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Overweight and associated factors in adolescents from a brazilian capital

Excesso de peso e fatores associados em adolescentes de uma capital brasileira

Carolina de Souza Carneiro[I], Maria do Rosário Gondim Peixoto[III], Karla Lorena Mendonça[I], Thaís Inácio Rolim Póvoa[I], Flávia Miquetichuc Nogueira Nascente[I], Thiago de Souza Veiga Jardim[I,II], Weimar Kunz Sebba Barroso de Souza[I,II], Ana Luiza Lima Sousa[I,IV], Paulo César Brandão Veiga Jardim[I,II]

ABSTRACT: ***Objective:*** To evaluate the prevalence of overweight in adolescents and its associated factors. ***Methods:*** A cross-sectional study in public and private schools in Goiania, Brazil. Socioeconomic status, family history of obesity, lifestyle, blood pressure and Body Mass Index were studied in a sample of 1,169 Brazilian youth aged 12 – 18 years, who attended public and private schools. Data were obtained from a questionnaire and anthropometric measurements previously tested in a pilot study. Poisson regression was used to estimate the prevalence of overweight, prevalence ratios and associations with the other factors. ***Results:*** The prevalence of overweight was 21.2%, with a significant difference between boys and girls (26.3 and 16.8% respectively). Regression analysis showed that maternal obesity was associated with a higher prevalence of overweight in boys (PR = 1.86; p = 0.004), and boys aged 15 – 18 years had a lower prevalence of overweight than boys aged 12 – 14 years (PR = 0.70; p = 0.021). Among the girls, the presence of obese parents was associated with higher prevalence of overweight (PR = 2.42; p < 0.001), and the girls from a C class socioeconomic position were negatively associated with overweight (PR = 0.67; p = 0.035). ***Conclusions:*** Overweight in adolescence is associated with gender, obesity family history, and socioeconomic position. These data should be considered when planning intervention programs.

Keywords: Overweight. Adolescent health. Obesity. Risk factors. Life style.

[I]Arterial Hypertension League, Clinical Hospital, *Universidade Federal de Goiás* – Goiânia (GO), Brazil.
[II]School of Medicine, *Universidade Federal de Goiás* – Goiânia (GO), Brazil.
[III]School of Nutrition, *Universidade Federal de Goiás* – Goiânia (GO), Brazil.
[IV]School of Nursing, *Universidade Federal de Goiás* – Goiânia (GO), Brazil.
Corresponding author: Paulo César Brandão Veiga Jardim. Faculdade de Medicina da Universidade Federal de Goiás. Rua 115-F, 135, Setor Sul, CEP: 74085-300, Goiânia, GO, Brasil. E-mail: fvjardim@terra.com.br
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RESUMO: ***Objetivo:*** Avaliar a prevalência de excesso de peso (EP) e fatores associados em adolescentes. ***Métodos:*** Estudo transversal realizado em escolas públicas e privadas de Goiânia (GO). Foram analisados adolescentes de 12 a 18 anos (n = 1.169) por meio de questionário padronizado. A prevalência de EP foi avaliada pelas curvas de crescimento da Organização Mundial da Saúde (OMS) de Índice de Massa Corporal (IMC) por idade. As associações entre as variáveis sociodemográficas, de antecedentes familiares de obesidade, de estilo de vida e de pressão arterial com o EP foram analisadas por intermédio da razão de prevalência bruta e ajustada por meio da regressão múltipla de Poisson. ***Resultados:*** A prevalência de EP foi de 21,2%, sendo 14,1% de sobrepeso e 7,1% de obesidade, com diferenças significativas entre gêneros (26,3% dos rapazes *versus* 16,8% das moças). Na análise de Poisson, a obesidade materna (RP = 1,86; p = 0,004) foi associada com a maior prevalência de EP no sexo masculino, e aqueles com idade entre 15 e 18 anos tiveram menor prevalência de EP quando comparados àqueles com idade entre 12 e 14 anos (RP = 0,70; p = 0,021). No sexo feminino, a presença de pais obesos (RP = 2,42; p < 0,001) associou-se a maior prevalência de EP, e as moças pertencentes à classe C tiveram menor prevalência de EP (RP = 0,67; p = 0,035). ***Conclusões:*** O EP em adolescentes esteve associado ao gênero, à obesidade familiar, e a melhor classificação socioeconômica — fatores que devem ser o foco do planejamento de intervenções específicas na promoção da saúde.

