



Influence of Food Choices on Children's Nutritional State

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Abstract

Objective: To evaluate the influence of food choices on children's nutritional status.

Methods: Cross-sectional, analytical study with a quantitative approach, carried out in a private school in Fortaleza / CE, during the month of October 2017. The final sample of the study was composed of 34 children from the 1st year of elementary school. We measured weight and height to measure nutritional status, in addition to physical examination to detect possible nutritional deficiencies. To diagnose children's food preferences, we offer three types of food in different categories (popcorn, orange juice and chocolate chip cookies). We monitor the frequency of the food the children took for lunch at school. Results: Most children had ideal weight, but about 44% (n = 19) were overweight. From the physical examination, the signs that appeared more often were nails with small white spots followed by the pale conjunctiva, but most children did not present any changes. Children showed a greater preference, as well as consumption of the ultra-processed foods offered.

Conclusion: Parents are the biggest influencers of their children's eating habits and, despite the high level of education of the majority, they should encourage healthier habits; they provide food for their children that can lead to illnesses like obesity and nutritional deficiencies.

Keywords: Child Nutrition; Nutritional Deficiencies; Nutritional Status; Pediatric Obesity

Introduction

The infant stage forms eating habits that extend into adulthood. Parents, family and school are of great importance in forming these habits, as children do not have the power to choose the foods that will benefit them [1].

Children aged 7 to 10 years are in the period of change from childhood to adolescence. This phase has intense physical activity, a progressive growth rhythm and a facility for weight gain close to the spurt. It is essential that the quantity and quality of food are appropriate for caloric and nutritional needs and those healthy practices are encouraged [2].

However, in recent years, there has been a transformation in children's eating habits, such as increasing consumption of processed foods that are rich in sugars, fats and sodium; in addition, there has been a decrease in the consumption of foods source of vitamins and minerals like fruits and vegetables. This dietary modification ended up leading to an increase in cases of obesity and nutritional deficit in childhood [3].

Overweight and obesity are emerging earlier and earlier in children, unlike malnutrition that has been decreasing, although it still exists, different from some years ago, where the reality was the opposite [4]. According to the Nutritional Food Surveillance System (SISVAN) [5], the prevalence of high weight for age in Brazil in children aged 5 to 10 years of both sexes, in the years 2014, 2015 and 2016 was 8.74%, 9.16% and 10.61%, respectively.

On the other hand, the weight deficit of 5.7% in the years 1974 to 1975 increased to 4.3% in males, and from 5.9% to 3.9% in females. This result leads to a simple decrease in innutrition, while obesity increases every year [6]. Thus, it was found that despite the increase in overweight students, they are showing nutritional deficiencies, which may have been caused by the increased consumption of processed and ultra-processed foods that have a hyper caloric and nutritionally poor composition [7]. Micronutrient deficiency mainly affects children's physical and cognitive performance, in addition to inadequate growth [8].

Due to the prevalence of overweight children and an abundance of processed foods in the daily life of this public, it is essential to raise the children's guardians' awareness of the harmful effects of these foods and what nutritional status their children are in if it is necessary to intervene and carry out educational actions both public and private. Thus, the research aimed to assess the influence of food choices on the nutritional status of children.

Methods

This is a cross-sectional, analytical study with a quantitative approach, carried out in a private school in Fortaleza / CE, in October 2017. We sent the informed consent form and the socioeconomic questionnaire to 76 parents. Thirty-nine parents signed the terms. Of these, four had some type of food allergy and one child missed the day of the anthropometric assessment. Thus, the final sample was composed of 34 children from the 1st year of elementary school.

We check weight and height to assess nutritional status. We measure weight on a 200 kg portable digital scale. As for height, we used a measuring tape fixed on a straight wall, without a baseboard, in which the students should stand on their backs and place their feet against the wall with the upright column and arms relaxed, with heads positioned, considering the Frankfurt Plan (imaginary plane that passes through the orbit and external auditory meatus) [9].

From these measures, the Body Mass Index (BMI) was obtained and analyzed from WHO growth curves for age in months (BMI / A). Another parameter used for the nutritional diagnosis was the Height for Age (E / A) that expresses the linear growth, being the index that better indicates the effect of situations that can affect the children's growth.

