Prevalence of Body Mass Index and the Body Image in Adolescents of Both Sex

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Abstract

The objective of this study was to evaluate the correlation and prevalence of BMI and Body Image in adolescents of both sexes. 372 adolescents aged 12 to 14 from public schools participated in this study. The BMI was evaluated according to Conde and Monteiro (2006) and the Body Shape Questionnaire (BSQ) was used. Statistical analyzes were done through the Statistical Package for the Social Science, version 20.0. For normality the Kolmogorov-Smirnov test and the Levene's test. In the comparison of means, the T-Test was used for variables with normal distribution and U of Mann-Whitney for non-normal. The Chi-square test was used to compare proportions. 32% of adolescents were overweight and girls are more overweight and obese than boys. The dissatisfaction with body image was present in 33.3% of the evaluated ones, having significant difference between the sexes.

Keywords: Body Image; Adolescent health; Self-esteem; Overweight

Introduction

In adolescence, self-esteem is closely linked to the relationship the young man has with his body. It is a challenging transition, marked by the loss of the child's image and maturation to the adult stage. Consequently, there is a discomfort with her body image, not to mention the fact that the media shows a hard-to-reach beauty pattern that influences society to worship a mentality that values leanness and rejects the fat body, typifying thinness for women and athletic body for men [1-3].

The term body image covers many aspects, it is multifactorial [4], defined as that projected image between your mind and what you see in relation to body size and forms (perceptive), it is also linked to the feelings, thoughts and actions associated with the image of the body (attitudinal) [5]. It is based on what our body really is and on the lived social experiences, fortunately it can deconstructed and re-constructed, be re-signified over time with the exclusion of negative body image [6].

More than 60% of adolescents are dissatisfied with their body image. Due to this discontent, these young people look for various ways to obtain a body that conforms to the standards, and some means are harmful to their own health. The most common are dietary practices (characterized by low caloric intake), excessive physical exercise, exacerbated use of laxatives, diuretics, and anorexigenic drugs [7-9].

The reasons that lead teenagers to body dissatisfaction are innumerable and may trigger future problems and some disorders (anorexia, bulimia, vigorexia) and sometimes to lead adolescents not to want to exercise because they feel constrained by their physical form

[10]. In this way, this study aimed to evaluate the correlation and prevalence of BMI and Body Image in adolescents of both sexes of a medium-sized city of Paraná, Brazil.

Methods

This study has a cross-sectional descriptive and ex post facto linear correlation design. The ex post facto delineation represents an empirical systematic search in which the researcher does not have direct control over independent variables because their manifestations have already occurred or because they are intrinsically unmanageable. Inferences were made about the relations between them, without direct intervention, based on the concomitant variation of the variables. It is characterized as correlational, since it establishes association from the relations between diverse variables, indicating numerically the degree and the direction in which they tend to vary together (correlation) [11].

The population of the present study were composed of adolescents between 12 and 14 years old, of both sexes, from schools of the State Network of learning at the city of Maringá PR, Brazil, being subdivided into regions of the city (central, northwest, northeast, southwest, southeast). The selection of schools occurred in a random form per region. For the selection of the adolescents in the schools drawn, draws of the classes were carried out without restrictions and with replacements, of each age group (12 to 14 years old), of each school, meeting the inclusion criteria. The criteria for inclusion of the subjects were to be regularly enrolled and to have a minimum of 75% of annual attendance in classes up to the date of data collection.

In this way, the sample of the present research was selected by proportional random multiphase stratified sampling, since it presents several phases (state network, region, school, adolescents), aiming at the homogeneity among the regions and for the variability of the population to be represented within each one of them. There were 12,010 students in the State network of learning in the city, distributed: center region 2,938 students, northwest 3,836, northeast 2,308, southwest 1,873 and southeast 1,055 students. 372 students were selected, divided proportionally by the number of students enrolled in each region. In the center, 91 students were enrolled in the study, 119 in the northeast, 72 in the northeast, 58 in the southwestern region, and 33 in the Southeast. The research was approved in the Standing Committee of ethics in researches of the State University of Maringá (UEM) under the opinion n. 0127.0.093.000-11, being part of the institutional project "Evaluation of motor development typical of children and pre-adolescents".

