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Association of body image with the consumption of sugary drinks and nutritional status in adolescents

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Abstract

The consumption of sugary drinks has increased and may affect weight and body image; however, little is known about the relationship of body satisfaction with the intake of these drinks. This study aimed to evaluate the association of body image with the consumption of sugary drinks and nutritional status in adolescents. 42 students of an integrated technical education were evaluated according to the silhouette scale, consumption of sugary drinks, and anthropometric parameters. The data were analyzed by ANOVA and Chi-squared tests and categorized by body satisfaction. Most adolescents were eutrophic (83.3%) but showed a high level of body image dissatisfaction (boys: 65.2% and girls: 63.1%). Sugary drinks are consumed by 73.8 to 88.1% of those evaluated. Artificial juice and soft drinks were the most consumed beverages for 2-5x/week at school for having a pleasant taste and practicality and were predominantly ingested by adolescents dissatisfied with being overweight. According to the silhouette scale, 52.4% of students reported body image equal to the BMI/age classification, however, 33.3% overestimated and 14.3% underestimated their body image. Girls showed a higher overweight estimate than boys (42.1 vs. 26.1%). Body weight, BMI and waist and abdomen circumferences were greatest in overweight students, as well as being associated with dissatisfaction with overweight. It was concluded that artificial juice and soda were the most consumed sugary drinks by adolescents dissatisfied with being overweight. Overestimation of body image was presented at a high level, suggesting the need for educational intervention in this population.

Keywords: Body Image, Carbonated Drinks, Body Mass Index, Vocational Education.

INTRODUCTION

Adolescence is a critical period in the lives of young people due to changes in puberty and may acquire inappropriate behaviors can be incorporated into adult life affecting their acceptance of their body image[1,2]. Adolescents with low self-esteem feel inferior, devalued and insecure[3], and when associated with inappropriate eating habits such as excessive consumption of sugars[4], they can trigger disorders in body image.

Media culture disseminates that the ideal body image for women is to be thin and is synonymous with competence, successs, and sexual attraction, whereas men must be strong and athletic[5-8]. Different patterns of this stereotyped culture generate body dissatisfaction in both sexes[3,5], mainly due to being overweight[3,9,10]. Body image has been efficiently identified by the silhouette scale of nine images[3,7,11], and is directly related to the development of eating disorders[3].

Studies indicate that in the last decades, changes in eating patterns have occurred in Brazil and in the world, resulting in an increase in non-communicable diseases[8,12]. Factors such as changes in lifestyle and food inadequacy

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with a high consumption of ultra-processed foods rich in simple sugars, such as sugary drinks, can impact weight gain and increase the risk of obesity, diabetes, and associated comorbidities[13-16].

As mentioned by Claro and collaborators[17], in the last 30 years there was an increase in the consumption of soft drinks by 225% in Mexico, 500% in the United States, and 525% in Brazil, where according to IBGE[18] there was an increase from 18.6 to 41.1% in the prevalence of overweight and obesity among men. The World Health Organization (WHO) recommends that the daily sugar intake per adolescent should be only 10%, suggesting a reduction in sugary drinks, which are the main source of calories among non-alcoholic drinks10. A can of soda has about 12% sugar (±144 kcal in 300mL), providing no mineral and vitamin contents, and are considered a source of empty calories[16,19], which demonstrates the importance of studying the impact of sugary drink intake on nutritional status and body image of students.

Nutritional status can be efficiently determined by anthropometric parameters such as weight, height, and body mass index (BMI)[9,13,14,20], waist, hips and abdominal circumference[2,21], as well as neck circumference[1,22]. Anthropometry is used to determine the risk of metabolic complications such as obesity[1,6,23], cardiovascular diseases[8,21,24], among others. They have also been related to the intake of sugary drinks assessed by a food frequency survey[13,14,25,26], however, there are no studies that investigate the relationship between the consumption of sugary drinks with body image in adolescents.

Authors report that the poor diet of adolescents and adults is associated with the quantity, type, and location of restaurants and/or snack bars[16,27], as well as the intake of fast food and sugary drinks[7,13,15], however, other authors have not reported an association[28].

Studies report an association between nutritional status and body satisfaction[2,8,10], as well as nutritional status and consumption of sugary drinks[13,15,16,25]. However, little is known about the relationship between the consumption of sugary drinks and body satisfaction, especially among adolescents who eat mainly at their educational institution, such as in the federal professional education network[29]. Thus, this study aimed to assess the association of body image with the consumption of sugary drinks and nutritional status in students of the federal technical-integrated education program in Minas Gerais.

MATERIALS AND METHODS

This is a qualitative and quantitative cross-sectional, observational, and comparative study, with a convenience sampling composed of students aged 15 to 17, enrolled in the 1st year of technical-integrated courses at the Southeast Federal Institute of Minas Gerais, Rio Pomba campus.

This project and the Informed Consent Form (ICF) were approved by the Ethics Committee in Research with Human Beings of the Southeast Federal Institute (IFS) of MG, under opinion number 1.953.631, and according to resolution CNS 466/12 of the Ministry of Health. Prior to participating in the experiment, the participants signed the informed consent form and, when applicable, their parents signed the parental consent form.

