

Assessment of dietary intake among adolescents with obesity according to the *Guia Alimentar para a População Brasileira*

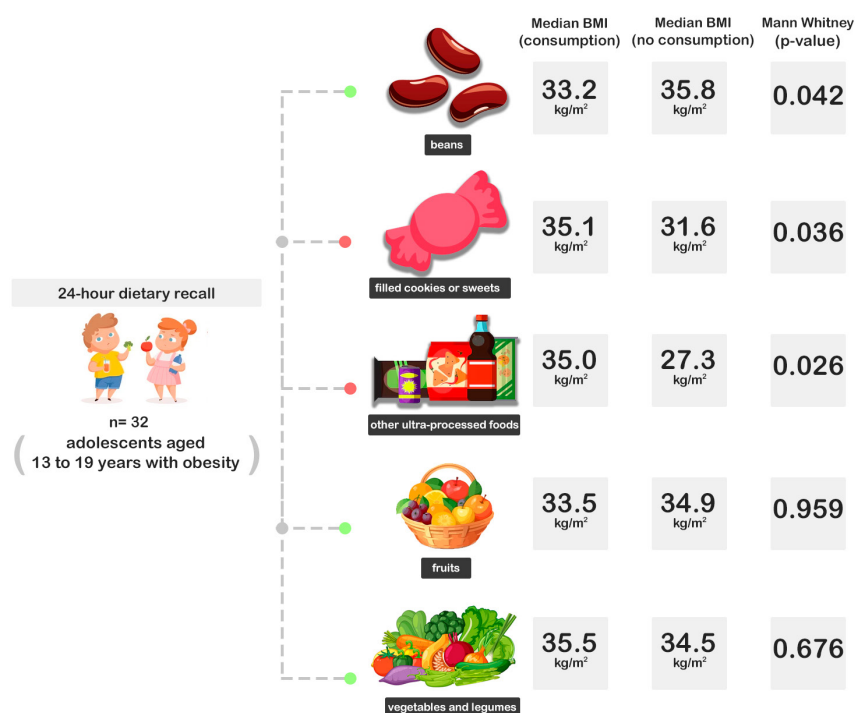
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Highlights

- Among the 32 adolescents, 53.12% were classified as having severe obesity, according to WHO criteria.
- Only 15.63% reported fruit intake, indicating low adherence to the *Guia Alimentar para a População Brasileira* (GAPB).
- Higher median BMI among those who did not consume beans (35.8 vs. 33.2; $p = 0.042$).
- Higher median BMI among those who consumed filled cookies/sweets (35.1 vs. 31.6; $p = 0.036$).
- Higher median BMI among those who consumed other ultra-processed foods (35.0 vs. 27.3; $p = 0.026$).

Graphical Abstract



Abstract

Obesity among adolescents is an increasing public health concern, with significant impacts. In this context, Fascicle 5 of the *Guia Alimentar para a População Brasileira* (GAPB), developed to guide healthy food choices among adolescents, was used as a reference in this study, which aimed to evaluate the dietary intake of adolescents with obesity, as well as to analyze its association with Body Mass Index (BMI). After approval by the Research Ethics Committee, 32 adolescents with obesity, aged between 13 and 19 years, were included. During the nutritional consultation, a 24-hour Dietary Recall (24hDR) was applied and anthropometric assessment (weight and height) was performed, with the data compared to the recommendations of Fascicle 5 of the GAPB. Statistical analysis was conducted using JAMOVI software. Of the 32 adolescents interviewed, 59.38% were female, with a median age of 15.4 years and a median BMI of 36.0 kg/m². Among the adolescents, 46.88% were classified as having obesity and 53.12% as having severe obesity. A high frequency of consumption of ultra-processed foods (93.75%) and low intake of fruits (15.63%) and vegetables/legumes (43.75%) were observed. Breakfast consumption was reported by 87.50% of adolescents; those who did not consume breakfast had a higher median BMI (40.7 vs. 34.3), although without statistical significance. It was also observed that adolescents who did not consume beans had a significantly higher BMI ($p = 0.042$), as did those who consumed filled cookies and sweets ($p = 0.036$) or other ultra-processed foods ($p = 0.026$). The results indicate an association between the consumption of minimally processed foods, such as beans, and lower BMI values, whereas the intake of ultra-processed foods is associated with increased BMI. Therefore, it is essential to develop programs based on the GAPB that encourage healthy habits from adolescence, contributing to improved nutritional profiles and prevention of diseases in adulthood.