Palavras-chave: Sobrepeso. Saúde do adolescente. Obesidade. Fatores de risco. Estilo de vida.

INTRODUCTION

Adolescence is characterized by the transition between infancy and adult life, with profound somatic and biopsychosocial transformations[1]. Acquired habits in this phase can last for someone's whole life, and the early onset of harmful behavior represents a risk for the emergence of chronic non-communicable diseases (CNCD)[2].

Although predominant in adults, the CNCD originate early in life and grow alarmingly in childhood and adolescence[3-5].

The increase in the prevalence of overweight (OW) and obesity in adolescents is a reality in developed countries, in developing countries, and even in the poorest countries with food security and malnutrition problems[6].

Epidemiological studies in various countries reinforce the epidemic characteristic of obesity in the world[4,7,8]. In the United States, a study concerning the increase of Body Mass Index (BMI) in 3,281 children and adolescents found a high prevalence of OW and obesity (31.7 and 11.9%, respectively)[7]. In Brazil, the analyses of the nutritional status of adolescents in the Family Budgets Research (FBR) from 2002-2003 and 2008-2009 show that the prevalence of OW increased from 16.7 to 20.5%, and obesity increased from 2.3 to 4.9%[4,8].

The increasing prevalence of OW and obesity in adolescents has been attributed not only to genetic and physiological factors, but mainly to changes in lifestyle, such as the decrease in the practice of physical exercises, the increase in the consumption of food that is rich in fat, sodium, and the reduction of the consumption of fruits and vegetables (FV)[9].

Various factors are crucial for the genesis of obesity in adolescents, especially gender, socioeconomic level, physical activity, food habits, and heredity[9].

Adolescents with OW have a high risk of obesity in adulthood. Thus, for the prevention of this condition and the risks that are associated with the disease, effective and directed interventions are extremely important for this population[10].

The recent advances in the understanding of the behavior dynamics of adolescence can facilitate the promotion of actions that result in a greater impact in the future well being of these individuals.

Broader population-based studies concerning associated factors of OW in adolescents are scarce in the Mid-West Region of Brazil; however, they are important for the search of alternatives to promote prevention and early intervention.

As a result, the objective of this study was to evaluate the prevalence of OW and its association with sociodemographic variables, including the personal background and lifestyle of a representative sample of adolescents enrolled in the public and private school system in the city of Goiânia (GO).

METHODS

This is a cross-sectional study that is part of a larger project entitled "Residential Blood Pressure Measurements (MRPA) and its relation with the left ventricular mass index and insulin resistance (HOMA) in adolescents with masked and white coat hypertension."

Adolescents aged from 12 to 18 years, from both genders, who were enrolled in the private and public school system of Goiânia, were studied. In conjunction with the State and Municipal Secretaries of Education and the Union of Private Schools of Goiânia, a total of 133,528 enrolled students in this age group were identified. They represent 63% of the total population of 211,072 adolescents, according to the 2010 census[11].

Considering the prevalence of OW of 20.5% described in the FBR 2008 – 2009[4], and an absolute precision of 2.46% (relative 12%) and with a significance level of 5%, a sample of 1,027 adolescents was calculated.

To select the adolescents, all of the state, municipal, and private schools were identified in the nine regions of the municipality. Five public schools and five private schools per region were randomly selected and invited to participate in the study. Contact with the school was performed using a lottery system. In the end, 26 schools accepted to participate in the study. The selection of the adolescents was performed randomly in accordance with the list of enrolled students in the institution, stratified by age and gender and by means of invitation after an oral explanation of the project.