The population characterization questionnaires, frequency of food consumption, and silhouette scales were applied individually and were coded to guarantee the confidentiality of those evaluated. The inclusion criterion was of individuals over 13 years old and under 20 years old and enrolled and participating in one of the average technical-integrated courses on campus. Students who reported having metabolic disorders (lactose intolerance and gluten), anorexia, bulimia, or special needs were excluded from the study, as well as students who did not present a medical certificate for the institution's daily activities. For socioeconomic and demographic variables, gender (male and female), age (in years), student's course (integrated te-

chnician in food, agriculture, environment, zootechnics and computers) and family income (number of minimum wages) were analyzed.

The students' body image was analyzed using the nine-stage silhouettes scale proposed by Stunkard and already applied to adolescents from different Brazilian regions[3,7,11,30]. A questionnaire with two items was applied, in which the student selected the image of the silhouette that represented their real body appearance (BA/Real), as well as the silhouette they would like to have, their ideal body appearance (BA/Ideal). The body image was defined by the equation: BI/Real - BI/Ideal, where the value of this equation was zero the body image was classified as "satisfactory". "Unsatisfactory due to overweight" was considered when the result of the equation was positive, and "dissatisfaction due to thinness" when the result was negative[9].

For the anthropometric assessment, the body weight and height to calculate BMI; in addition to the neck, waist and abdominal circumferences were collected[22,31]. To measure body weight (kg), a digital scale with a capacity of 150 kg (SONGHE-TOOLS, model SH0550) and a precision of 10 g was used. Height was measured with a portable stadiometer (CESCORF, model NswRo7MHlaI) with an accuracy of 0.1 cm. BMI was calculated by dividing weight by height squared to obtain the Z score according to age and gender (BMI/age), using the World Health Organization Anthroplus (WHO)[32] software. According to the Z score, individuals were classified as underweight (Z score <-2), eutrophic (-2 ≤ Z score <1), overweight (1 ≤ Z score <2), and obese (Z score ≥ 2)[5,32,33].

The circumference measurements of the neck, waist and abdomen were evaluated using an inelastic measuring tape with a capacity of 150 cm (SANNY, model TR4010) and precision of 0.01 cm. Neck circumference was measured at the midpoint of the cervical spine to the anterior middle of the neck for the girls. The boys had their neck circumference measured at the point immediately below the laryngeal prominence22. Waist measurements were taken at the point of lowest abdominal circumference and waist circumference was measured at the umbilical scar[31].

To identify the consumption of sugary drinks, a questionnaire on the frequency of consumption of sugary drinks was applied, adapted from Epifânio and collaborators[12]. The questionnaire consisted of five items to identify the sugary non-alcoholic beverages the students consumed (chocolate drinks, milk drinks, sweetened coffee, fresh milk, nectar, soft drinks, soda, and artificial juice, naturally sweetened and ready for consumption), which drink the students consumed more, their frequency (1 to 3 times a month, 1 time a week, 2 to 5 times a week, 1 time a day and 2 or more times a day) and the places where they consumed (school, home, or others), as well as the reasons why they consumed (pleasant taste, practicality, more affordable price, or nutritional value).

In the data analysis, descriptive statistics presented by measures of frequencies, mean and standard deviations were used. Then, the normality of the data was assessed using the Kolmogorov-Smirnov test and the homogeneity of variance using the Levene test. For quantitative variables, data were analyzed by Student's t-test or analysis of variance (ANOVA), using the Tukey test. For qualitative variables, the Chi-squared test was applied. In determining the relationship between the variables, the Pearson correlation test was used. The analyses were performed using Sigma Stat 3.0 software (Systat Software Inc., USA) at a 5% probability level.

RESULTS

The present study evaluated 42 students, the majority of whom were boys (54.8%) aged 16 (50.0%), family income of up to 2 salaries (50.0%), and a similar distribution among the five institutional courses. Body image dissatisfaction due to being overweight predominated in girls (52.6%) and boys (47.8%), as well as at the ages of 15 (66.6%), 16 (38.9%), and 17 years (100.0%). Dissatisfaction with being overweight stood out in most courses, where only in the culinary course did dissatisfaction with thinness prevail (44.5%). For family income, there was a prevalence of dissatisfaction with being overweight in most classes, with a higher occurrence of satisfaction only in the income class between 4-10 minimum wage salaries (Table 1). No students reported any metabolic dysfunctions being excluded from the study.

Table 2 shows the consumption of beverages according to the body image stratified by the sex of the students. Of all the evaluated drinks, soda, artificial juice, natural juice, milk drinks, chocolate, and ready juice were consumed by most students, with a predominance of students with a dissatisfaction due to overweight. Regardless of body image, in general, boys claimed to consume more sugary drinks than girls. For dissatisfaction with overweight, boys reported consuming more soft drinks, natural juice, sweetened coffee, and nectar, while girls mentioned drinking more chocolate drinks.

Artificial juice and soda were the most consumed drinks for 2 to 5x/week and were predominantly consumed by students dissatisfied with being overweight in similar proportions between genders. For those dissatisfied with thinness, boys reported consuming more artificial juice than girls. For the satisfied, girls mentioned drinking more soft drinks and artificial juice than boys.