We carried out the evaluation of the physical examination was carried out in a systemic and progressive way, starting at the head and ending at the feet, according to the direction of the caudal skull [10] for the detection of possible nutritional deficiencies through the clinical signs observed in the hair, nails, skin, eyes and others. We observed the most common signs among children: pallor, pale conjunctiva and dull nails caused by iron deficiency; bitot spot caused by vitamin A deficiency. We also checked for the possible presence of xanthelasma, small yellow bags around the eyes formed due to hyperlipidemia; angular stomatitis, angular wounds and

cheeks caused due to a lack of riboflavin; nails with small white spots caused by zinc deficiency; among other signs.

To assess students' food choices, we offer three foods from different categories: orange juice, cookies and popcorn. We display food on a table and invite each child to choose the food of their choice. First among the natural orange juice, natural orange juice with sugar and industrialized orange juice (powdered); then, decide between the chocolate-filled cookie, the whole cookie, and the chocolate cookie; and finally choose between natural popcorn with salt and microwave popcorn with salt. After tasting each food, the students declared their preference and we noted it in our report.

Finally, they monitored for five days what food the children took to school for lunch, or bought in the school cafeteria. The researchers before the break time examined the students' lunch boxes and recorded the food brought from each one. Finally, we also monitor the food that the students bought in the canteen.

Data analysis was performed using descriptive statistics, analysis of variance (ANOVA), simple correlation and comparison between means by the Tukey test, using the GraphPad Prism® version 6.0 software, the results that were considered significant when $p < 0.05$. The Ethics Committee of the University of Fortaleza, under opinion No. 53969416.0.0000.5052, approved the study.

Results

The sample consisted of 34 students of both sexes, the majority of whom were female with 64.70% ($n = 22$) and 35.29% ($n = 12$) male, aged between 6 and 8 years. According to the analysis of the socioeconomic data, the majority of the students' guardians 44.11% ($n = 15$) had completed Higher Education.

The anthropometric profile of the children is shown in (Table 1), where the majority of children presented ideal weight, however, about 44.10% ($n = 15$) of the children were overweight.

Classification	(N=34)	%
Marked thinness	0	0
Thinness	0	0
Ideal weight	19	55.88%
Overweight	8	23.52%
Obesity	4	11.76%
Severe Obesity	4	8.82%

Table 1: Anthropometric assessment according to BMI by age for children aged 5 to 10 years according to WHO 2006.

The anthropometric evaluation, according to height for age, showed that 100% ($n = 34$) of the children evaluated had an adequate height for their age. Among the clinical signs investigated, the one with the highest prevalence was nails

with small white spots, followed by the pale conjunctiva, however, 35.29% (n = 12) of the students did not present any type of physical alteration.

(Table 2) shows the analysis of the students' food preference through taste, according to the foods offered in the tasting stage, obtained a prevalence of choices between the three categories of foods by ultra-processed foods.

Food	(n=34)	%
Natural orange juice	4	11.76%
Sweetened natural orange juice	3	8.82%
Industrialized orange juice	27	79.41%
Integral chocolate cookie	5	14.70%
Chocolate Cookie	10	29.41%
Stuffed chocolate chip cookie	19	55.88%
Corn Popcorn	1	2.94%
Microwave popcorn	33	97.05%

Table 2: Arrangement of children's food choices according to taste.

(Figure 1) analyzes the frequency of foods in the lunch box, into seven categories. Among these categories, the ones that obtained more prevalence are equivalent to ultra-processed foods, being similar with the tasting phase where this same group obtained superior choices.

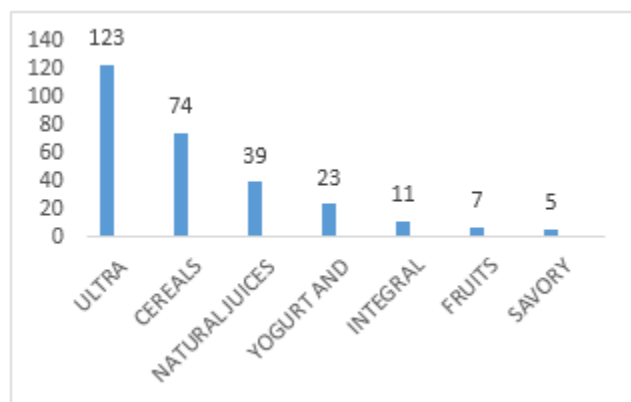


Figure 1: Frequency of food in the students' lunch box in decreasing order of the five collections.