Before the beginning of the investigation, the students that accepted to participate voluntarily in the study signed a Term of Agreement release form and were directed to an appropriate space to participate in the study.

Adolescents aged between 12 and 18 years and enrolled in the selected schools were included in the study. Those with a physical deficiency or any other factor that did not permit the anthropometric evaluation, in addition to pregnant women and individuals with chronic diseases, were excluded.

Data collection was performed in 2011, and respected the school system's calendar. The data was collected by means of a questionnaire that was pre-tested in a pilot study that presented the school and adolescents' identification by appropriately trained research assistants. All of the standards were standardized and supervised.

The following demographic and socioeconomic variables were considered: gender, age, skin color, and socioeconomic class (SEC). Age was presented in years and categorized by age groups of 12-14 years and 15-18 years. Skin color was defined by the interviewee as white or non-white and SEC was established using the criteria from the Brazilian Association of Market Research Institutes –ABIPEME[12].

The variables of maternal and paternal obesity were investigated using the question: "Is anyone in your family (mother or father) obese?"

For the lifestyle variables, the following were considered: smoking, alcohol consumption, FV consumption, and physical activity. The evaluation of smoking and the consumption of alcoholic beverages were performed through questions that diagnosed the use and frequency of consumption of such substances.

The individual ingestion of FV was estimated based on four questions coming from the questionnaires of the Global school-based student health survey (GSHS) and from the National School Health Survey (PeNSE)[13,14].

The consumption of FV was categorized in accordance with the weekly frequency of consumption and then transformed into quantitative variables, according to Fornés[15]. Five daily portions of FV was considered an appropriate consumption[16].

For the evaluation of physical activity level (PAL), the short form of The International Physical Activity Questionnaire (IPAQ), version 8, that was developed by the WHO and validated in Brazil, was used[17]. This instrument evaluates PAL by means of questions related to light, moderate, or vigorous effort performed in the last week. Individuals were considered insufficiently active with a summation of less than 600 MET-minutes/week, and sufficiently active with a summation greater than 600 MET minutes/week[18].

For the investigation of the altered blood pressure variable, casual blood pressure measurements in the school were taken in a calm place as defined by the team responsible for the project in conjunction with the principal of the school, and before recess. Blood Pressure (BP) was measured using semiautomatic devices of the brand OMRON® and the model HEM-705CP. The equipment used was validated by international agencies for use with adolescents[19].

The devices were periodically calibrated with a mercury column apparatus to prove their accuracy. Cuffs of three different sizes (9 x 16 cm, 13 x 23 cm, and 15 x 30 cm) were selected based on the arm circumference of each individual (the cuff should wrap around 80 to 100% of the circumference of the arm).

BP was measured in the right arm in accordance with the procedures recommended by the 4th Task Force[20]. Two measurements were taken, in an interval of five minutes after every five minutes

of rest. For the purpose of analysis, the second casual measurement was performed. For the BP values, the percentile was calculated according to the formulas proposed by 4th Task Force.

BP was defined as altered when the BP (systolic and / or diastolic) was equal to or greater than the 90th percentile for the respective age, gender, and height[20].

For the evaluation of the nutritional status, anthropomorphic measurements of weight, height in duplicate, using standard procedures were performed[21]. Weight was measured using a portable electronic scale of the brand Kratos®, calibrated by Inmetro, with a capacity of up to 150 kg and a variation of 50 g. For the height measurement, the portable Secca® stadiometer was fixed to the wall and graduated to an accuracy of 0.1 cm. BMI was calculated by weight (kg) divided by the square of height (meters) (weight / [height]^2). Adolescents who were above the 85th percentile were considered overweight, and those above the 97th percentile were considered obese, from the BMI cutoff points, specific for age and gender, according to the criteria proposed by the WHO[22].

