

OVERWEIGHT AND OBESITY IN SCHOOLCHILDREN AGED 10 TO 14 YEARS

Sobrepeso e obesidade em escolares de 10 a 14 anos

Sobrepeso y obesidad en estudiantes entre los 10 y 14 años

Original Article

ABSTRACT

Objective: To estimate the prevalence of overweight and obesity in 10- to 14-year-old schoolchildren from both public (state and municipal) and private educational network of Campo Grande-MS, and to verify the association between anthropometric data, physical activity, alimentary habits, sexual maturation and type of school. **Methods:** The sample was composed of 941 students from public and private school, whose anthropometric data was evaluated by the Body Mass Index and Cole's classification. The body composition was obtained through the body fat percentage and the habits of physical activity were assessed. Dietary habits were raised through questions about frequency of consumption of foods with high caloric density, vegetables, legumes and fruits and the habit of eating while watching television. **Results:** The study identified 217 (23.1%) overweight or obese schoolchildren and 530 (56.3%) with high percentage of body fat. There was not association with the physical activity and the alimentary habits. Overweight and obesity prevalence was higher among schoolchildren with signs of sexual maturation. The students of private schools presented prevalence 1.5 times higher of overweight and obesity, and 1.3 times higher of excess body fat percentage. **Conclusion:** There was a prevalence of overweight and obesity of 23.1% and 56.3% had high fat percentage, with higher prevalence of overweight and obesity among those with signs of sexual maturation, without association to physical activity and diet.

Descriptors: Adolescent; Anthropometry; Obesity; Overweight.

RESUMO

Objetivo: Estimar a prevalência de sobrepeso e obesidade em escolares de 10 a 14 anos, das redes pública (estadual e municipal) e particular de Campo Grande-MS, e verificar a associação entre as informações antropométricas, as atividades físicas, os hábitos alimentares, a maturação sexual e o tipo de escola. **Métodos:** A amostra, composta por 941 escolares da rede pública e particular, recebeu avaliação de dados antropométricos utilizando-se o Índice de Massa Corporal e classificação de Cole. Obteve-se a composição corporal através do percentual de gordura corporal e buscaram-se os hábitos de atividade física. Hábitos alimentares foram obtidos por meio de questões sobre frequência do consumo de alimentos de alta densidade calórica, de verdura, legumes e frutas e o hábito de alimentar-se assistindo televisão. **Resultados:** Identificaram-se 217 (23,1%) escolares com sobrepeso ou obesidade e 530 (56,3%) com percentual alto de gordura corporal. Não houve associação com os hábitos de atividade física e alimentares. Foi observada maior prevalência de sobrepeso ou obesidade nos escolares com sinais de maturação sexual. Os alunos das escolas particulares apresentaram uma prevalência 1,5 vezes maior de sobrepeso ou obesidade, e 1,3 vezes maior de percentual alto de gordura corporal. **Conclusão:** 23,1% dos escolares avaliados apresentaram sobrepeso ou obesidade e 56,3% apresentaram um percentual de gordura alto, com maior prevalência de sobrepeso e obesidade naqueles com sinais de maturação sexual, sem associação com hábitos de atividade física e alimentação.

Descritores: Adolescente; Antropometria; Obesidade; Sobrepeso.

RESUMEN

Objetivo: Estimar la prevalencia de sobrepeso y obesidad en estudiantes entre 10 y 14 años de la red pública (del estado y del municipio) y privada de Campo Grande-MS, y

Mariana de Lima Mendes Ramos⁽¹⁾
Elenir Rose Jardim Cury Pontes⁽¹⁾
Marília de Lima Mendes Ramos⁽²⁾
Vivian Rosa dos Santos Paes de Barros⁽³⁾

1) Federal University of Mato Grosso do Sul (Universidade Federal do Mato Grosso do Sul - UFMS) - Campo Grande (MS) - Brasil

2) Dom Bosco Catholic University (Universidade Católica Dom Bosco - UCDB) - Campo Grande (MS) - Brasil

3) Municipal Health Secretariat (Secretaria Municipal de Saúde) - Campo Grande (MS) - Brasil