After the raffle of the schools, a contact with the principals of the schools to obtain authorization for the research execution was made, then the students were drawn by class and year. After, the contact was made with the subjects and responsible, to clarify the objectives and procedures of the research, and to schedule dates to obtain the signature of the Term of Free and Informed Consent. All evaluations were carried out during school hours, in the morning and afternoon periods by an evaluator. Each adolescent was evaluated individually, only once, with the mean evaluation time being approximately 20 minutes. First of all, the adolescents filled out the identification form (name, sex, age, date of birth, school, name of the guardians), which had personal data and asked if the adolescent practiced Physical Activity outside school and which activity. In sequence, the anthropometric evaluation was carried out. The body mass was measured with a mechanical scale with a maximum capacity of 150 kg and a resolution of 100 grams. The stature was measured using an aluminum stadiometer coupled to the scale with a resolution of 0.1 cm. The BMI (Body Mass Index) was calculated considering the ratio of body mass in kilograms to the square of height in meters (kg/m^2). According to the adjusted cutoff points proposed by Conde and Monteiro [12], the adolescents were classified as low weight, eutrophic, overweight and obese.

To evaluate the presence or absence of body image distortion, the Body Shape Questionnaire (BSQ) test developed by Cooper., *et al.* [13], was used to measure the degree of concern about body shape, self-depreciation due to the physical appearance and the feeling of being fat. The BSQ was validated for the Brazilian adolescent population by Conti, Córdas and Latorre [14] in 386 adolescents of both genders in the age range of 10 - 18 years old. The instrument consists of 34 (thirty-four) questions with six options of answers: 1 - never; 2 - rarely; 3 - sometimes; 4- often; 5 - very often and 6 - always. The classification of BSQ scores is divided into four levels of body image

distortion. Scores below 80 indicate no distortion; score between 80 and 110 indicates slight distortion, score between 110 and 140 indicates moderate distortion, and score equal to or above 140 indicates severe distortion of body image.

The data were submitted to statistical analysis in order to respond to the specific objectives assigned in this study. The descriptive analysis of the data was performed through the Statistical Package for Social Science (SPSS), version 24.0. To verify the normality of the data, the Kolmogorov-Smirnov test was performed, for homoscedasticity the Levene test. For comparison of means, the T-Test was used for variables with normal distribution and Mann- Whitney U for non-normal, the Chi-square test was used to compare proportions. The Spearman test was used for correlation and Odds Ratio for prevalence, adopting a Confidence interval of 95%, for a $p \leq 0.05$.

Results

The sample of this study consisted of 372 adolescents (249 girls and 123 boys) with a mean age of 13.28 ($\pm$ 0.79) years, with a mean body mass of 53.3 kg ($\pm$ 12.1), with a height of 1,60m ($\pm$ 0.09), BMI 20.7 kg/m^2 ($\pm$ 3.7) (Table 1). The data were mostly normal, only the height of the boys did not present normality.

	Girls				Boys					
	K-S^b				K-S^b			Levene	
	N	Mean ($\pm$ sd)	p.	N	Mean ($\pm$ sd)	p.	F	p.
Age (years)	249	13,23 ($\pm$ 0,82)	0,001	123	13,4 ($\pm$ 0,7)	0,003	5,73	0,017
Body Mass (Kg)	249	52,38 ($\pm$ 11,1)	0,000	123	52,74 ($\pm$ 13,8)	0,000	5,4	0,020
Height (m)	249	1,58 ($\pm$ 0,07)	0,000	123	1,63 ($\pm$ 0,11)	0,079	42,3	0,000
BMI (Kg/m^2)	249	20,76 ($\pm$ 3,79)	0,000	123	20,71 ($\pm$ 6,66)	0,000	0,085	0,771
Body Image (points)	249	79,7 ($\pm$ 33,03)	0,000	123	55,45 ($\pm$ 23,9)	0,000	30,6	0,000

Table 1: Distribution of central tendency measures and dispersion for the anthropometric variables and scores obtained in the scales of the adolescents.BMI: Body Mass Index; sd: Standard Deviation.