The data bank was written in the Epi-Info® program (version 3.5.3) with double typing for error checking. Statistical analyses were performed in the Stata program (version 12.0). The χ^2 test was applied to evaluate the differences between the genders. The variables associated with the outcome (OW) were analyzed using crude prevalence ratios (CPR) and adjusted prevalence ratios (APR) in the Poisson regression, with a robust variance adjustment, and those with $p < 0.20$ in the multivariate model were tested in the bivariate analysis. The level of significance adopted was 5%.

The project was submitted and approved by the Ethics Committee on Human and Animal Medical Research of the Clinical Hospital of the *Universidade Federal University de Goiás* (GO), under case number 017/2010, and assisted by the Municipal Secretaries of Goiânia and Goiás State.

RESULTS

Twenty-six schools drawn from all regions of the city of Goiânia were investigated. Of the 1,248 adolescents invited to participate in the study, 48 did not accept (3.8% refusal), 27 did not meet the inclusion criteria, and 4 students refused to do the anthropometric measurements. Thus, 75 of the adolescents initially invited did not participate in the study, resulting in a final sample of 1,169 adolescents, which was 14% higher than the calculated sample.

The sociodemographic characteristics, maternal and paternal obesity, lifestyle, blood pressure, and nutritional status of the sample are described and presented in Table 1. The analyses were stratified by gender to evaluate whether the control variables studied were different between girls and boys.

It was verified that the studied population had a balanced distribution between the genders (53.1% female) and within the age groups, according to the stratification adopted. There was also a balance in the sample regarding skin color, as shown in Table 1.

Smoking had a lower prevalence in both genders, but alcohol consumption was present in approximately 60% of young men and women. It was slightly more accentuated among girls (65.5%, $p = 0.02$).

Table 1. Distribution of the sample by gender, according to sociodemographic variables, family history of obesity, lifestyle, blood pressure, and nutritional status. Goiânia, GO, 2011 – 2012. (n = 1,169).

Variables	Male (n = 548)		Female (n = 621)		p-value[a]
	n	% (95%CI)	n	% (95%CI)	
Age (years)					
12 – 14	246	44.9 (40.7 – 49.2)	280	45.1 (41.1 – 49.1)	0.946
15 – 18	302	55.1 (50.8 – 59.3	341	54.9 (50.9 – 58.9)	
Skin Color[b]					
Non-white	288	52.7 (48.5 – 57.0)	307	49.5 (45.5 – 53.5)	0.271
White	258	47.3 (43.0 – 51.5)	313	50.5 (46.5 – 54.5)	
Socioeconomic classification					
A and B	251	45.8 (41.6 – 50.1)	250	40.3 (36.4 – 44.2)	0.019
C	281	51.3 (47.0 – 55.5)	335	53.9 (49.9 – 57.9)	
D and E	16	2.9 (1.7 – 4.7)	36	5.8 (4.1 – 7.9)	
Maternal obesity[c]					
No	510	94.6 (92.4 – 96.4)	568	92.8 (90.5 – 94.7)	0.209
Yes	29	5.4 (3.6 – 7.6)	44	7.2 (5.3 – 9.5)	
Paternal obesity[d]					
No	495	92.5 (90.0 – 94.6)	562	92.4 (90.0 – 94.4)	0.955
Yes	40	7.5 (5.4 – 10.0)	46	7.6 (5.6 – 10.0)	
Smoking					
No	540	98.5 (97.1 – 99.4)	614	98.9 (97.7 – 99.5)	0.614
Yes	8	1.5 (0.6 – 2.8)	7	1.1 (0.4 – 2.3)	
Consumption of alcoholic beverages					
No	225	41.1 (36.9 – 45.3)	214	34.5 (30.7 – 38.3)	0.020
Yes	323	58.9 (54.7 – 63.1)	407	65.5 (61.6 – 69.6)	
Consumption of FV (times per day)					
Did not consume	11	2.0 (1.0 – 3.7)	12	1.9 (1.0 – 3.4)	0.003
One	178	32.5 (28.6 – 36.6)	160	25.8 (22.4 – 29.4)	
2 – 3	322	58.8 (54.5 – 62.9)	372	59.9 (55.9 – 63.8)	
4 or more	37	6.7 (4.8 – 9.2)	77	12.4 (9.9 – 15.3)	

Continue...