After correlating the variables of parents' education, parents' marital status, income, food preferences, anthropometric status, we found no significant correlation $p > 0.05$.

Discussion

A survey carried out in Paraíba where they assessed the nutritional status of children showed that the majority studied were overweight and then underweight [7]. Showing a different result from the present study, which mostly consisted of children with normal weight and overweight. These findings showed a similar result between studies and revealing that the number of children overweight is currently increasing. About

30% of the child population, aged five to nine years in the Northeast are overweight [11].

A study carried out with children from six to ten years old to show the relationship between eating behavior and nutritional assessment, it was observed that most of the students analyzed presented ideal weight and then overweight, however, more than half (51%) had some degree of overweight [12]. The current study obtained similar results in relation to anthropometric data.

A survey done to analyze the nutritional status and nutritional deficiencies in children, evaluated Body Mass Index for age, height for age and clinical signs that revealed a relevant number of children with growth deficit and micronutrients [7]. In contrast, the current study showed that all children evaluated were of an adequate height for their age, which may indicate that they do not have longitudinal nutritional deficiencies.

Micronutrient deficiency mainly affects children's physical and cognitive performance, in addition to adequate growth. A review study conducted with Indian children showed that among micronutrients, the highest prevalence of deficiencies are folic acid, riboflavin and iron. ⁸ On the other hand, the present study found zinc deficiency to be the most prevalent, followed by iron, which is an almost insignificant value.

In Brazil, children manifest a high inadequacy of nutritional status, due to the high prevalence of micronutrient deficiency, mainly of iron, vitamin A and zinc and by the large number of overweight children. A possible attribution of this result is the erroneous feeding practices in childhood, since the early cessation of breastfeeding, the incorrect introduction of complementary foods and the abusive ingestion of processed foods that contain excess sugar, fat and salt [13]. Among the categories analyzed, ultra-processed foods that they are precisely the contributors to this high inadequacy of the nutritional status, they are the most present in the children's food according to the current research.

A study analyzed the composition of the school lunch for children at a private school in São Paulo, Brazil showing that the three main food groups most present in schoolchildren's snacks are cereals, artificial juices and milk and dairy products. This result points out that the intake of energy and macronutrients is much higher than that recommended by the PNAE (National School Feeding Program) [14]. Corroborating further, a study carried out the analysis of foods found in lunch boxes of schoolchildren from public schools in Fortaleza-CE and concluded that there was a high frequency of processed foods classified as processed [15].

The study carried out by Matuk, Stancari, Bueno and Zaccarelli [16] indicated that among the food categories, the most present in schoolchildren's snacks are cereals with 82%, artificial juices and other drinks with 67% and milk and derivatives with 65%. These results are in accordance with the conclusion of the present study, which may point out that

usually the existing foods in the lunch boxes are inherent to these three food groups.

With the change in eating habits, more and more children are consuming industrialized foods. These foods, in addition to not having adequate nutritional value, hinder the absorption of nutrients ingested through fresh foods that have recently been decreasing in the schoolchildren's diet. An example is phosphate soft drinks that increase the excretion of calcium in the urine [17]. This corroborates with the current study where ultra-processed foods are among the most consumed and fruits are in penultimate among the foods taken for children's snacks.

A study carried out in municipal schools in the State of Paraná, assessed the children's nutritional status by BMI by age, and found that most participants were of adequate weight. This same study also verified assessed food consumption of healthy and unhealthy foods. Regarding healthy foods such as fruits and vegetables, comparing overweight children with those of adequate weight, there was a considerable difference, showing that most children with adequate weight consume more than three times a week. Regarding the consumption of unhealthy foods, there was no significant difference between these two groups, this result can be associated with the high consumption of ultra-processed foods, as well as the current study that showed that high calorie foods are present in the consumption of children with adequate weight and overweight children [18].

Excess weight is increasingly noticeable in the child population, in contrast to the malnutrition that has been decreasing; however, there is still a divergence from some years ago, where the reality was the opposite.