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verificar la asociación entre las informaciones antropométricas, las actividades físicas, los hábitos alimentares, la maduración sexual y el tipo de escuela. **Métodos:** La muestra, constituida de 941 estudiantes de la red pública y privada recibió evaluación de datos antropométricos utilizando el Índice de Masa Corporal y clasificación de Cole. Se obtuvo la composición corporal a través del porcentaje de grasa corporal y se buscó los hábitos de actividad física. Los hábitos alimentares fueron obtenidos por medio de cuestiones acerca de la frecuencia de consumo de alimentos de elevada densidad calórica, de verdura, legumbres y frutas y el hábito de comer viendo la televisión. **Resultados:** Se identificaron 217 (23,1%) estudiantes con sobrepeso u obesidad y 530 (56,3%) con porcentaje elevado de grasa corporal. No hubo asociación con los hábitos de actividad física y alimentares. Se observó mayor prevalencia de sobrepeso u obesidad en los estudiantes con signos de maduración sexual. Los alumnos de escuelas privadas presentaron una prevalencia de 1,5 veces más sobrepeso u obesidad y 1,3 veces más de porcentaje elevado de grasa corporal. **Conclusión:** El 23,1% de los estudiantes evaluados presentaron sobrepeso u obesidad y el 56,3% presentaron un porcentaje de grasa elevado, con mayor prevalencia de sobrepeso y obesidad en aquellos con signos de maduración sexual, sin asociación con hábitos de actividad física y alimentación.

Descriptores: Adolescente; Antropometría; Obesidad; Sobrepeso.

INTRODUCTION

Obesity is a universal disease, regarded a global epidemic by the World Health Organization (WHO). It is a serious health disorder that contributes to trigger the onset of metabolic and chronic degenerative diseases, such as diabetes mellitus, hypertension and cardiovascular disease, musculoskeletal disorders, osteoarthritis and sleep apnea^(1,2).

The prevalence of obesity is progressively increasing worldwide, regardless of socioeconomic level, despite being considered the most common disorder in developed countries⁽³⁾. Epidemiologic data estimates that a quarter of the world's inhabitants suffer from obesity; being 40% of males and 30% of females. In Latin America, 50% of individuals are overweight (200 million) and 11% are obese (45 million), with the prognosis of 100% of excess weight in 2025^(4,5).

Recent data released by the World Health Organization, through the World Health Statistics 2012 Report, stated that 12% of the population is considered obese, and that obesity is the cause of death of 2.8 million people per year. The highest incidence of the problem lies in the American continent, reaching 26% of the adults⁽⁶⁾.

In Brazil, according to data from the National Institute of Food and Nutrition (*Instituto Nacional de Alimentação e Nutrição - INAM*), there have been changes in the

lifestyle of the population, a reduction in malnutrition and a progressive increase in childhood obesity, featuring a nutritional transition process. Between 1975 and 1989, there was a 61.4% reduction in the prevalence of child malnutrition⁽⁷⁾.

According to the World Health Organization (WHO), childhood obesity is increasing worldwide, including Brazil. It is estimated that about 17.6 million children under 5 years are diagnosed overweight throughout the world. In the United States, the prevalence of childhood obesity has doubled and the number of overweight adolescents has tripled between 1980 and 2000. In youth 12 to 17 years the prevalence of obesity has increased sharply from 5% to 13% in boys and from 5% to 9% in girls between the 60s and 90s^(8,9). In developing countries, the percentage of underweight children under five years decreased from 28% in 1990 to 17% in 2011⁽⁶⁾.

Studies show that the epidemic character and the increasing prevalence of childhood obesity are influenced by modifications in lifestyle, determined by cultural, social and economic features. Such changes involve improper dietary habits, characterized by excessive increase in the consumption of foods with high contents of fat and high energetic value, sedentary behavior conditioned by reducing the practice of physical activities, the increase in habits which do not generate energy expenditure, such as watching television, computers and videogame use, as well as occupational and locomotion changes, and modifications in the type of leisure activities^(3,10).

A research conducted in Campo Grande - MS in 2006 estimated a prevalence of overweight of 16.6% and 14.5% of obesity in 6- to 11-year-old schoolchildren⁽¹¹⁾. One year later, another study in the same municipality indicated excess weight (overweight or obesity) in 30.1% of children aged 6 to 10 years enrolled in the state school⁽¹²⁾.