The consumption of these drinks occurred primarily at school and by students dissatisfied with being overweight (46.9%), due to the taste being pleasant and being practical. As for the sex of students, girls dissatisfied with being overweight reported higher consumption at school than boys.

Table 3 shows the comparison of the classifications of nutritional status determined by BMI with the body image perceived by the students. It was observed that 52.4% of students estimated their body image correctly when calculating BMI. Only 14.3% underestimated their body image due to their calculated BMI; however, 33.3% of adolescents overestimated their body image. We also observed that girls showed a higher overestimation of body image (42.1%) than boys (26.1%). Boys, on the other hand, underestimated their body image more than girls (17.4 vs. 10.5%, respectively).

The comparison of the results of the anthropometric parameters with the nutritional status and body image is shown in Table 4. The overestimation of body image in the dissatisfaction with being overweight category was statistically identified in the parameters: weight, BMI, waist and abdomen circumferences in eutrophic students. The underestimation of body image was observed in the category of dissatisfaction due to thinness through the parameters weight, height, neck, and abdomen circumferences. On the other hand, BMI and waist circumference showed a statistical difference between satisfactory and unsatisfactory thinness in eutrophic students.

Table 5 shows the results of the correlation between the anthropometric parameters. Correlation analyses report a positive relationship ranging from moderate to very strong between anthropometric parameters of weight, height, BMI and circumferences of the neck, waist and abdomen. In the body image parameter, the actual silhouette was correlated moderately positive with the neck circumference and strongly positive with weight, BMI, and waist and abdomen circumferences.

Table 1 – Characterization of the sample, according to the perception of body image, in a Federal Institute of Education, MG, Brazil (2019).

Variable	Total (n/%)	Unsatisfactory Thinness (%)	Satisfactory (%)	Unsatisfactory Overweight (%)	P
SEX					
Male	23 (54.8)	17.4	34.8	47.8	0.817
Female	19 (45.2)	10.5	36.9	52.6	
AGE					
15 years	18 (42.9)	4.8	28.6	66.6	
16 years	21 (50.0)	27.7	33.4	38.9	0.027
17 years	03 (7.1)	0.0	0.0	100.0	
TECHNICAL-INTEGRATED COURSE					
Agriculture	11 (26.2)	0.0	45.5	54.5	
Culinary	09 (21.4)	44.5	22.2	33.3	
Computing	07 (16.7)	0.0	42.9	57.1	0.101
Environmental	07 (16.7)	28.6	14.3	57.1	
Zootechnics	08 (19.0)	0.0	50.0	50.0	
FAMILY INCOME					
Up to 2 salaries	21 (50.0)	14.3	33.3	52.4	
From 2 to 4 salaries	13 (30.9)	15.4	38.5	46.1	0.707
From 4 to 10 salaries	05 (11.9)	0.0	60.0	40.0	
More than 10 salaries	00 (0.0)	0.0	0.0	0.0	
No income	03 (7.1)	33.3	0.0	66.7	

Legend: Data as number and % of individuals in the category's variable. P-value (Chi-squared test for P<0.05)

Table 2 – Consumption of sugary drinks stratified by sex of students of technical-integrated education program, according to the perception of body image, in the Federal Institute of Education, MG, Brazil (2019).

Variable	Total n (%)	Unsatisfactory Thinness (%)		Satisfactory (%)		Unsatisfactory Overweight (%)		P
		Male	Fem	Male	Fem	Male	Fem	
SUGARY DRINK CONSUMPTION								
Soda	37 (88.1)	13.5	5.4	18.9	16.2	27.0	18.9	
Artificial juice	31 (73.8)	9.7	6.5	9.7	16.1	29.0	29.0	
Sweetened natural juice	31 (73.8)	6.5	3.2	22.5	9.7	32.3	25.8	
Dairy drinks	31 (73.8)	9.7	3.2	16.1	12.9	29.0	29.0	
Chocolate drinks	31 (73.8)	12.9	3.2	16.1	12.9	25.8	29.0	0.877
Ready-to-drink juice	28 (66.7)	10.7	3.6	10.7	10.7	32.1	32.1	
Sweetened coffee	23 (54.8)	13.0	4.3	8.7	17.4	39.1	17.4	
Soft drinks	22 (52.4)	18.2	4.5	4.5	-	36.4	36.4	
Fresh milk	13 (31.0)	15.4	-	7.8	15.4	30.7	30.7	
Nectar	11 (26.2)	27.3	9.1	9.1	9.1	27.3	18.1	
BEBIDA QUE MAIS CONSOME								
Artificial juice	12 (28.6)	25.0	8.3	-	16.7	25.0	25.0	
Soda	09 (21.4)	11.1	11.1	-	33.3	22.2	22.2	
Chocolate drinks	04 (9.5)	-	-	75.0	-	25.0	-	
Sweetened coffee	04 (9.5)	-	-	50.0	25.0	25.0	-	0.356
Sweetened natural juice	04 (9.5)	-	-	50.0	-	25.0	25.0	
Fresh milk	02 (4.8)	-	-	-	-	50.0	50.0	
Other	07 (16.7)	-	-	14.3	14.3	28.5	42.9	
QUANTAS VEZES CONSOME A BEBIDA MAIS CONSUMIDA								
Up to 1x/week	08 (19.0)	12.5	-	25.0	-	25.0	37.5	
2 to 5x/week	22 (52.5)	9.1	9.1	13.6	13.6	31.8	22.7	0.644
6 to 7x/week	03 (7.1)	-	-	33.3	33.3	33.3	-	
More than 7x/ week	09 (21.4)	11.1	-	22.2	33.3	11.1	22.2	
LOCAL ONDE MAIS CONSOME AS BEBIDAS								
School	32 (76.2)	12.5	6.2	21.9	12.5	21.9	25.0	
Home	7 (16.7)	-	-	14.3	42.9	28.5	14.3	0.240
Other	3 (7.1)	-	-	-	-	50.0	50.0	
PORQUE CONSOME ESTAS BEBIDAS								
Pleasant taste	32 (76.2)	9.4	6.3	21.9	15.5	25.0	21.9	
Practicality	15 (35.7)	20.0	-	13.3	13.3	26.7	26.7	0.908
Most affordable price	7 (16.7)	14.3	-	14.3	14.2	28.6	28.6	
Nutritional value	2 (4.8)	-	-	-	-	100	-	