This increasing number is most often the responsibility of parents, who early and constantly offer their children foods with low nutritional values, contributing in a harmful way to the development of children [4]. In this study, we realized that parents are of paramount importance, especially in forming their children's habits and even in eating habits, because the children do not have the discernment to choose the foods that will benefit them. However, even those theoretically having a higher education and knowing the harm that these foods can provide to your children continue to offer them. During the childhood phase, eating habits are formed and learned that extend into adulthood and therefore parents are essential in this process, as they are the ones who will guide their children to make the best choices, however, in the current framework those responsible continue to offer food with low nutritional value.

This is one of the factors that can contribute to causing overweight in children, making it increasingly evident, becoming an epidemiological scenario in Brazil and worldwide. One of the main causes of this epidemic is the abundance of ultra-processed foods that are hyper caloric and nutritionally poor, thus contributing to the emergence of diseases such as obesity and nutritional deficiencies. It is noteworthy that

studies with a longitudinal design are essential to consolidate the evidence base on the consequences of food choices on the nutritional status of children.

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References

1. Portuguese Association of Nutritionists (PT). School Age Food: Practical Guide for Educators 2013.
2. Brazilian Society of Pediatrics (BR), Department of Nutrology. Guidance manual for feeding infants, preschoolers, schoolchildren, adolescents and at school. 3^a. ed. Rio de Janeiro, SBP, 2012.
3. Vieira DA, Castro MA, Fisberg M, Fisberg RM (2017) Nutritional quality of dietary patterns of children: are there differences inside and outside school? *J Pediatr (Rio J)* 93:47-57.
4. Lopes JI, Lange SG, Navarro F (2013) Nutritional profile of preschoolers from the Municipal Network of Assis Chateaubriand in the State of Paraná. *Brazilian Journal of Obesity, Nutrition and Weight Loss* 7:131-137.
5. Ministry of Health (BR), Nutritional Food Surveillance System - SISVAN. Report of the nutritional status of individuals followed up by period, stage of the life cycle and index: years 2014, 2015, 2016. Brasília; Ministry of Health.
6. Brazilian Institute of Geography and Statistics (BR). Survey of family budgets - POF - 2008-2009: anthropometry and nutritional status of children, adolescents and adults in Brazil. Rio de Janeiro: IBGE; 2010. [accessed on: 20 apr. 2017].
7. Santos JLB, Palmeira PA, Cardoso VVBP, Frazão MF (2016) Nutritional status, clinical signs of nutritional deficiencies and social vulnerability among children from the semi-arid region of Paraíba. *Demetra* 11: 1031-1048.
8. Swaminathan S, Edward BS, Kurpad AV (2013) Micronutrient deficiency and cognitive and physical performance in Indian children. *EJCN* 64: 467-474.
9. Ministry of Health (BR), Department of Health Care, Department of Primary Care. Guidance for the collection and analysis of anthropometric data in health services: technical standard of the Nutritional Food Surveillance System - SISVAN. Brasília: Ministry of Health, 2011.
10. Mussoi TD. Nutritional assessment in clinical practice: from pregnancy to aging. Rio de Janeiro: Guanabara Koogan; 2015.
11. Brazilian Association for the Study of Obesity and Metabolic Syndrome (BR). Obesity map 2016.
12. Passos DR, Gigante DP, Maciel FV, Matijasevich A (2015) Infant eating behavior: comparison between overweight and underweight children at a school in the city of Pelotas, RS. *Rev Paul Pediatr* 33: 42-49.

13. Carvalho CA, Fonsêca PCA, Priore SE, Franceschini SCC, Novaes JF (2015) Food consumption and nutritional adequacy in Brazilian children: systematic review. Rev Paul Pediatr 33: 211-221.
14. Mello AV , Morimoto JM., Paternez ACAC (2016) Nutritional value of snacks consumed by students from a private school. Ciência&Saúde 9: 70-75.
15. Nunes MPO, Santiago FES, Matos RSD et al. (2019) Analysis of the presence of industrial food in children's lunch boxes. MOJ Anat&Physiol6: 196-200.
16. Matuk TT, Stancari PCS, Bueno MB, Zaccarelli EM (2011) Composition of lunch boxes for students from private schools in São Paulo. Rev Paul Pediatr29:157-163.
17. Brazilian Society of Pediatrics (BR). Healthy Snack - Guidance manual. São Paulo: SBP, 2012.
18. Camaduro SDP, Oliveira DV, Bennermann RM, Silva ES, Gonçalves JE (2016) Food consumption and nutritional assessment: characterization of students in the city of Maringá - Paraná. Cinergis17: 146-149.

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