Therefore, this study aimed to estimate the prevalence of overweight and obesity in schoolchildren from 10 to 14 years of public (state and municipal) and private schools in Campo Grande-MS, and the association between anthropometric data, physical activities, dietary habits, sexual maturation and type of school.

METHODS

This cross-sectional observational study was conducted with students from 10 to 14 years, of both sexes, regularly enrolled in public (state and municipal) and private schools in the city of Campo Grande, located in Mato Grosso do Sul, Central-West region of Brazil. Data was collected between August and October 2008.

The sample was classified as probabilistic, by cluster, selected by simple and stratified random sampling, using

the following parameters for calculation: 65,438 school population, prevalence of 50% ($\pm 5\%$), significance level of 5% and design effect 2. The minimal sample size required was 764 students. However, 941 students were studied, with 758 children of public school and 183 of private education, preserving proportionality by school type, gender and age. By lottery, three schools (a municipal, one state and one private) were selected for each health district in Campo Grande (East, North, West and South), totaling 12 schools. In each one, also by lot, the students were selected according to gender and age.

Data collection consisted of anthropometric measurements and information, such as personal identification, dietary habits, physical activity and sexual maturation (which justified the age group), obtained through a structured interview.

To determine the body weight, the child stood in the center of the scale platform, with arms alongside the body, while height was measured up with the individual at maximal inspiration, with the head oriented in the Frankfurt plane. A portable digital scale (Tech Line™), with capacity of up to 180 kg and 100 g precision previously calibrated and tested, and a portable stadiometer (Sany™ American Medical do Brazil Ltda, Telescopic Personal Sanny Model), with accuracy of 0.5 centimeters, were used.

The Body Mass Index (BMI) followed the relation height and weight, according to equation proposed by Quetelet ($BMI = \text{body weight (kg)}/\text{height (m)}^2$)⁽¹⁾. After calculating BMI, it was adopted the Cole rating standard for children and adolescents, taking as overweight values of BMI at or above the 85th percentile and less than the 95th percentile, and as obesity the BMI at or above the 95th percentile⁽¹³⁾.

The percentage of body fat (% BF) was estimated from the values of skinfold thickness determined at triceps (TSF) and subscapular (SB) regions, through the use of predictive equations⁽¹⁴⁾. The percentage of fat >20% was considered high for males, and high for females when fat >25%. The triceps skinfold (TSF) and subscapular (SB) regions were measured with a compass (Sany™ American Medical do Brazil Ltda, Classic Sanny Scientific Model), with accuracy of 0.1 mm.

The measurements were performed by a single evaluator, always in the right side of the body, by performing three consecutive measurements in each of the folds, to obtain the arithmetic mean of the values⁽²⁾. The triceps skinfold was obtained on the back of the arm, parallel to the longitudinal axis at the point it comprises half the distance between the superolateral edge of the acromion and the olecranon. The subscapular skinfold was measured obliquely relative to the longitudinal axis, following the orientation of the ribs, being located from the inferior angle of the scapula⁽²⁾.

For data on physical activity habits, the analysis was performed through a questionnaire containing questions on the participation in physical education classes (frequency); practice of sports outside the school (frequency and hours per week); practice of physical activity in leisure time (hours per week), the time spent watching television, playing video games and using the computer (hours per day), and the habit of eating while watching television.

To estimate the habits, data was collected on the frequency of consumption of some food groups with high calorie density (sweets, fast food, fried food and soda), and vegetables and fruits. These questions were adapted^(11, 15) for this study. Sexual maturation of the schoolchildren was considered present upon the report of the occurrence of menarche in females and the presence of axillary hairs in males^(16,17).

In the descriptive analysis, tabular representation was performed. To investigate possible associations between the study variables, the chi-square test and prevalence ratio were used. To compare the averages, t test or Mann Whitney were used according to normality of data distribution. To estimate the adjusted prevalence ratios, Cox regression was used (with time equal to one unit), being selected the variables with significance less than or equal to 20% or those with clinical and epidemiological relevance. Kappa was used to analyze the agreement between the diagnostic methods (BMI and body fat percentage). The significance level of 5% was adopted. Data processing was performed in Epi Info version 3.2.2 and Bio Estat version 5.

