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ORIGINAL

Innovative methods in nutritional interventions through sensory-based workshops with preschool children

Métodos inovadores em intervenções nutricionais com pré-escolares por meio de oficinas sensoriais

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ABSTRACT

Objective

This study aimed to describe the sensory workshops carried out as part of an intervention study developed in 2018 (Brazil), designed to promote the consumption of vegetables, legumes, and fruits among preschool children aged 4 to 6 years old (n=179).

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Methods

The study comprised three stages: (a) raising awareness among the school staff and parents; (b) collecting data on children's food consumption; and (c) conducting sensory-based workshops. Through experimentation, children were encouraged to explore the senses of smell, taste, sight, hearing, and touch to learn about foods. Five workshops were held weekly each one corresponding to one of the senses. Participatory and interactive dynamics as well as playful techniques were adopted to stimulate children's interaction with foods and verbal expression about the experiences.

Results

Through experimentation, the senses of smell, taste, sight, hearing, and touch were explored, enabling children to learn about food and preparations.

Conclusion

The low-cost sensory method proved easy to apply and its replication in the school environment to promote healthy eating in preschoolers should be encouraged. Brazilian Registry of Clinical Trials, under the register number RBR-5b6zrg.

Keywords: Food and nutrition education. Infant food. Preschoolers.

RESUMO

Objetivo

O objetivo deste estudo é descrever as oficinas sensoriais realizadas no âmbito de um estudo de intervenção desenvolvido em 2018 (Brasil), para promover o consumo de verduras, legumes e frutas em pré-escolares de 4 a 6 anos (n=179).

Métodos

O estudo compreendeu três etapas: (a) sensibilização dos funcionários da escola e responsáveis; (b) coleta de dados sobre o consumo alimentar das crianças; e (c) realização de workshops de base sensorial. Por meio da experimentação, as crianças foram incentivadas a explorar os sentidos do olfato, do paladar, da visão, da audição e do tato para aprender sobre os alimentos. Semanalmente foram realizadas cinco oficinas, cada uma correspondendo a um dos sentidos. Dinâmicas participativas e interativas, bem como técnicas lúdicas foram adotadas a fim de estimular a interação das crianças com os alimentos e a expressão verbal sobre as experiências.

Resultados

A experimentação dos sentidos do olfato, paladar, visão, audição e tato foram explorados, possibilitando que as crianças aprendessem sobre alimentos e preparações.

Conclusão

O método sensorial de baixo custo mostrou-se de fácil aplicação, e sua replicação no ambiente escolar para promoção da alimentação saudável em pré-escolares deve ser incentivada. Registro Brasileiro de Ensaios Clínicos, número de registro RBR-5b6zrg.

Palavras-chave: *Educação alimentar e nutricional. Alimentação infantil. Pré-escolares.*

INTRODUCTION

Early childhood education is aimed at children up to six years old, an age group with high biological vulnerability to nutritional problems. In this phase, the child develops motor, language, and social skills, and depends on adults to receive adequate food. Nutritional guidelines designed for this age group favor healthy eating habits and practices to ensure an adequate diet; furthermore, the insertion of new foods in the children's diet should occur according to their development stage [1].

In Brazil, nationwide studies on preschoolers' food consumption are scarce. In 2006, the National Demography and Health Survey of Children and Women (*Pesquisa Nacional de Demografia e Saúde da Criança e da Mulher – 2006*) evaluated approximately 5,000 children under 5 years old and showed that 7.3% of these children were overweight when evaluated by the weight-to–height index. These results

indicate that this group is moderately exposed to the risk of excessive weight gain and stunting [2]. Diet quality is among the causes of these conditions.

According to the Food and Agriculture Organization, the school is the ideal setting for the development of interventions that encourage healthy eating due to the fact that it reaches a great number of children on a daily basis during a long period, beyond reaching the children's families and the local community [3]. In Brazil, guidelines on school feeding indicate several approaches to the introduction of new foods to young children, involving playful activities, such as drawing, theater or themed stories, thereby bringing the food to the classroom [1]. The Framework of Food and Nutrition Education for Public Policies (*Marco de Referência de Educação Alimentar e Nutricional para as Políticas Públicas*), a document that presents the premises that should permeate the actions of food and nutritional education in Brazil, points out that these actions should favor the individual autonomy in food choices and practices. For example, increasing cooking skills enables the awareness on sensory, cognitive, and symbolic dimensions of food; thus, food and nutrition education actions that involve the handling of food and cooking are emancipatory practices that encourage active participation in building a better quality of life and the empowerment for healthy food choices [4].