Table 1. Continuation.

Variables	Male (n = 548)		Female (n = 621)		p-value[a]
	n	% (95%CI)	n	% (95%CI)	
Physical activity					
Insufficiently active	120	21.9 (18.5 – 25.6)	292	47.0 (43.0 – 51.0)	< 0.001
Active	428	78.1 (74.4 – 81.5)	329	53.0 (49.0 – 57.0)	
Altered BP[e]					
No	421	76.8 (73.0 – 80.3)	534	87.4 (84.5 – 89.9)	< 0.001
Yes	127	23.2 (19.7 – 26.9)	77	12.6 (10.0 – 15.5)	
Overweight[f]					
No	404	73.7 (69.8 – 77.4)	515	83.2 (80.0 – 86.1)	< 0.001
Yes	144	26.3 (22.6 – 30.2)	104	16.8 (13.9 – 20.0)	

[a]Using the χ^2 test from Pearson; [b]Three individuals did not respond; [c]18 individuals did not know how to respond; [d]26 did not know how to respond; [e]10 individuals did not measure blood pressure; [f]Two individuals refused to be weighed.

Regarding SEC, the majority (approximately 50%) is included in class C, whereas fewer individuals classified in classes D and E were found (2.9% among boys and 5.8% among girls). The description of maternal and paternal obesity occurred in a similar way and in a percentage lower than 10%.

It was observed that less than 10% of the adolescents consumed FV adequately (four times or more per day). Male adolescents were more active (78.1%), and female adolescents were classified as insufficiently active in almost 50% of the sample ($p < 0.001$).

BP was altered in a higher percentage of males (23.2%) than in females (12.2%), with $p < 0.001$.

The prevalence of OW was 21.2%, with 14.1% overweight and 7.1% obese, with a significant difference between the genders – 26.3% in males and 16.8% in females ($p < 0.01$).

In the bivariate analysis, the prevalence of OW in male adolescents was more than double in children of obese mothers (PR = 2.11, $p < 0.001$) and in those with BP above P 90° (PR = 2.30; $p < 0.001$). For the other independent variables, there were no statistically significant differences (Table 2).

In female adolescents, OW was practically twice as prevalent in daughters of obese mothers (PR = 1.99) and three times more prevalent in daughters of obese parents (PR = 3.11). In girls with altered BP, OW was also almost three times more prevalent (PR = 2.81). For the other independent variables there were no significant differences (Table 3).

In the multivariate analysis performed among the independent variables that remained in the male multiple model, the children of obese mothers had a higher prevalence of OW (PR = 1.86), and those aged between 15 and 18 years had a lower prevalence of OW (PR = 0.70). In females, OW remained significantly associated with paternal obesity (PR = 2.47), and girls in class C had a lower prevalence of OW (PR = 0.67) (Table 4).

Table 2. Prevalence of overweight (outcome), crude prevalence ratio, and respective confidence intervals of its association with sociodemographic characteristics, family history of obesity, lifestyle ,and blood pressure among male individuals. Goiânia, GO, 2011 – 2012. (n = 1,169).

Variables	Prevalence %	Crude PR	95%CI	p-value*
Age (years)				
12 – 14	30.1	1.00	0.58 – 1.02	0.068
15 – 18	23.2	0.77		
Skin color				
White	29.5	0.77	0.58 – 1.03	0.081
Non-white	22.9	1.00		
Socioeconomic classification				
A and B	27.9	1.00		
C	24.9	0.89	0.67 – 1.19	0.437
D and E	25.0	0.90	0.37 – 2.14	0.806
Maternal obesity				
No	24.5	1.00	1.44 – 3.10	< 0.001
Yes	51.7	2.11		
Paternal obesity				
No	24.8	1.00	0.98 – 2.31	0.060
Yes	37.5	1.50		
Smoking				
No	26.5	1.00	0.07 – 2.97	0.424
Yes	12.5	0.47		
Consumption of alcoholic beverages				
No	23.1	1.00	0.92 – 1.65	0.164
Yes	28.5	1.23		
Consumption of FV				
Did not consume	9.1	1.00		
One time per day	22.5	2.47	0.37 – 16.36	0.348
2 – 3 times per day	28.9	3.17	0.48 – 20.78	0.228
4 times or more	27.0	3.00	0.42 – 20.77	0.272

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Table 2. Continuation.