This research complies with the normative resolutions of the National Health Council/Ministry of Health, and has been submitted and approved by the Ethics Research Committee (*Comitê de Ética em Pesquisa - CEP*) of UFMS (Process No. 1008/2007). Each child and their legal guardians were informed about the study procedures and signed a Free Informed Consent Form for participation in the study.

RESULTS

The sample consisted of 473 (50.3%) male participants and 468 (49.7%) females. Regarding the school type, 758 (80.6%) students belonged to the public and 183 (19.4%) to the private network. As to the onset of menarche in females and presence of axillary hairs in males, it was observed that 394 (42.9%) individuals reported signs of sexual maturation. In the study, 217 (23.1%) children were overweight according to BMI, and 530 (56.3%) showed a high percentage of body fat.

The agreement between the two diagnostic methods was 36% between the two criteria ($K=0.3613$, $p<0.001$). Of the eutrophic schoolchildren (724), 43.8% (317) had a

high body fat percentage. Among those with appropriate percentage of body fat, 1% (4) was considered overweight.

Table I shows the prevalence of normal weight, overweight or obesity, according to gender, age, school and sexual maturation. Overweight had a 1.5 times greater prevalence in private schools compared to the public ones ($p=0.002$). There was no statistically significant difference in relation to sex ($p=0.807$), age ($p=0.053$) and sexual maturation ($p=0.175$).

When evaluating the percentage of body fat by sex, age, school and sexual maturation (Table II), there was a higher prevalence in the following variables: 1.2 times in females ($p<0.001$), 1.3 times in individuals from private schools ($p<0.001$) and 1.2 times in the students who reported signs of sexual maturation ($p<0.001$). There was no statistically significant difference in relation to age ($p=0.083$).

As regards the physical activity habits, the majority (906; 96.3%) of the students practiced physical education, although adherence to sports was lower (392; 41.7%), being preferred the practice of physical activities in leisure time (632; 67.2%). In relation to the time they spend watching TV, videogame or computer, 25.5% (240) performed these activities in a period longer than four hours per day.

The average time spent (weekly) with physical education was higher for students with low or appropriate

percentage of body fat ($p=0.041$) (Table III). As to other variables on physical activity and leisure, there was no statistically significant difference in relation to children with overweight or obesity and high body fat percentage ($0.275 \geq p \leq 0.939$).

In relation to the eating habits, more than half of the students have the habit of eating while watching television (525; 55.8%), eat sweets (607; 64.5%) and soft drinks (592; 62.9%). A minor part of the students consumes fast food (261; 27.7%) and fried food (284; 30.2%). There is a good adherence to consumption of fruits and vegetables (734; 78%). There was no association of overweight, obesity and high percentage of fat to these habits ($0.002 \geq p \leq 0.742$).

Results of the Cox regression described in Table IV show statistically significant associations between excess weight (overweight and obesity) and the variables: type of school (most prevalent in private compared to public schools; $p=0.022$), age (the older the age, the lower the frequency of overweight; $p<0.001$) and sexual maturation (higher prevalence of overweight among schoolchildren who reported signs of sexual maturation; $p = 0.004$). For the high percentage of body fat there was an association solely to the type of school, with a higher prevalence in the private school ($p=0.029$).

Table I – Number and percentage of 10 to 14 year-old schoolchildren, according to gender, age, type of school, sexual maturation. Campo Grande-MS, 2008. (n=941).

Variables	Overweight or obesity		Eutrophic		p
	n	%	n	%	
Gender					
Female	110	23.5	358	76.5	⁽¹⁾ 0.807
Male	107	22.6	366	77.6	
Age					
10 years	46	24.0	146	76.0	⁽²⁾ 0.053
11 years	59	29.5	141	70.5	
12 years	45	23.9	143	76.1	
13 years	37	19.9	149	80.1	
14 years	30	17.1	145	82.9	
School					
Private	58	31.7	125	68.3	⁽¹⁾ 0.002
Public	159	21.0	599	79.9	
Sexual maturation					
Yes	100	25.4	294	74.6	⁽¹⁾ 0.175
No	117	21.4	430	78.6	

Note: if $p \leq 0.05$ – statistically significant difference

⁽¹⁾ Qui-square corrected by Yates

⁽²⁾ Qui- square of tendance

Table II - Body fat percentage rating of 10 to 14 year-old schoolchildren, according to gender, age, type of school, sexual maturation. Campo Grande-MS, 2008. (n=941).