Keywords: Adolescent. Obesity. Dietary Guidelines.

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INTRODUCTION

Obesity among adolescents has become one of the major public health challenges of the present time, negatively impacting both the physical and psychological well-being of this population. According to the World Health Organization (WHO), its prevalence has increased significantly in recent decades, representing an important risk factor for the development of non-communicable chronic diseases (NCDs), such as type 2 diabetes and cardiovascular diseases¹. Given the central role of diet in the management of obesity, strategies that promote healthier food choices are essential².

In this context, and in accordance with WHO guidelines, the Brazilian Ministry of Health (MH), with the support of nutritionists and other professionals in the field, developed in 2006 the first *Guia Alimentar para a População Brasileira* (GAPB). As a public health and policy tool, the document provided the first official guidelines directed to the population, using accessible language and a scientific basis, addressing both the prevention of NCDs and issues related to nutritional deficiencies. Furthermore, the guidelines considered the actual dietary patterns of the Brazilian population, encompassing the entirety of eating habits and the diverse socioeconomic contexts of the country^{3,4}.

In light of epidemiological and social changes over the years, a new edition of the GAPB, developed through public consultation, was published in 2014. This update was grounded in the recognition of the universal right to health and to a more balanced and diverse diet. In addition to consolidating

itself as an instrument for food and nutrition education, the guidelines began to support governmental measures aimed at the development of national food programs⁵.

As part of the continuous improvement of the GAPB, in 2021 the Ministry of Health launched a series of fascicles with guidance for individual care, entitled “Protocols for the Use of the *Guia Alimentar para a População Brasileira*” These materials were developed for specific populations, such as adults, older adults, pregnant women, children aged 2 to 10 years, and adolescents⁶.

Given the increasing prevalence of obesity among adolescents and recognizing that this stage of development is marked by vulnerabilities influenced by multiple factors affecting eating behaviors, it is essential to understand how this population’s dietary intake aligns with the recommendations proposed by the GAPB. Among these influences, the high consumption of ultra-processed foods – increasingly present in adolescents’ daily routines – stands out⁷. Thus, the present study aimed to evaluate the dietary intake of adolescents with obesity according to the recommendations of Fascicle 5 of the GAPB, as well as to analyze its association with BMI. Adolescents undergoing follow-up in an adolescent medicine outpatient clinic in São Paulo were included, selected voluntarily. The study aims to support the development of more effective nutritional intervention strategies and to contribute to the promotion of healthy eating habits during this stage of development.

METHODOLOGY

A cross-sectional study was conducted at the Center for Health Promotion, Rehabilitation, and Social Integration (PROMOVE), at Centro Universitário São Camilo, São Paulo. The sample consisted of 32 adolescents with obesity, selected by convenience, without prior sample size calculation. Participants were recruited among adolescents undergoing follow-up at an adolescent medicine outpatient clinic who met the study criteria (adolescents with obesity) and were invited to participate. Adolescents aged 13 to 19 years with obesity were included, while those using weight-loss medications or diagnosed with endocrine diseases were excluded. This study is part of a project previously approved by the Research Ethics Committee (CAAE 1242122.3.0000.0062, opinion 5,649,597).

After signing the Assent Form (TALE) by participants and the Informed Consent Form (TCLE)

by their legal guardians, consultations were conducted by a nutritionist. During data collection, the guardian remained in a separate environment to reduce potential information bias and enhance the reliability of dietary intake reports. Eating habits were assessed using the 24-hour Dietary Recall (24hDR), completed during the consultation.

