

Nutritional Intervention Based on Ludic Activities: Effect on Eating Habits and Nutritional Status of Brazilian Schoolchildren

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Abstract This study aimed to evaluate the effect of a nutritional intervention on eating habits and nutritional status of schoolchildren. It is a non-controlled intervention study with children from the 4th grade of elementary of nine public schools of a Brazilian metropolis. Five workshops based on healthy eating habits were performed using ludic activities. Eating habits (food frequency questionnaire) and anthropometry (weight and height) were evaluated before and after the intervention. Nutritional status was obtained by Body Mass Index (BMI)-for-age. McNemar test was performed with 5% significance. We evaluated 613 students with a median age of 9.4 (8.6-11.9) years. After the nutritional intervention, we observed a reduction in the consumption of chips, cookies, candy, artificial juice and soft drinks ($p < 0.05$). There was no significant change in the nutritional status ($p > 0.05$). The intervention had a positive effect on eating habits of schoolchildren which might contribute to future changes on nutritional status.

Keywords: *nutritional intervention, schoolchildren, food consumption, nutritional status, child health*

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1. Introduction

A food intake balanced on energy and nutrients during childhood is essential to promote adequate growth and development and prevent chronic diseases. [1]

Despite the importance of healthy eating habits for children, a low consumption of fruits, vegetables and dairy products is commonly observed in this population, with an excessive intake of food with high energy content, such as sausages, chips, cookies, soft drinks and artificial juices. [2,3]

The inadequate food intake has a negative impact on the nutritional status and health of schoolchildren. A national survey conducted in 2008-2009 in Brazil revealed that in the last three decades, there was a significant increase in the rate of overweight among children from 5 to 9 years of age (from 10.9% to 34.8% and from 8.6% to 32.0% among boys and girls, respectively). [4]

Considering this scenario, the demand for food and nutritional education emerges as an important instrument to promote healthy eating habits [5], with emphasis on the school environment as a privileged space to develop educational actions. [6]

The use of ludic and interactive interventions is relevant to promote an easy and fun way to learn, favoring changes in

habits and eating practices. [7] Under these circumstances, the present study aimed to evaluate the effect of a nutritional intervention on eating habits and nutritional status of schoolchildren.

2. Material and Methods

2.1. Design and Study Sample

It is a non-controlled intervention study with children from the 4th grade of elementary of nine public schools of a Brazilian metropolis (Belo Horizonte, 1.43 million inhabitants, 330.9 km²) in 2013.

Using the Epi Info™ 7 software, we estimated the need of 600 participants, calculated from the total number of students in each school. A 95% test power was adopted, with an alpha error of 5% for finite population, with an estimated proportion of 50% for the outcomes.

2.2. Intervention

The intervention was constituted of five workshops based on ludic activities about healthy eating habits. During the meetings, the students received printed informative material and at the end of each workshop received an activity to be performed at home or in the classroom with the teacher.

Workshop	Theme	Ludic Activity	Activity to be performed at home or classroom
1	“Healthy Food”	Skit	Illustrate two baskets, with healthy and unhealthy foods
2	“Fruits and Vegetables”	Dynamic of the 5 senses + expositive class	Bring a recipe that has some fruit or vegetables as ingredients
3	“How to eat safe food”	Truth or Lie Game + Skit + expositive class	Write an essay on everything learned until the third meeting
4	“Safe and balanced food”	Visit to the food bank + Cooking healthy recipes + interview with the nutritionist	Create with the teacher a ludic activity about healthy eating habits
5	Reviewing Healthy Eating Habits	Schoolchildren presentation about all the topics addressed during the intervention	-

Figure 1. Description of the five workshops of the intervention

The themes and methodology used in each workshop are described in Figure 1. All the meetings were held in the schools. The last meeting was a presentation about the topics addressed during the intervention, conducted by the schoolchildren with the participation of the families.

2.3. Data Collection

A face-to-face questionnaire was applied to the schoolchildren before and after the nutritional intervention. Data collection was carried out by nutritionists and nutrition students and allowed the evaluation of eating habits, and anthropometry (weight and height).

Eating habits were assessed by a qualitative food frequency questionnaire (FQQ), referring to food consumption in the last six months. [8]

To assess the nutritional status, weight and height were measured according to the techniques recommended by the World Health Organization. [9] Using these data, we calculated the body mass index (BMI)-for-age and evaluated the nutritional status according to the criteria proposed by the World Health Organization [10] and the Brazilian Food and Nutrition Surveillance System. [11]

2.4. Statistical Analysis

Data were analyzed using the Statistical Package for Social Sciences (SPSS) software version 19. The Kolmogorov-Smirnov test was applied to evaluate the adhesion of the variables to the normal distribution. Afterwards, descriptive analysis was conducted by calculating frequencies and measures of central tendency and dispersion. To evaluate the effectiveness of the nutritional intervention, the McNemar test was applied, adopting the significance level of 5%.

2.5. Ethical Aspects

This research was approved by the Research Ethics Committee of the Universidade Federal de Minas Gerais (CAAE 00734412.0.0000.5149). Written informed consent was obtained from the parents/guardians of all participants.

3. Results

We evaluated 613 schoolchildren, of which 53.0% were male, with a median of 9.4 (8.6-11.9) years of age. Before the intervention, there was a high prevalence of inadequate eating habits and a low prevalence of fruit and vegetable consumption (Table 1).