Variables	High		Normal		p
	n	%	n	%	
Gender					
Female	290	62.0	178	38.0	⁽¹⁾ < 0.001
Male	240	50.7	233	49.3	
Age					
10 years	94	49.0	98	51.0	⁽²⁾ 0.083
11 years	122	61.0	78	39.0	
12 years	99	52.7	89	47.3	
13 years	110	59.1	76	40.9	
14 years	105	60.0	70	40.0	
School					
Private	126	68.9	57	31.1	⁽¹⁾ < 0.001
Public	404	53.3	354	46.7	
Sexual maturation					
Yes	249	63.2	145	36.8	⁽¹⁾ < 0.001
No	281	51.4	266	48.6	

Note: if $p \leq 0.05$ – statistically significant difference. ⁽¹⁾ Qui-square corrected by Yates. ⁽²⁾ Qui- square of tendance

Table III - Descriptive statistics of time (in minutes) spent in physical activities by 10 to 14 year-old schoolchildren, according to the BMI classification and body fat percentage. Campo Grande-MS, 2008. (n=941).

Time (in minutes)	BMI		p	% body fat		p
	Overweight or obesity	Low weight or eutrophic		High	Low or adequate	
	Mean Median SD	Mean Median SD		Mean Median SD	Mean Median SD	
Physical education (weekly)	100 103.2 32.5	100 106.1 34.4	0.275	100 103.4 32.7	100 108.0 35.5	⁽¹⁾ 0.041
Sports (weekly)	0 101.2 186.1	0 100.2 170.6	0.939	0 94.6 168.2	0 107.9 181.5	0.327
Physical activity at leisure (weekly)	360 416.6 472.2	300 460.7 825.6	0.376	300 431.0 696.4	360 475.6 832.7	0.390
Watching TV etc. (daily)	180 196.2 137.7	180 196.7 145.4	0.820	180 199.2 140.3	180 193.1 147.7	0.286

Note: SD= standard deviation. If $p \leq 0.05$ – statistically significant difference. Mann Whitney Test. ⁽¹⁾ t test.

Table IV - Multivariate analysis for the prevalence of overweight and obesity (excess weight) as for the BMI classification and high body fat percentage in 10- to 14-year-old schoolchildren, according to the variables included in the model. Campo Grande-MS, 2008. (n=941).

Variables	BMI		% body fat	
	PR (CI 95%)	<i>p</i>	PR (CI 95%)	<i>p</i>
Age ⁽¹⁾	0.80 (0.71 - 0.91)	<0.001	1.00 (0.93 - 1.08)	0.984
Sexual maturation ⁽²⁾	1.67 (1.18 - 2.37)	0.004	1.17 (0.94 - 1.46)	0.169
Type of school ⁽³⁾	1.47 (1.06 - 2.04)	0.022	1.27 (1.02 - 1.58)	0.029
Gender	0.95 (0.72 - 1.26)	0.736	1.17 (0.98 - 1.41)	0.085
Weekly time on physical education	1.00 (0.99 - 1.00)	0.872	1.00 (0.99 - 1.00)	0.754
Weekly time on sports practice	1.00 (0.99 - 1.00)	0.774	1.00 (0.99 - 1.00)	0.696
Weekly time on physical activity at leisure	1.00 (0.99 - 1.00)	0.372	1.00 (0.99 - 1.00)	0.770
Daily time watching TV. computer etc.	1.00 (0.99 - 1.00)	0.839	1.00 (0.99 - 1.00)	0.993

⁽¹⁾ The higher the age, the lower the prevalence of excess weight as expressed by the BMI.

⁽²⁾ Higher prevalence of excess weight as expressed by the BMI in schoolchildren with present signs of sexual maturation.

⁽³⁾ Higher prevalence of excess weight as expressed by the BMI and body fat percentage in children of private schools.