In addition to dietary records, anthropometric assessment was performed, including measurements of weight (kg) and height (m). Nutritional status was classified according to WHO reference curves for BMI-for-age, specific by sex⁸.

The collected data were tabulated using Excel[®] software. In parallel with the analysis of dietary habits, a comparison was conducted with the recommendations of the “Protocol for the Use of the *Guia Alimentar para a População Brasileira* – Adolescence (Fascicle 5)”⁶. For protocol application,

adapted tools were used, such as the “Dietary Intake Assessment Form” and the “Directional Flowchart for Dietary Guidance in Adolescence.”

Statistical analysis was performed using JAMOVI® software (version 2.3). Data normality was assessed using the Shapiro–Wilk test, which

indicated a non-normal distribution. Therefore, the non-parametric Mann–Whitney test was applied. Continuous variables were expressed as median, minimum, and maximum values. Categorical variables were described as absolute and relative frequencies.

RESULTS

A total of 32 adolescents participated in the study, aged between 13 and 19 years (median: 15 years). Body Mass Index (BMI) ranged from 26.2 to 56.2 kg/m², with a median of 34.8 kg/m². According to

WHO BMI-for-age reference curves⁸, 15 adolescents (47%) were classified as having obesity and 17 (53%) as having severe obesity. The detailed distribution by sex is presented in Table 1.

Table 1 - Demographic and anthropometric characteristics of adolescents with obesity treated at PROMOVE – Centro Universitário São Camilo. São Paulo, 2025.

Variables	n (%)	Age (years)	BMI (kg/m ²)*
Sex			
Male	13 (41%)	14 (13–19)	33.5 (26.7–56.2)
Female	19 (59%)	15 (14–18)	35.4 (26.2–49.7)

Source: research data. Note: *values expressed as median (minimum–maximum).

Table 2 presents the association between the consumption of specific foods and meals reported in the 24hDR and the median BMI

among adolescents with obesity. Comparisons were performed using the Mann–Whitney test.

Table 2 - Association between the presence or absence of dietary intake and median BMI (kg/m²) in adolescents with obesity treated at PROMOVE – Centro Universitário São Camilo. São Paulo, 2025.

Variables assessed	Consumption		No consumption		p-value
	n (%)	BMI (median)	n (%)	BMI (median)	
Meal					
Breakfast	28 (87.50%)	34.3	4 (12.50%)	40.7	0.146
Morning snack	6 (18.75%)	35.3	26 (81.25%)	34.5	0.398
Lunch	32 (100%)	34.8	–	–	–
Afternoon snack	14 (43.75%)	34.3	18 (56.25%)	35.5	0.470
Dinner	31 (96.88%)	35.1	1 (3.13%)	34.7	0.914
Supper	2 (6.25%)	35.0	30 (93.75%)	32.1	0.243
Foods					
Beans	14 (43.75%)	33.2	18 (56.25%)	35.8	0.042*
Fruits	5 (15.63%)	33.5	27 (84.38%)	34.9	0.959
Vegetables and/or legumes	14 (43.75%)	35.5	18 (56.25%)	34.5	0.676
Hamburger and/or	19 (59.38%)	34.9	13 (40.63%)	34.4	0.604
Sugar-sweetened beverages	22 (68.75%)	35.1	10 (31.25%)	36.9	0.207
Instant noodles, packaged snacks, or savory biscuits	5 (15.63%)	32.3	27 (84.38%)	35.1	0.177
Filled cookies	23 (71.88%)	35.1	9 (28.13%)	31.6	0.036*
Other ultra-processed foods	30 (93.75%)	35.0	2 (6.25%)	27.3	0.026*

Source: research data. Note: *The correlation is statistically significant at the p < 0.05 level.

Based on the data presented in Table 2, a statistically significant association was observed between the consumption of certain foods and the median BMI among adolescents with obesity. Adolescents who did not consume beans had a higher median BMI compared to those who consumed this food (35.8 vs. 33.2; $p = 0.042$).