In relation to the BMI of the adolescents (Table 2), the majority indicate the expected value of BMI (68%) according to age, that is, they are low weight (1.6%) or eutrophic (66.4%).

		Total	Girls	Boys	X^2	
		F (%)	F (%)	F (%)	X^2	p.
BMI (Kg/m^2)	Underweight	6 (1,6)	4 (66,7)	2 (33,3)	0,654	0,884
	Normal	247 (66,4)	166 (67,2)	81 (32,8)		
	Overweight	90 (24,2)	58 (64,4)	32 (35,6)		
	Obesity	29 (7,8)	21 (72,4)	8 (27,6)		
Body Image	Absence of distortion	248 (66,7)	142 (57,3)	106 (42,7)	33,59	0,000*
	Light	63 (16,9)	51 (81)	12 (19)		
	Moderate	39 (10,5)	37 (94,9)	2 (5,1)		
	High	22 (5,9)	19 (86,4)	3 (13,6)		

*Table 2: Distribution of prevalence and comparison of Body Mass Index and Body Image related to sex of the adolescents. BMI: Body Mass Index (*difference p<0,05).*

However, 32% of adolescents are above the ideal weight-for-age (24.2% overweight and 7.8% obesity). Comparing the BMI between girls and boys, even the comparison is not statistically significant, it is noticed that girls present more frequency of overweight and obesity than boys in the classification.

The results of the Body Image level evaluation show that 33.3% of the adolescents present one of the degrees of body dissatisfaction, that is, they are dissatisfied with the light Body Image (16.9%), moderate (10, 5%) and high (5.9%). Comparing body image between the sexes, there was a significant difference (x^2 - 33.59; $p \leq 0.000$), girls have a higher level of body image distortion than boys.

There was a weak positive correlation between BMI and Body Image for girls and boys (rho = 0.311; $p \leq 0.000$) and a weak negative correlation for Body Image and sex (r = -0.295; $p \leq 0.000$). For BMI and sex, no correlation was found (Table 3).

		Correlation coefficient; p-value (n=372)		
		Sex	**BMI**	**Body Image**
Sex	r	1		
	p	p < 0,05		
BMI	r	0,001	1	
	p	0,987	p < 0,05	
Body Image	r	-0,295*	0,311*	1
	p	0,000	0,000	p < 0,05

Table 3: Correlation between the body image level and body mass index of the adolescentes.
BMI: Body Mass Index (*difference p<0,05).

In the association analysis, the variables were grouped into two categories, with and without overweight for BMI, and with or without distortion for Body image (Table 4). In the overweight category individuals were grouped in overweight and obese and for the not overweight category individuals were grouped in underweight and normal. For Body Image, the distorted group was grouped in the three degrees of distortion (light, moderate and high) and "without distortion" in the second group. It was identified that overweight girls have (4,768) more chances to present distortion of body image in relation to those without excess weight. For the group of boys there was no prevalence of overweight and distortion of Body Image. Analyzing the prevalence of BMI and Body Image of adolescents it was observed that, overweight individuals present (3,351) more chance of presenting Body Image distortion in relation to adolescents without excess weight.

	F (%)	With distortion	Without distortion	
		F (%)	OR (IC 95%)	
Girls	With overweight	54(68,4)	25 (31,6)	4,768 (2,684 - 8,470) *
	Without overweight	53(31,2)	117 (68,8)	
Boys	With overweight	8 (20)	32 (80)	2,056 (0,727 - 5,808)
	Without overweight	9 (10,8)	74 (89,4)	
Total	With overweight	62 (52,1)	57 (47,9)	3,351 (2,116 - 5,307) *
	Without overweight	62 (24,5)	191 (75,5)	

Table 4: Prevalence of BMI and Body Image in general and related to sex of the adolescents.
(*difference p<0,05).