Variables	Prevalence %	Crude PR	95%CI	p-value*
Physical activity				
Insufficiently active	28.3	1.00	0.65 – 1.26	0.559
Active	25.7	0.907		
Altered BP				
No	20.2	1.00	1.76 – 3.00	< 0.001
Yes	46.5	2.30		

*Using the Poisson test.

The altered BP variable was not used in the multiple model because it was not a risk factor for OW. The reverse was true, as already described in the literature[23].

DISCUSSION

The results of this study highlight the high prevalence of OW and its important associations with paternal obesity, as well as high BP in adolescents. A comparison with previous studies confirms the alarming character of the nutritional situation of this age group.

The study sample was 14% larger than the calculated sample, and was representative of the adolescent population enrolled in the school system of Goiânia, as well as of all the adolescents of the capital city. In addition, the validity of the study was ensured by information collected in the schools, by trained staff and using standardized instruments.

The prevalence of OW was 21.2%, which indicates an important increase in relation to the prevalence found in a study conducted in the same city in 2006 by Monego and Jardim (16% of OW)[24].

The OW found in this investigation was similar to that reported in FBR 2008 - 2009 (20.5%[4]), in a study carried out in the Southeast (21.2%[25]), and in international studies of South American countries[26,27] and in Asia[28]. On the other hand, it was higher than what has been found in national studies on OW in other regions of Brazil, such as in the North (17.4%)[29], the Northeast (13.9%)[30] and the South (12%)[31], and lower than what was observed in the United States (31.7%[7]).

In this study, OW was significantly more prevalent in males than in females (26.3 versus 16.8%), a result similar to that found by Júnior and Silva in Paraíba[32], and by Nasreddine et al. in Syria[33]. According to FBR 2008-2009, male adolescents showed a higher prevalence of OW in all regions of Brazil[4].

Age was associated with OW only in males, in which the older ones had a lower prevalence. In national and international studies, the prevalence of OW in this age group was lower in both genders[7,29].

Table 3. Prevalence of overweight (outcome), crude prevalence ratio, and respective confidence intervals of its association with sociodemographic characteristics, family history of obesity, lifestyle, and blood pressure among females. Goiânia, GO, 2011 – 2012. (n = 1,169).

Variables	Prevalence %	Crude PR	95%CI	p-value*
Age (years)				
12 – 14	19.6	1.00	0.52 – 1.04	0.087
15 – 18	14.4	0.74		
Skin color				
Non-white	18.6	1.00	0.57 – 1.15	0.238
White	15.1	0.81		
Socioeconomic classification				
A and B	21.7	1.00		
C	13.7	0.63	0.44 – 0.90	0.012
D and E	11.4	0.53	0.20 – 1.36	0.188
Maternal obesity				
No	15.2	1.00	1.21 – 3.27	0.006
Yes	30.2	1.99		
Paternal obesity				
No	14.3	1.00	2.12 – 4.57	< 0.001
Yes	44.4	3.11		
Smoking				
No	16.8	1.00	0.16 – 6.00	0.993
Yes	16.7	0.99		
Consumption of alcoholic beverages				
No	16.4	1.00	0.71 – 1.50	0.859
Yes	17.0	1.03		
Consumption of FV				
Did not consume	33.3	1.00		
One time per day	16.2	0.49	0.20 – 1.17	0.107
2 – 3 times per day	17.2	0.52	0.22 – 1.19	0.120
4 times or more	13.2	0.39	0.15 – 1.06	0.065
Physical activity				
Insufficiently active	13.8	1.00	0.98 – 2.02	0.063
Active	19.5	1.41		
Altered BP				
No	13.9	1.00	1.98 – 3.99	< 0.001
Yes	39.0	2.81		

*Using the Poisson test.