In line with the political proposals for food and nutrition education actions in the school environment, the SAPERE method, by placing the food as the focus of educational activities, allows to explore in depth the sensory, cognitive and symbolic dimensions of food. Interventions based on the SAPERE method have been carried out in Europe with the aim of promoting healthy eating among preschoolers [5]. The SAPERE method, developed in France in the 1970s, consists of workshops with activities that stimulate the senses of smell, taste, touch, sight, and hearing to make young children more aware of and familiarized with foods. These experiences showed that children that participated in the workshops gained cooking skills and ate a greater variety of foods, especially fruits and vegetables. In addition, it was evidenced that eating in groups encouraged the most reluctant children to try new foods [6-8].

The present work describes sensory workshops based on the SAPERE method adapted to the context of public schools of early childhood education in Brazil.

METHODS

The sensory-based workshops were carried out within the scope of the intervention study "Expansion of Preschoolers Food Repertoire", developed in 2018 to stimulate acceptance and consumption of vegetables, legumes, and fruits among children enrolled in an Early Childhood Education unit in the city of *Rio de Janeiro*. All 231 4-to-6 year-old children registered during the school in the period of study were eligible for the study.

The study team consisted of undergraduate students and faculty from the courses of Gastronomy and Nutrition, which were trained to work in all stages of the study; a manual was prepared to ensure the standardization of procedures.

The study was approved by the Research Ethics Committee of the *Hospital Universitário Clementino Fraga Filho* (CAAE nº 85829518.2.0000.5257), and registered in Brazilian Registry of Clinical Trials, under the register number RBR-5b6zrg. The participation on the study was conditioned to signing the Consent Form by the parents/guardians. The materials used in the workshops were donated to schools.

The workshops were conducted in three stages: (a) raising awareness among teachers, school staff, and parents; (b) collecting data on children's food consumption; and (c) conducting sensory-based workshops.

In the first stage, a meeting between the study team, parents, teachers and the school staff had as purpose to clarify regarding the objectives and dynamics of each workshop. Parents were informed about the details of the entire process involved in the workshops. The second stage consisted of an in-person interview with parents/guardians. The third stage consisted of the workshops, which are described below.

A questionnaire was applied to parents/guardians in an in-person interview to obtain information on children´s and families eating habits, children's preferred and rejected foods. The instrument comprised three modules: a Food Frequency Questionnaire, a questionnaire on parental feeding style, and an adapted version of the SAPERE method questionnaire.

A 50-item qualitative Food Frequency Questionnaire was applied to assess the consumption of vegetables, fruits, legumes, cereals, and markers of unhealthy eating. The parental feeding style was assessed using a 27-item questionnaire cross-culturally adapted from the Parental Feeding Style Questionnaire [9]. Six questions from the original 8-questions instrument presented in the SAPERE method manual were translated and cross-culturally adapted to obtain information about the child's attitude when presented with new foods or flavors, their participation in food preparation at home, food preferences and rejections, and the child greatest challenge in eating [10]. In addition, other questions were added to the questionnaire to obtain data on parent's perception of the child's diet quality; the meals eaten at home; and child's food allergy or restrictions to ensure safety for children's food handling and tasting.

The translation and cross-cultural adaptation of both the questionnaire on parental feeding style and the questions from the SAPERE method followed the procedures proposed by Borsa *et al.* [11]: (a) translation of the instrument by two independent translators; (b) comparison and synthesis of the translated versions, considering semantic, conceptual, linguistic, and contextual issues; (c) modifications based on expert's evaluation related to semantic equivalence and adequacy of the instrument content to the Brazilian culture as well as the use of language and expressions easier to understand by the target audience; (d) back-translation of the Brazilian Portuguese version into English performed by a translator who did not participate in the previous stages of the study; (e) evaluation by a group of 20 parents/guardians of preschool children belonging to the target audience, *i.e.* with similar sociodemographic characteristics. These procedures were performed by experts in nutrition, gastronomy, and psychology.

