IC, Castro IRR. Fatores socioeconômicos, demográficos, ambientais e comportamentais associados ao excesso de peso em adolescentes: uma revisão sistemática da literatura. *Rev Bras Epidemiol*. 2009;12(3):378-403.
32. Ceschini FL, Andrade DR, Oliveira LC, Araújo Júnior JF, Matsudo VKR. Prevalence of physical inactivity and associated factors among high school students from state's public schools. *J Pediatr*. 2009;85(4):301-6
33. Lippo BRS, Silva IM, Aca CRP, Lira PIC, Silva GAP, Motta MEFA. Determinants of physical inactivity among urban adolescents. *J Pediatr*. 2010;86(6):520-4.
34. Bessa M, Valente H, Cordeiro T, Padrão P, Moreira A, Lopes C, et al. Ingestão de alimentos fluidos e risco de excesso de peso em crianças. *Acta Med Port*. 2008;21(2):161-70.
35. Mendes KL, Catão LP. Avaliação do consumo de frutas, legumes e verduras por adolescentes de Formiga – MG e sua relação com fatores socioeconômicos. *Alim Nutr*. 2010;21(2):291-6.
36. Jamie S. Nutrição na Adolescência. In: Mahan LK, Escott-Stump S. Krause, alimentos, nutrição e dietoterapia. 12ª ed. Rio de Janeiro: Elsevier; 2010. p. 255-56.
37. Leal GVS, Philippi ST, Matsudo SMM, Toassa EC. Consumo alimentar e padrão de refeições de adolescentes, São Paulo, Brasil. *Rev Bras Epidemiol*. 2010;13(3):457-67.
38. Reichert FF, Baptista Menezes AM, Wells JCK, Carvalho Dumith S, Hallal PC. Physical activity as a predictor of adolescent body fatness: a systematic review. *Sports Med*. 2009;39(4):279-94.
39. Silva RCD. Obesidade, perfil lipídico e sua relação com o nível de atividade física de adolescentes escolares [dissertação]. Brasília: Universidade de Brasília; 2007.
40. Enes CC, Slater B. Obesidade na adolescência e seus principais fatores determinantes. *Rev Bras Epidemiol*. 2010;13(1):163-71.

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