Legend: Data as number and % of individuals in the category's variable. P-value (Chi-squared test for P<0.05)

Table 3 – Comparison of Nutritional Status according to BMI/age with Body Image, at a Federal Institute of Education, MG, Brazil (2019).

BMI/age	Body Image n(%)			P
	Unsatisfactory Thinness	Satisfactory	Unsatisfactory Overweight	
Total Individuals (n=42)				
Eutrophic	06 (14.3)	15 (35.7)	14 (33.3)	
Overweight	-	-	05 (11.9)	0.049
Obese	-	-	02 (4.8)	
Boys (n=23)				
Eutrophic	04 (17.4)	08 (34.8)	06 (26.1)	
Overweight	-	-	04 (17.4)	0.137
Obese	-	-	01 (4.3)	
Girls (n=19)				
Eutrophic	02 (10,5)	07 (36,8)	08 (42.1)	
Overweight	-	-	01 (5.3)	0.734
Obese	-	-	01 (5.3)	

Legend: Data as number and % of individuals in the category's variable. P-value (Chi-squared test for P<0.05)

Table 4 – Anthropometric parameters according to Nutritional Status and Body Image, in a Federal Institute of Education, MG, Brazil (2019).

BMI/age Classification (WHO, 2011)	Body Image		
	Unsatisfactory Thinness	Satisfactory	Unsatisfactory Overweight
Weight (n=42)			
Eutrophic	49.9±5.9^{A}	57.0±7.7^{AB}	61,1±9,2^{aB}
Overweight	-	-	78,7±12,6^{b}
Obese	-	-	81,8±14,0^{b}
Estatura (n=42)			
Eutrófico	1.67±0.07	1.66±0.07	1.68±0.12
Sobrepeso	-	-	1.72±0.11
Obesidade	-	-	1.69±0.15
IMC (n=42)			
Eutrófico	17.9±2.0^{A}	20.7±2.1^{B}	21.6±2.2^{aB}
Sobrepeso	-	-	26.3±1.0^{b}
Obesidade	-	-	28.7±0.1^{b}

BMI/age Classification (WHO, 2011)	Imagem Corporal		
	Unsatisfactory Thinness	Satisfactory	Unsatisfactory Overweight
Neck (n=42)			
Eutrophic	32.3±2.1	33.5±2.9	33.7±2.4
Overweight	-	-	36.3±2.9
Obese	-	-	36.5±5.0
Waist (n=42)			
Eutrophic	64.2±4.0A	70.8±4.1B	71.7±5.9^{aB}
Overweight	-	-	82.8±6.8^{b}
Obese	-	-	84.0±8.5^{b}
Abdomen (n=42)			
Eutrophic	68.1±6.0A	75.6±5.0AB	78.8±7.7^{aB}
Overweight	-	-	89.6±8.9^{b}
Obese	-	-	94.0±9.9^{b}

Legend: BMI/Age: body mass index according to age. Values are in Mean±SD. Averages in the same column followed by lowercase letters and in the same row followed by different capital letters differ for One-Way ANOVA with Tukey's post-hoc test (p<0.05).

Table 5 – Correlations between Anthropometric Parameters and Body Image (r) of students in a technical-integrated program, at a Federal Institute of Education, MG, Brazil (2019).

Parametros	Height	BMI	Neck	Waist	Abdomen	Real Silhouette
Weight	0.627*	0.798*	0.800*	0.882*	0.898*	0.758*
Height		0.038	0.693*	0.400**	0.506*	0.294
BMI			0.498*	0.818*	0.762*	0.748*
Neck				0.650*	0.678*	0.497*
Waist					0.930*	0.766*
Abdomen						0.774*

Legend: Values are in correlation coefficients (r). Pearson's correlation (* vs. P<0.001; ** vs. P <0.05).