Discussion

The study of Castro., *et al.* [15] corroborates with the data showed in this research, because 32% of the adolescents were overweight and obese. The authors show that around the country the reality is the same, were investigated 26 Brazilian capitals with adolescents from 13 to 16 years old and indicated that 24% of the adolescents were overweight. Another study that focused on the state of Rio Grande do Sul with 710 girls of average age 12.8 years old indicated that 21.6% of the sample were overweight/obese [16]. In the Northeast, 12.3% of schoolchildren were overweight and 9.2% were obese.

Increasing levels of overweight and obese adolescents are not unique to Brazil; a study in Iran [17] found that 21.1% of adolescents were overweight and 7.8% had obesity, and in China [18], 14.4% were overweight and 11.9% had obesity. In the study conducted in China what differs from the present research was that boys are more prone to overweight and obesity. The possible justifications for the increase in overweight in young people are linked to the consumption of ultra-processed and high calorie foods associated with the increase in the time in front of TV and smartphones.

A systematic review [19] looked at the large intake of snack foods, fast foods, junk foods, ultra-processed foods, soft drinks, sugary drinks, sweets and chocolates especially among children and adolescents. In the United States, Australia and Europe [20], the average time spent on screens was 3 ½ hours to 5 hours. These sedentary activities are accompanied by less daily energy expenditure, energy imbalance accumulating fat resulting in overweight and obesity. And the result of this is the greater propensity to develop chronic diseases, high lipid profile, insulin resistance and metabolic syndrome [21].

When comparing BMI between boys and girls, no significant difference was found, but it is possible to observe that girls have a higher BMI than boys, especially boys, in this age group, achieve an increase in lean mass, favoring the development of muscles, and girls have an increase in fat mass, accumulating mainly in the abdomen and hip [22].

When analyzing the body image, it was observed that the number of adolescents with some degree of body dissatisfaction is high corroborating with the result found by Branco, Hilário e Cintra [23] that used the same instrument of this research, of the 20% of adolescents with a BMI eutrophic profile, 16.6% presented moderate dissatisfaction with their image.

A study [7] carried out in Santa Catarina with a sample of more than 600 adolescents identified that 65% of the girls had dissatisfaction with the body image, the boys had 54% of dissatisfaction, a value a little smaller than the one of the girls, however in both sexes representing more than half the sample. The method used by them to check for dissatisfaction was the drawing board with the scale of nine body silhouettes, a method different from that used in this study but that found the same result. At the Northeast [16] the figures are also high, 86% of the adolescents evaluated were dissatisfied with their body image. Another study [24] study that also used the same questionnaire from this study concluded that adolescents who presented dissatisfaction with body image showed (3.7) times more likely to present depressive symptoms.

Girls are the most affected by dissatisfaction with their bodies, 63% of girls are dissatisfied and 23% of them are obese and even among those who fit into the eutrophic profile, there is a presence of dissatisfaction aiming to have a more robust body [25]. This present dissatisfaction with more force in the female sex can be explained because the woman suffers more influence of the media to have a thin body, as already said in the introduction. By the age of 6, girls had already shown a desire to have a lean body as they had seen in adult women's magazines and the media in general [26].

A limiting factor in the study was the participation of the adolescents in the research, many did not want to participate even with the encouragement of the teachers, however this did not interfere in the sample of the study, being then these students replaced by others in the same school.

Conclusion

The data were mostly normal, however, it is possible to verify that 24.2% of the adolescents who participated in this study were overweight and 7.8% obese. Although no statistically significant difference was identified, girls excelled at boys with a higher frequency in the classification of overweight and obesity. Regarding body image, 33.3% of the sample showed one of the degrees of dissatisfaction, and again, girls have a higher level of body image distortion than boys, obtaining a significant difference (x^2 - 33.59; p ≤ 0,000). Overweight girls had (4,768) more chances of having body image distortion compared to those without excess weight. Therefore, it is important that the Physical Education teacher and the school work together to intervene especially with this age group on the existence of body image dissatisfaction and excess weight, avoiding future eating disorders that are serious. It is also important to question the beauty standards presented by the media, strengthening self- esteem and acceptance in these adolescents.

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