PR=prevalence ratio

DISCUSSION

The prevalence of overweight and obesity observed in this study (23.1%) was close to that found in Europe – where about 20% of children are overweight and one-third of these are obese – and it was lower than in the United States, where the prevalence of obesity among adolescents, in some locations, reaches values above 30%^(8,18). In Brazil, between 1974 and 2009, the prevalence of excess weight in children (47.8%) and adolescents (21.5%) showed three to four times percentage increases during this time interval⁽¹⁹⁾.

The results of this study indicate that the prevalence of overweight and obesity was lower than the values obtained for children aged 6 to 10 years in Cruzeiro do Oeste-PR, where the authors identified 26.4% of children with overweight. The results showed that, as the age increases, excessive body weight also increases, similarly to this study⁽²⁰⁾.

The prevalence of obesity may vary in communities with different socioeconomic and cultural levels, even within the same country. Consumption patterns, diet and physical activity are determining factors for this difference. When the economic situation is better, there is greater access to healthy foods and health-related information, however, an abundance of food can lead to overconsumption. Conversely, in disadvantaged populations, there is limited supply of fruits and vegetables, and increased availability of high-calorie food of low nutritional value, although the amount for consumption is lower⁽²¹⁻²³⁾.

In the present study, the prevalence of overweight or obesity was 23.5% in females and 22.6% in males, without statistical significance between the sexes. In another survey conducted in Campo Grande-MS in 2008, there was also no statistically significant difference between the sexes⁽¹²⁾.

There was a 25.4% prevalence of overweight and obesity in schoolchildren with signs of sexual maturation in the present investigation. Similar results were found in Guarapuava-PR, in 2004, where the sexual maturation occurred on average at 11.9 years and was present in 50.1% of the students, 17.9% of whom were overweight and 4.1% obese.

Sexual maturation causes changes in the body composition mainly from 10 to 12 years. In females, there is an increase in adiposity, while the muscle mass increases in males⁽¹⁶⁾. Up to approximately 11 years, although there are minimal differences when comparing BMI values between the sexes, the median values are similar⁽²⁴⁾.

It is believed that in the range from 10 to 16 years old there is indeed a higher rate of weight gain, mainly due to the development of adiposity, either by adipocytes hyperplasia or hypertrophy⁽²⁵⁾. Following this reasoning, the students evaluated in this study were in the repletion pre-pubertal phase, a period where there is a greater energy storage, which is going to be used later during the intense puberty growth spurt.

The results of the present study revealed that students from private schools had a higher prevalence of overweight or obesity and high percentage of body fat. These results

were similar to those observed in 2003, in adolescents aged 10-19 years in Fortaleza-CE and in 2007 in three cities in the state of Rio Grande do Norte in students aged 10-17 years^(26,27).

In another research in a city of the South of Brazil, in 2004, a higher prevalence of overweight or obesity was identified in students of private schools (39.2%), when compared to the public ones (25.7% e 17.1%, in municipal and state schools, respectively)⁽²⁸⁾. In Campo Grande (MS), in 2006, for the 6-11 years age range, overweight and obesity prevalences were slightly superior, being 21.7% and 15.7% in private schools, while 11.5% e 13.3% in the public ones⁽¹¹⁾.

The higher prevalence of overweight or obesity found in private schools by those studies might be explained by the students' increased socioeconomic level, which often provides easy access to the consumption of high-calorie food, habits that reduce physical activity, unavailability of open space for occupation of spare time with games involving energy expenditure, making frequent use of computers and electronic games⁽²⁹⁾. One cannot ignore the lack of security and poor availability of parental time, which often hinder children's access to play in the squares, streets and parks.

The spare time available for the practice of physical activity is being replaced by activities with little or no energy expenditure. It is noticeable that the majority of studies relate obesity to the habit of staying watching television, video game, computer. In addition, there is the habit to feed in front of the television, often consuming high-calorie foods (popcorn, potato chips, cookies, soft drinks, chocolates and sweets)^(11,28,29).

Other behavior observed in students of private schools is the consumption of unhealthy food, usually offered by school canteens (soft drinks, snack foods, fried foods, sweets and greasy sandwiches), which aggravates the problem of obesity and creates incorrect eating habits. In public schools there is monitoring of school meals by nutritionists, where a balanced diet is observed, by offering fruits, vegetables and other healthy foods⁽¹⁵⁾.