Additionally, those who reported consumption of filled cookies, sweets, or confectionery presented a higher median BMI compared to those who did not consume these items (35.1 vs. 31.6; $p = 0.036$). Similarly, adolescents who consumed other ultra-processed

foods also exhibited a significantly higher median BMI (35.0 vs. 27.3; $p = 0.026$). No statistically significant associations were found between BMI and the consumption or absence of the other meals or foods evaluated.

Regarding dietary intake, a low frequency of fruit consumption (15.63%) and vegetables/legumes (43.75%) was observed, contradicting the GAPB guidelines. Conversely, the consumption of ultra-processed foods was high, with 93.75% of adolescents reporting intake of at least one of these products on the assessed day.

DISCUSSION

The results of this study demonstrate an association between the consumption of specific foods and increased median BMI among adolescents with obesity. In particular, lower consumption of beans and higher intake of ultra-processed foods, such as filled cookies, sweets, and confectionery, were associated with higher BMI values. This dietary pattern reflects a preference for ultra-processed, sugar-rich products, to the detriment of traditional foods such as beans, which are commonly associated with healthier and more balanced diets.

This dietary trend is situated within a broader context of vulnerabilities inherent to adolescence, defined as the period between 10 and 19 years, representing the transition from childhood to adulthood. This stage, marked by intense physiological, psychological, and social transformations, directly influences eating behavior⁹. In response to these challenges, Fascicle 5 of the GAPB Protocols⁶ proposes specific guidelines for adolescents, emphasizing the encouragement of daily consumption of beans, fruits, vegetables, and legumes; the reduction of ultra-processed food intake; as well as the adoption of mindful eating practices and the avoidance of skipping meals. These recommendations become even more relevant when contrasted with the dietary patterns observed in this study.

This scenario is also supported by findings from Bailey *et al.*⁷, who analyzed NHANES (2009–2012) data from more than 16,000 participants and demonstrated that adolescents exhibit the highest proportion of energy derived from added sugars in the diet (16.2%), significantly exceeding that of children and adults. Even more concerning results were reported by Horta *et al.*¹⁰, who identified ultra-processed food consumption corresponding to 39.7% of total energy intake among adolescents in Barbacena-MG. Additionally, Magriplis *et al.*¹¹ demonstrated that added sugar consumption exceeding 10% of total energy intake is significantly

associated with increased overweight and obesity among adolescents, even after adjustment for other dietary factors, reinforcing the importance of controlling this nutrient in the prevention of excess weight.

In line with the prevention of excess weight, the role of breakfast is noteworthy. Although this study did not find a statistically significant association between skipping breakfast and BMI values, a trend toward higher median BMI (40.7 vs. 34.3) was observed among adolescents who skipped this meal, possibly limited by sample size. This relationship is supported by the meta-analysis conducted by Wang *et al.*¹², which included more than 320,000 children and adolescents and found a significant association between skipping breakfast and a higher prevalence of excess weight. Fascicle 5 of the GAPB⁶ emphasizes that maintaining regular breakfast consumption contributes to a more balanced diet, suggesting simple practices such as starting with light meals (e.g., fruits or bread with butter), as well as strategies to overcome common barriers such as lack of appetite or time in the morning.

In addition to the relevance of breakfast, another finding of concern is the low consumption of fruits among adolescents, observed in only 15.63% of the sample. Although no statistically significant association with BMI values was found, this remains a worrying finding given the importance of this habit for overall diet quality. A recent meta-analysis reported that, although the reduction in BMI did not reach statistical significance, increased fruit consumption was associated with a significant reduction in waist circumference ($p = 0.03$) and a lower prevalence of obesity among children and adolescents ($p < 0.05$), suggesting beneficial effects not fully captured by traditional body mass parameters¹³. Fascicle 5 of the GAPB⁶ reinforces the importance of daily fruit consumption and proposes practical strategies to encourage this habit, such as

highlighting the convenience of fruits, promoting their availability at home, and suggesting their use as snacks for consumption outside the home.