Table 1. Frequência de consumo alimentar dos escolares antes e após a intervenção. Belo Horizonte/MG, 2013

Foods	Before Intervention (%)	After Intervention (%)	p Value*
Chips (≥ 3 times/week)	17.3	10.8	0.001
Cookies (≥ 3 times/week)	34.4	24.1	<0.001
Soft Drinks (≥ 3 times/week)	34.2	25.2	<0.001
Candy (≥ 3 times/week)	39.1	24.6	<0.001
Artificial Juice (≥ 3 times/week)	50.5	33.3	<0.001
Fruits (≥ 1 time/day)	42.2	44.7	0.373
Vegetables (≥ 1 time/day)	42.6	41.4	0.694
Natural Juice (≥ 1 time/day)	23.1	22.6	0.886

*McNemar test.

After the nutritional intervention, there was a reduction in the frequent consumption (≥ 3 times/week) of chips (17.3% vs. 10.8%, $p=0.001$), cookies (34.4% vs. 24.1% %, $p<0.001$), candy (39.1% vs. 24.6%, $p<0.001$), artificial juice (50.5% vs. 33.3%, $p<0.001$) and soft drinks (34.2% vs. 25.2%, $p<0.001$) (Table 1).

Regarding nutritional status, a high prevalence of overweight (31.5%) was observed, without changes after the intervention (Figure 2).

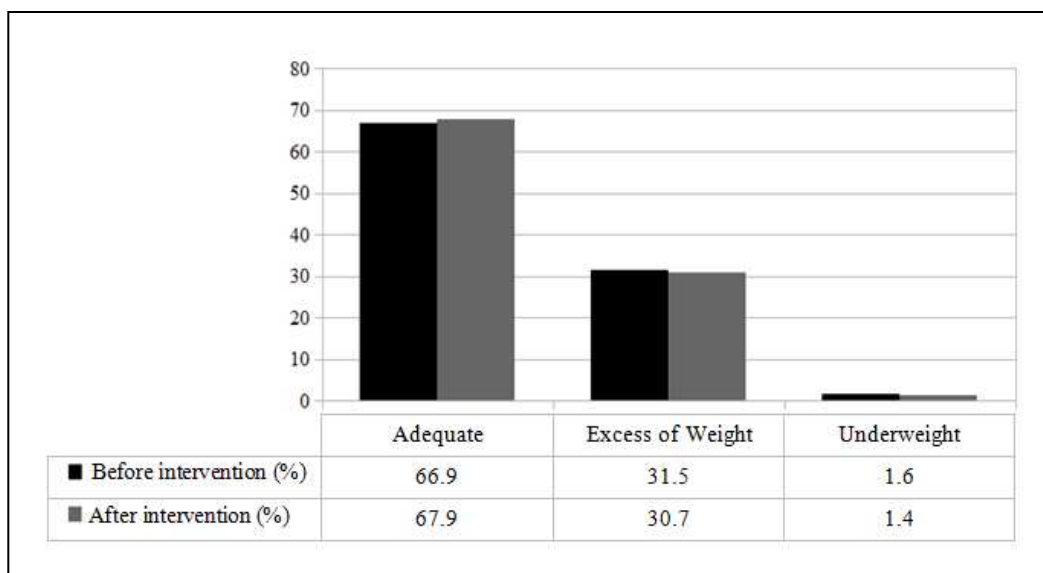


Figure 2. Nutritional status of schoolchildren before and after the nutritional intervention

4. Discussion

We found high a prevalence of inadequate eating habits and excess weight before the intervention. At the end of the study a reduction in the frequent consumption of chips, cookies, candy artificial juice and soft drinks it was observed, with no changes in the nutritional status.

The high prevalence of inadequate eating habits observed in our sample corroborates with other studies conducted with schoolchildren. [3,12,13]

Daboné et al. (2013) in a study with 769 schoolchildren found reduced consumption of fruits and vegetables. In addition, the consumption of unhealthy foods such as candy, soft drinks and cookies was significantly higher when compared to healthy ones, denoting the need for nutritional interventions with this public. [3]

The intervention adopted in this study was effective to improve eating habits of schoolchildren. The reduction of ultraprocessed food intake among schoolchildren is important in the prevention of noncommunicable diseases and the formation of healthy eating habits. A national survey involving a sample of 55,970 Brazilian households revealed that the availability of ultraprocessed food was positively associated with increased BMI and the prevalence of overweight and obesity in childhood. [14]

However, no changes in nutritional status were observed after the intervention. A systematic review with meta-analysis performed by Friedrich et al. (2012) included two studies that evaluated the effect of nutritional intervention on the reduction of BMI with 3,524 participants. Similarly to our study, the authors concluded that nutritional education interventions did not show a significant effect on BMI reduction. [5]

This result can be explained by the fact that changes in body weight do not occur in a short period considering the multiple factors associated with child anthropometry, such as hereditary, environment and physical activity practice [5], while changes in dietary intake can be observed in a shorter period of time. [12,13]

The present investigation presents the absence of a control group, to assure that changes identified were in fact due to the intervention, as a limitation. However, it

stands out as an inexpensive and feasible intervention, with wide possibility of implementation in the school context.

5. Conclusions

The short-term nutritional intervention resulted in qualitative improvements in schoolchildren eating habits, which may contribute to future anthropometric changes. The design and methodology of the workshops developed indicate its feasibility and viability in food and nutrition education programs.

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Statement of Competing Interests

The authors have no competing interests.

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