Children participating in physical education classes or practicing some kind of sports might not be working out satisfactorily. The time reserved for these activities is usually not sufficient to cause changes in the metabolism and result in greater energy expenditure. Classes typically restrict effective physical activity only to 25 to 30 minutes⁽⁴⁾. This could explain the difficulties this study found in associating physical activity habits to the prevalence of overweight/obesity and high body fat percentage.

The inverse relationship between obesity and physical activity is present in most of the studies analyzed, although

there is still difficulty in standardizing the instruments and methods used to assess the level of physical activity in epidemiological studies, especially involving the infant and juvenile population^(11,28,29). Despite the difficulty in associating obesity and overweight and the high fat percentage to physical activity habits, the results found in this study can work as an indicator of the physical activity profile assumed by the population. Though there are differences in the methodologies and results, the evaluation of physical activity habits in children and adolescents becomes important for being a determining factor in the development and maintenance of overweight and obesity.

A research comparing the characteristics of food intake among adolescents who were overweight and normal weight observed that these individuals' consumption was similar or lower than the minimum recommended servings, while there was increased consumption of foods with high energy density⁽²⁹⁾. Similarly, in children and adolescents diagnosed with overweight and obesity, it was found difficulty in relating the consumption of foods with high energy density and overweight or obesity, reporting that often, as it is known, overweight individuals can manipulate information in their favor⁽²⁹⁾.

One observes that the consumption of high-calorie foods in obese individuals is similar or lower than in normal individuals, which may reveal the obesees' tendency to underestimate their own consumption. The difficulties found when investigating dietary patterns in epidemiological studies with large sample relate to the disability of tools with easy and fast application that might have a good understanding, especially when used with children and adolescents.

The results of this study suggest some difficulty in reporting the students' eating habits, mostly students who are overweight, but one cannot deny that poor eating habits have been seen associated to a sedentary lifestyle, as one of the most important factors related to the increasing prevalence of overweight and obesity.

Most of the cited studies utilizes the BMI associated with skinfolds measures to determine the nutritional status of children and adolescents, which is still the most used anthropometric method, because it can be applied at all stages of life and exhibits good correlation with body adiposity⁽³⁰⁾. When comparing results obtained by the two anthropometric methods used in this study, 43.8% of the schoolchildren classified eutrophic by BMI had a high percentage of body fat, which reinforces the need for verification of the fat percentage to complement anthropometric assessment.

There is a consensus that the majority of obesity causes is due to the combination of genetically susceptible individuals to its development, associated with certain

environmental factors. Therefore, the current study may confirm the high influence of the micro and macro environment in the development of overweight and obesity in children and adolescents, specifically. Intervention programs for overweight or obesity in childhood and adolescence should involve changes in these individuals' lifestyle, promote healthy eating habits, decrease sedentary activities and increase physical activity. It is essential to emphasize that such changes do not involve only the child or adolescent, but also the family, the school and the whole environment^(31, 32).

In the light of these findings, it is important to emphasize the need for researches that examine the level of physical activity and the eating habits on a more detailed basis, therefore favoring a more careful analysis of the overweight and obesity development process in the school environment, which is considered an available space, to be worked on the concepts of healthy living and physical activity.

CONCLUSION

It was found that 23.1% (217) of the students were overweight or obese (BMI) and 56.3% (530) of the students presented a high fat percentage (skinfolds). The type of school was the only variable associated with overweight in both methods (BMI and skinfold thickness). There was a higher prevalence of overweight and obesity in schoolchildren with present signs of sexual maturation and the higher the age, the lower the frequency of children with obesity or overweight.

There was no association of the prevalence of overweight/obesity and high fat percentage to the habits of physical activity and diet, except for the weekly time allocated to physical education, which was longer for the children with low or appropriate body fat percentage.

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Mailing address:

Mariana de Lima Mendes Ramos
Rua Chanés, 210
Bairro: Chácara Cachoeira.
CEP: 79.040-004 - Campo Grande-MS – Brazil
E-mail: mariana_ms82@hotmail.com