DISCUSSION

The aim of this study was to evaluate the association of body image with the consumption of sugary drinks and nutritional status in adolescents. The main results show that body dissatisfaction prevails among adolescents, with girls reporting greater dissatisfaction with being overweight than boys without showing an association with drinking between genders. Artificial juice and soft drinks were the most consumed drinks 2 to 5x/week at school due to the pleasant taste and practicality which was reported predominantly by adolescents dissatisfied with being overweight. Anthropometric parameters confirmed that most adolescents are eutrophic, however, a high index of body image dissatisfaction was found; and an association was also observed between body image and nutritional status parameters.

The findings of this study identified that 73.8 to 88.1% of the investigated students mentioned consuming sugary drinks such as soda, artificial juice, natural juice, milk, and chocolate drinks. Similar results were identified in 90.8% of adolescents aged 11 to 16 years in New Caledonia, Oceania[26]; in 73% of adolescents aged 12 to 16 years in a full-time school in Paraná, Brazil; and in 71% of children and adolescents aged 9 to 18 years in Bento Gonçalves, RS who consumed sugary drinks more than 4 times a week.

The most consumed drinks in this study were artificial juices (28.6%) and soft drinks (21.4%), similarly to the results of Oliveira *et al.*[4], who found a higher consumption of soft drinks and artificial juice among adolescents aged 11 to 17 years in five Brazilian capitals. Epifânio and collaborators[12], in spite of a reduction in the consumption of soft drinks and artificial juice between the period 2007-2014 in the Brazilian population aged 18 to 60 years old, observed that young people aged 18 years old had an intake of these drinks 2.5 times greater than the other ages. Even finding a reduction in consumption from 9.3 (2007) to 6.7 (2014) cups or cans/week, these authors show that the average intake of soda by the Brazilian population is still one cup or can/day/inhabitant, which is an amount slightly above that observed in this study.

The consumption of sugary drinks in this study was more referenced by adolescents with body dissatisfaction. Sugary drinks are ul-

tra-processed products with high caloric content, increasing the risk of weight gain12,14. Marshall *et al.*[13] reported that the intake of 226 ml/day of sugary drinks throughout adolescence was associated with an increase in BMI, which may trigger body dissatisfaction disorders. Fontes and collaborators15 found a consumption of 263.9 ml/day of soft drinks by adolescents, 62.7% of whom were overweight. Epifânio and collaborators[12] state that 300 ml of a soft drink contains approximately 30g of sugar, corresponding to 120% of the daily intake recommended by WHO for adults. There are reports in the literature that sugar content in soft drinks can raise blood glucose levels, which when associated with a lower satiety of drinks stimulates weight gain and insulin resistance, increasing the risks of obesity and diabetes[4,13-15]; which can raise body dissatisfaction among adolescents. Such factors put the participants in this study at greater risk for the development of these pathologies.

In this study, the highest consumption of sugary drinks was reported by adolescents with dissatisfaction due to overweight. Authors report that a high intake of soft drinks is associated with higher energy intake and excess body weight[10,13,15]. Also excess weight is inversely associated with beverage prices[25] and adolescents are more susceptible to the persuasion of advertisements for the purchase of these drinks[15]. The present study is one of the first to indicate that the consumption of sugary drinks is associated with body dissatisfaction. Such findings reinforce the danger that inadequate eating habits may trigger high risks of behavioral disorders[2,9], inhibiting adolescents from assuming healthy habits in weight reduction6. A favorable school environment with nutritional programs that show the adverse effects of poor diet on health can reduce the consumption of sugary drinks over time[5,34]. This suggests that educational policies must be implemented by the institution to minimize the results expressed by the students in this study.

The increase in the consumption of sugary drinks has been related to the greater exposure of these products to consumers in convenience stores, at home or at school28. In the present study, the highest consumption of these drinks occurred at school (76.2%) where students eat meals in the institutional restaurant that offers artificial or natural juices sweetened in their meals. Students also have a habit of buying soft drinks at the school store next to the restaurant and taking them to meals. Duran *et al.*[27] affirm that the consumption of sugary drinks increases due to the greater offer and/or exposure to the consumer. This information associated with pleasant taste and practicality, which were the reasons why students consumed more artificial juices and soft drinks, could increase the intake of sugary drinks, and increase the risk of pathologies. In this context, the institution needs to reevaluate the offer of sugary drinks in the school restaurant.

In the present study, 83.3% of the adolescents had a eutrophic BMI, similarly to other studies with adolescents aged 15 to 17 years in Araras, SP (81.5%)[20] and in Juazeiro do Norte, CE (77.3%)[21]. In this investigation, boys exhibited a higher frequency of overweight than girls (21.7 vs. 10.6%). Similar results were found in boys from Vitória, ES (20.6%)[23], Araras, SP (20.6%)[20], and São José do Rio Preto, SP (23.1%)[8], and in girls in the Minas Gerais forest zone (12.6%)[9]. The excess weight identified by the parameters body weight, BMI, waist, and abdomen circumference confirmed that all overweight and obese adolescents were dissatisfied due to being overweight.