The data on inadequate and persistent dietary habits are concerning, especially during adolescence, a period characterized by rapid growth and changes in body composition that require a balanced diet¹⁴. This reality is also discussed in Fascicle 5 of the GAPB⁶, which, recognizing the high prevalence of ultra-processed food consumption among adolescents, proposes concrete strategies to address the challenges that hinder the adoption of healthy eating practices in this group. Reinforcing the severity of this scenario, the WHO⁸ reports that the prevalence of overweight among children and adolescents has nearly tripled in recent decades, increasing from 8% in 1990 to 20% in 2022, establishing itself as one of the major global public health problems.

Alves *et al.*¹⁴ also identified, among adolescents in public schools, reduced intake of raw vegetables and dairy products, highlighting the limited presence of nutritious foods in the dietary routine of this age group. Similarly, in the present study, only 43.75% of adolescents reported consuming vegetables on the evaluated day. Complementarily, a study involving 1,438 adolescents from public schools in João Pessoa-PB, which also used the 24hDR, found that dietary patterns characterized by the consumption of processed meats, butter, savory biscuits, sweets, and sugar-sweetened beverages were associated with worse metabolic outcomes, such as obesity. Conversely, previous studies identified that a traditional dietary pattern – characterized by high factor loadings for rice, beans, tubers, and meats – was associated with lower adiposity and a better lipid profile¹⁵.

Aligned with the relevance of traditional dietary patterns and the present findings, Fernandes Gomes *et al.*¹⁶ analyzed data from Brazilian adolescents and found that frequent bean consumption

(five or more times per week) was positively associated with better nutritional outcomes, including a lower prevalence of overweight and obesity, as well as healthier eating practices, such as regular consumption of fruits and vegetables. The findings of this study corroborate the recommendations of Fascicle 5 of the GAPB⁶, which emphasizes the importance of considering the complex physiological, psychological, and sociocultural transformations inherent to this life stage, which influence dietary choices and lifestyle behaviors among adolescents. In this regard, school, family, and community environments should facilitate access to and consumption of traditional and nutritious foods, such as fruits, vegetables, and legumes, exemplified by beans in the present study.

Despite the relevance of these findings, some limitations must be considered. Dietary intake was assessed using a single 24hDR, a method widely used in epidemiological studies due to its practicality, low cost, and detailed capture of recent intake; however, it presents important limitations, such as reliance on participants' memory to report and quantify consumed portions, which may compromise data accuracy. Moreover, its isolated application does not allow estimation of habitual dietary intake, as it does not account for intra-individual variability in diet¹⁷, a limitation also recognized in studies involving adolescents that use this instrument^{15,17,18}. Thus, the results reflect point-in-time dietary intake and should be interpreted with caution. In addition, no adjustment for multiple comparisons was performed, and the potential increase in type I error risk should be considered when interpreting the findings. The cross-sectional design also precludes causal inference, with the possibility of reverse causality. Finally, the use of Fascicle 5 of the GAPB does not specifically address certain food groups, such as foods of animal origin, which should be considered in the interpretation of results.

CONCLUSÃO

It can be concluded that dietary intake was associated with BMI among adolescents, with higher consumption of ultra-processed foods being related to higher BMI values, and consumption of minimally processed foods, such as beans, being associated with lower BMI values. These findings reinforce the importance of nutrition education strategies based on the guidelines of Fascicle 5 of the GAPB, aimed at promoting healthier food choices from adolescence. Early adoption of ade-

quate dietary habits, combined with public policies focused on food and nutrition education, food security, and regulation of food supply, may contribute to improving nutritional indicators throughout life. As a limitation, it should be noted that the use of Fascicle 5 of the GAPB does not specifically address the consumption of foods of animal origin, such as dairy products, eggs, and meats (non-ultra-processed), thereby restricting the assessment of important dietary components.

CRedit author statement

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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