Table 4. Adjusted prevalence ratio and respective confidence intervals for association of age, socioeconomic status, and overweight for males and females. Goiânia, GO, 2011 – 2012. (n = 1,169).

	Males			Females		
	Adjusted PR	95%CI	p-value*	Adjusted PR	95%CI	p-value*
Age (years)						
12 – 14	1.00	0.52 – 0.95	0.021	–	–	–
15 – 18	0.70					
Socioeconomic classification						
A e B	–	–	–	1.00		
C				0.67	0.47 – 0.97	0.035
D e E				0.56	0.21 – 1.50	0.251
Maternal obesity						
No	1.00	1.21 – 2.86	0.004	–	–	–
Yes	1.86					
Paternal obesity						
No	–	–	–	1.00	1.62 – 3.77	< 0.001
Yes				2.47		

*Multivariate Analysis - Poisson Regression.

With regard to socioeconomic classification, in both genders there was a higher prevalence of OW among adolescents of classes A and B, but this difference did not reach statistical significance. In female adolescents, there was a negative association of OW with class C ($p = 0.037$, $PR = 0.69$), and there was no social class interference in relation to males ($p = 0.733$).

These results were different from those found in São Paulo where both genders had a significant association with SEC, and were positive for classes A and B[34], and from those found in Paraíba where the OW in males was also associated with the higher classes[32]. In international studies, SEC was also associated with OW in females, but not in males[35,36].

It is important to emphasize that OW in adolescents has been more associated with parents' schooling than with parental purchasing power – a piece of data that was not analyzed in the present study[36], but deserves attention.

As in other studies[37,38], OW in adolescents had a direct association with the obesity of the father and / or the mother, reinforcing the family influence on the children's life habits and highlighting an important risk factor for the development of obesity in this age group.

In international studies, weight gain has been highlighted as an important risk factor for the development of hypertension in adolescents[39-41].

In the bivariate analysis of this study, a strong association of altered BP (P > 90º) with OW ($p < 0.001$) was observed for both genders, in concordance with results from similar studies[39-41]. The change in BP was almost three times more prevalent in boys with OW (PR = 2.81) and about twice as prevalent in girls with OW (PR = 2.30).

Although there was no observed association of FV consumption with OW, it is important to note that the majority of the studied sample, approximately 90% (being smaller in females – 87.6 *versus* 93.3%), did not reach the WHO daily consumption recommendation of five servings / day. This is worrying because of the worldwide assertions related to this eating habit, according to which the low intake of FV is among the ten main risk factors for mortality in the world. It is estimated that up to 2.7 million lives could be saved annually around the world if FV consumption were adequate[16].

A different result was found in a study carried out with 63,111 adolescents in South Korea, where the association of FV consumption with EW was investigated, with a positive association between both genders[28].

The main limitation of this study was its cross-sectional nature. Owing to this fact, it was only possible to analyze the association of the outcome with the exposure at the moment of data collection.

Other limitations were the lack of adequate cutoff points for the BMI assessment of the Brazilian adolescent population, as international parameters may not reflect the actual condition of nutritional status[42], and the self-reported definition of the nutritional status of family members, as the distortion of body image has been increasing alarmingly in the studied age group[43].

Among the results found, the increasing prevalence of OW in adolescents and its association with gender, family obesity, SEC, and BP stand out. Such variables should be considered in public health for the planning of specific interventions to combat this epidemic in adolescents.

CONCLUSION

The data in this study corroborate the claim that obesity and OW are a global pandemic. The results found reinforce the need for efficient public policies for health promotion and the stimulation of lifestyle changes with a focus on nutritional education and the practice of regular physical activity, thus aiming at the prevention of OW and its consequences, such as cardiovascular diseases.

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