An important finding of this study was to verify that 42.9% of individuals with eutrophic BMI had body satisfaction; however, 17.1% underestimated and 40.0% overestimated their body image. Teixeira *et al.*[8] identified an overestimation of 33.2% with schoolchildren aged 10 to 19 years in São José do Rio Preto, SP. Miranda *et al.*[2] showed an overestimation of 23.8% in schoolchildren in the forest

zone of Minas Gerais. Brito et al.6 observed a 5.6% overestimation of body image in full-time school students in Paraná, which confirms the concern about the high levels of body dissatisfaction with being overweight in the present study. The literature shows that many adolescents see themselves as overweight due to media culture and are depressed for not reaching the standard of social beauty. As they are not aware of the morphological and biopsychosocial changes at puberty, these adolescents turn the negative feelings of body dissatisfaction into a psychological obstacle for the treatment of excess weight[5,6,30].

Dissatisfaction with overweight prevailed in this study in both sexes, with girls showing greater overestimation than boys (47.1 vs. 33.3%) and less underestimation (11.8 vs. 22.2%), however, there was no significant difference in the consumption of sugary drinks between the sexes. Similar results of body dissatisfaction between genders have been verified previously[3,5,8,9]. Jesus and collaborators[5] justify that girls crave a slimmer and more slender body, because they suffer from the media's influence of stereotyped beauty in which women are thin, and men are strong and muscular causing body dissatisfaction. Girls greatly exaggerate their physical appearance because they are more susceptible to socio-cultural pressures, rising the feeling of body dissatisfaction and increasing the likelihood of having body image and eating disorders[5,7,9]. Part of this dissatisfaction can be attributed to the girls using the internet more as a source of food information for weight control[5] and being discriminated against by expressions of hatred and intolerance due to being overweight[2]. However, the difference in the overestimation of body image between the sexes cannot be attributed to the consumption of sugary drinks.

The media's influenced beauty[5-7] may be one of the reasons for having found a higher prevalence of dissatisfaction due to thinness in the culinary course, where approximately 80% of girls are identified among those enrolled. Miranda *et al.*[9] reported that overweight girls from the Minas Gerais forest area were more dissatisfied than boys. The literature shows that girls with body dissatisfaction have low esteem inducing feelings of inferiority, devaluation, and insecurity, which can trigger eating disorders, stimulated by aesthetic and health aspects[3]. Thus, the adolescents observed in this study who underestimated and overestimated body image should receive specific care with nutritional guidelines by the institution.

Alves *et al.*[20] report that 80% of obese adolescents show a tendency to be obese adults and may develop cardiac disorders and health risks caused by inappropriate eating habits. In this study, overweight and obesity were identified by anthropometric parameters and were associated with body dissatisfaction, as well as with overestimation in eutrophic adolescents. These results are corroborated by the positive and strong correlation observed between anthropometric parameters and the actual silhouette, identifying body dissatisfaction. Such results indicate the severity of adolescents who are dissatisfied with their bodies following inappropriate diets or consume medication without a medical prescription aiming at weight loss, as reported by Brito *et al.*[6]. This reinforces the importance of the school in promoting educational programs that guide its students on nutritional and body standards appropriately.

This study showed a low number of participants as a limitation, although the sample represents all technical-integrated courses at the institution. The study did not evaluate the level of physical activity and physical inactivity of individuals correlating them with body image, nutritional status, and consumption of sugary drinks; nor did it quantify the volume consumed of these drinks and the total energy value of the participants' diet. As a positive point, it should be noted that this is one of the first studies to relate the consumption of sugary drinks with body image in adolescents, to which a high rate of dissatisfaction with overweight was identified in the adolescents who consumed these drinks the most.

CONCLUSION

From the results of this study, it is concluded that artificial juices and soda were the most consumed drinks. Sugary drinks are widely consumed by teenagers, especially by individuals with dissatisfied body image. Girls are more prone to body image dissatisfaction, but this dissatisfaction cannot be associated with drinking sugary drinks. Anthropometric parameters identify nutritional status and are associated with the identification of body dissatisfaction.

The high consumption of sugary drinks within the school suggests that the institution needs to reevaluate its food and nutritional policy, as well as offering more educational actions on the health risks of overconsumption of high-calorie and nutritionally poor foods, promoting a healthier lifestyle among their students.

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REFERENCES

1. Cerqueira L, Cerqueira M, Franco F, Faria R. Analysis and Comparison of the Nutritional Status of Adolescents Utilizing Different Anthropometrics Indices. Obesity. 2015;1.1:1-4. Disponível em: https://www.sciforschenonline.org/journals/obesity/OOA-1-102.php.
2. Miranda VPN, Morais NS, Faria ER, Amorim PRS, Marins JCB, Franceschini SCC, Teixeira PC, Priore SE. Insatisfação corporal, nível de atividade física e comportamento sedentário em adolescentes do sexo feminino. Rev Paul Pediat. 2018; 36:482-490 (2018). Disponível em:https://www.scielo.br/scielo.php?script=sci_arttext&pid=S0103-05822018000400482&lng=pt&nrm=iso&tlng=en
3. Petroski EL, Pelegrini A, Glaner MF. Motivos e prevalência de insatisfação com a imagem corporal em adolescentes. Ciênc Saúde Coletiva. 2012; 17:1071-1077.
4. Oliveira NCF, Bragança MLBM, Anjos, ABSL, Bagea EG, Cantanhede NAC, França AKTC. Contribuição energética e consumo de alimentos por adolescentes de uma capital do nordeste brasileiro. Adolesc Saude. 2019; 16(4):80-90. Disponível em: http://www.adolescenciaesaude.com/detalhe_artigo.asp?id=813.
5. Jesus DS, Cifuentes DJ, Menegali BT, Silva LA. Percepção e satisfação corporal de alunos do ensino médio de uma escola privada em Orleans-SC. Adolesc Saude. 2019; 16(3):102-110. Disponível em: http://www.adolescenciaesaude.com/detalhe_artigo.asp?id=802.
6. Brito LMS, Leite N, Menezes Junior FJ, Mascarenhas LPG, Boguszewski MCS. Associação entre a percepção do peso e comportamentos de risco para a saúde em escolares do Paraná. Adolesc Saude. 2020;17, 89-98. Disponível em: http://www.adolescenciaesaude.com/detalhe_artigo.asp?id=828.
7. Resende AS, Santos LR, Leite MMR, Raposo OFF, Netto RSM. Hábitos alimentares e imagem corporal entre frequentadores de academias. Mundo saúde. 2019; 43:227-248. Disponível em: http:// dx.doi.org/10.15343/0104-7809.20194301227248.
8. Teixeira CS, Dinardi B, Singh TC, Cesarino CB, Pompeo DA. Estado nutricional de adolescentes relacionado ao risco cardiovascular e imagem corporal. Mundo saúde. 2019; 43:249-264. Disponível em: http:// dx.doi.org/10.15343/0104-7809.20194301249264.
9. Miranda, V. P. N., Conti, M. A., Carvalho, P. H. B., Bastos, R. R. & Ferreira, M. E. C. Imagem corporal em diferentes períodos da adolescência. Rev Paul Pediatr. 2014; 32:63-69. Disponível em: https://www.scielo.br/scielo.php?script=sci_arttext&pid=S0103-05822014000100063&lng=pt&nrm=iso&tlng=en
10. Shih Y-H, Wu H-C, Pan W-H, Chang H-Y. Increased coffee, tea, or other sugar-sweetened beverage consumption in adolescents is associated with less satisfactory dietary quality, body fatness and serum uric acid profiles over the past 18 years in Taiwan. Asia Pac J Clin Nutr. 2019; 28(2):371-382. Disponível em: http://dx.doi.org/10.6133/apjcn.201906_28(2).0020.
11. Carvalho GX, Nunes APN, Moraes CL, Veiga GV. Insatisfação com a imagem corporal e fatores associados em adolescentes. Ciênc Saúde Coletiva. 2020; 25(7):2769-2782. Disponível em: http://dx.doi.org/10.1590/1413-81232020257.27452018.
12. Epifânio SOB, Silveira JAC, Menezes RCE, Marinho PM, Brebal KMM, Longo-Silva G. Análise de série temporal do consumo de bebidas açucaradas entre adultos no Brasil: 2007 a 2014. Ciênc Saúde Coletiva. 2020; 25(7):2529-2540. Disponível em: http://dx.doi.org/10.1590/1413-81232020257.19402018.
13. Marshall TA, Curtis AM, Cavanaugh JE, Warren JJ, Levy SM. Child and Adolescent Sugar-Sweetened Beverage Intakes Are Longitudinally Associated with Higher Body Mass Index z Scores in a Birth Cohort Followed 17 Years. J Acad Nutr Diet. 2019; 119(3):425-434. Disponível em: http://dx.doi.org/10.1016/j.jand.2018.11.003.
14. Corrêa Café AC, Lopes CAO, Novais RLR, Bila WC, Silva DK, Romano MCC, Lamounier JA. Consumo de bebidas açucaradas, leite e sua assoaicção com o índice de massa corporal na adolescência: uma revisão sistêmica. Rev Paul Pediatr. 2018; 36(1):91-99. Disponível

em: http://dx.doi.org/10.1590/1984-0462/;2018;36;1;00010.
15. Fontes AS, Pallottini AC, Vieira DAS, Fontanelli MM, Marchioni DM, Galvão Cesar CL, Alves MCGO, Goldbaum M, Fisberg RM. Demographic, socioeconomic and lifestyle factors associated with sugar-sweetened beverage intake: a population-based study. Rev Bras Epidemiol. 2020; 23:E200003. Disponível em: https://www.scielo.br/scielo.php?script=sci_arttext&pid=S1415-790X2020000100411&lng=en&nrm=iso&tlng=en.
16. Gregorio-Pascual P, Mahler HIM. Effects of interventions based on the theory of planned behavior on sugar-sweetened beverage consumption intentions and behavior. Appetite. 2020; 145:104491. Disponível em: http://dx.doi.org/10.1016/j.appet.2019.104491.
17. Claro RM, Levy RB, Popkin BM, Monteiro CA. Sugar-Sweetened Beverage Taxes in Brazil. Am J Public Health. 2012; 102(1):178-183. Disponível em: http://dx.doi.org/10.2105/AJPH.2011.300313.
18. IBGE (Instituto Brasileiro de Geografia e Estatística, Diretoria de Pesquisas, Coordenação de Índices de Preços). Rio de Janeiro, 2004. Disponível em: https://biblioteca.ibge.gov.br/visualizacao/livros/liv81847.pdf.
19. NEPA-UNICAMP. Tabela brasileira de composição de alimentos - TACO. Vol. 2 2 (NEPA – Núcleo de Estudos e Pesquisas em Alimentação, 2006). Disponível em: http://189.28.128.100/nutricao/docs/taco/tab_bras_de_comp_de_alim_doc.pdf.
20. Alves BP, Pereira RM, Breda L, Canciglieri RS, Canciglieri PH. Comparação do perfil antropométrico de adolescentes das redes pública e privada da cidade de Araras/SP e região. Adolesc Saude. 2020; 17(1):41-55. Disponível em: http://www.adolescenciaesaude.com/detalhe_artigo.asp?id=823.
21. Araújo EMPS, Chaves EM, Brito-Junior FE, Cavalcante EGR, Viana MCA, Duavy SMP. Indicativos de risco cardiovasculares em adolescentes do ensino médio por avaliação antropométrica. Adolesc Saude. 2020; 17(1):18-24. Disponível em: http://www.adolescenciaesaude.com/detalhe_artigo.asp?id=820.
22. Barbosa PS, Santos RP, Mendonça JLS, Rocha VS. Circunferência do pescoço e sua associação com parâmetros antropométricos de adiposidade corporal em adultos. Braspen J. 2017; 32(4):315-320. Disponível em: http://arquivos.braspen.org/journal/out-dez-2017/32-04-out-dez-2017.html.
23. Dalmaso SB, Santana PG, Cordeiro JP, Rodrigues AL, Ferreira LG, Leopoldo AS, Leopoldo APL. Prevalência de sobrepeso e obesidade em escolares do ensino fundamental de Vitória/ES. Mundo Saude. 2019; 43(1):061-082. Disponível em: http://dx.doi.org/10.15343/0104-7809.20194301061082.
24. Cimadon HMS, Geremia R, Pellanda LC. Hábitos Alimentares e Fatores de Risco para Aterosclerose em Estudantes de Bento Gonçalves (RS). Arq Bras Cardiol. 2010; 95(2):166-172. Disponível em: https://www.scielo.br/scielo.php?pid=S0066-782X2010001200005&script=sci_abstract&tlng=pt.
25. Ferretti F, Mariani M. Sugar-sweetened beverage affordability and the prevalence of overweight and obesity in a cross section of countries. Global Health. 2019; 15(30). Disponível em: http://dx.doi.org/10.1186/s12992-019-0474-x.
26. Wattelez G, Frayon S, Cavaloc Y, Cherrier S, Lerrant Y, Galy O. Sugar-Sweetened Beverage Consumption and Associated Factors in School-Going Adolescents of New Caledonia. Nutrients. 2019; 11:425. Disponível em: http://dx.doi.org/10.3390/nu11020452.
27. Duran AC, Almeida SL, Do Latorre MR, Jaime PC. The role of the local retail food environment in fruit, vegetable and sugar-sweetened beverage consumption in Brazil. Public Health Nutr. 2015; 19(3):1093-1102. Disponível em: http://dx.doi.org/10.1017/S1368980015001524.
28. Shareck M, Lewis D, Smith NR, Clary C, Cummins S. Associations between home and school neighbourhood food environments and adolescents' fast-food and sugar-sweetened beverage intakes: findings from the Olympic Regeneration in East London (ORiEL) Study. Public Health Nutr. 2018; 21:2842-2851. Disponível em: http://dx.doi.org/10.1017/S1368980018001477.
29. Duarte MLC, Brito-Júnior FE, Bertoldi R, Silva NS, Bandeira PFR. Qualidade de vida em adolescentes no domínio meio ambiente: associação com fatores comportamentais e sociodemográficos. Adolesc Saude. 2019;16(3):40-50. Disponível em: http://www.adolescenciaesaude.com/detalhe_artigo.asp?id=796.
30. Soares Filho LC, Batista RFL, Cardoso VC, Simões VMF, Coelho SJDDAC, Silva AAM. Body image dissatisfaction and symptoms of depression disorder in adolescents. Braz J Med Biol. Res. 2021; 54(1):e10397. Disponível em: http://dx.doi.org/10.1590/1414-431X202010397.
31. Salamunes ACC, Stadnik AMW, Neves EB. Estimation of female body percentage based on body circunferences. Rev Bras Med Esporte. 2018; 24(2):97-101. Disponível em: http://dx.doi.org/10.1590/1414-431X202010397. http://rbme.org/sumario/30.
32. World Health Organization. Growth reference data for 5-19 years, WHO reference 2007. Disponível em: <http://www.who.int/growthref/en/>. Acesso em: 05 jan.2021.
33. Lourenço AM, Taquette SR, Hasselmann MH. Avaliação nutricional: antropometria e conduta nutricional na adolescência. Adolesc Saude. 2011; 8(1):51-58. Disponível em: http://www.adolescenciaesaude.com/detalhe_artigo.asp?id=265.
34. Rauba J, Tahir A, Milford B, Toll A, Benedict V, Wang C, Chehab L, Sanborn T. Reduction of Sugar-Sweetened Beverage Consumption in Elementary School Students Using an Educational Curriculum of Beverage Sugar Content. Glob Pediatr Health. 2017; 4:1-5. Disponível em: http://dx.doi.org/10.1177/2333794X17711778.

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