The procedures adopted in the workshops were based on the SAPERE method, which is focused on sensory experience and knowledge about food to promote healthy eating habits and to develop early childhood independence so that children might express their tastes and preferences in a direction favorable to their health. Through experimentation, the senses of smell, taste, sight, hearing, and touch are explored, enabling children to learn about food and preparations [10,12].

In this study, the sensory-based workshop adapted from the SAPERE method took into account the age of the children involved in the study (4-6 years old) and their level of psychomotor development, the number of children per class, material resources, the physical structure of the school, and the length of the study. The workshops were designed to promote the consumption of vegetables, legumes, and fruits. The general objectives of the workshops involved the stimulation of food-related abilities and specific skills: (a) to develop positive and natural relationship with food in children; (b) to make children familiar with vegetables, fruits and legumes; (c) to help children understand the origin of the foods ; (d) to encourage the acceptance and tasting of varieties of fruits, vegetables, and legumes with which children are not familiar; and (e) to encourage children to use language to express experiences with fruit, vegetables and legumes.

The selection of foods used in the workshops was based on the following criteria: (a) foods avoided or rejected by children; (b) foods available in the study region; and (c) foods included in school meals. Baseline data showed that the foods that met the criteria to be included in the workshops were papaya,

banana, pear, collard greens, cauliflower, carrot, beet, rice, tomatoes, and beans. The materials used in the workshops were selected considering the ease of handling, the possibility of collective and continuous use, reduced cost, and environmental sustainability, prioritizing the reuse of recyclable materials (Table 1).

Five sensory workshops with an average duration of 20 minutes were held every week in a classroom especially prepared for the activities. Each workshop corresponded to one of the senses. The workshops developed participatory dynamics and interactive playful techniques to stimulate the relationship with food and the verbal expression among the children (Table 1).

Table 1 – Description of sensory workshops developed in early childhood schools. *Rio de Janeiro* (RJ), Brazil, 2018.

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Workshop/Sense	Objectives	Foods	Material	Procedures
Touch	To encourage children to feel foods by touching To encourage children to realize differences in the shape, texture, and size of foods	Two varieties of tomato and two varieties of pear	Styrofoam, cardboard, or shoe boxes adorned with adhesive tape	With closed eyes (or blindfolded), children were asked to place the hands inside the box and hold the foods. Then, children were encouraged to verbally express how they perceive the texture, shape, and size of the food. May use phrases such as: "How is it to touch this food?"; "How big is this food?"; "What is the food shaped like?"; "Is it soft or hard?"
Smell	To stimulate children's sense of smell To promote the association of odors with foods among children To stimulate affective memories while smelling the foods To demonstrate that the sense of smell also serves to indicate whether the food is unfit for consumption (burnt, spoiled, *etc.*)	Papaya and bananas	Cups with small holes in the lids, adorned with adhesive tape in order to avoid food inside to be seen	The cut foods (in order to give off more odor) were placed in the cups and children were asked to smell by the hole in the lid. Then, as a group, they were allowed to see and smell the foods again. Children were encouraged to express what the odor remind them or what they felt as smelling the food
Hearing	To stimulate the sense of hearing in children To encourage children to associate sounds with foods and movements To ask children to guess information from the sounds	Black-eyed peas, white beans, rice. Other seeds or grains can be used	Colored plastic bottles with lids. Transparent containers.	The grains were placed separately in the bottles to make rattles and in the containers. Children were asked to shake the rattles, listen to the sounds, and to relate the sounds to the foods in the containers. Children were stimulated to observe the sounds with probe questions as "What is the loudest sound?"; "How different are the noises?"
Sight	To arouse interest and perception about differences in the food shapes, colors, and sizes	Collard greens, cauliflower, and broccoli	Paper and colored crayons	Children were organized into groups up to six students. Paper and crayons were distributed to the groups. Children were asked to draw pictures of the exposed foods. It is recommended to present similar foods, for example, from the same botanical group, but in different colors such as broccoli and cauliflower

Table 1 – Description of sensory workshops developed in early childhood schools. *Rio de Janeiro* (RJ), Brazil, 2018.

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Workshop/Sense	Objectives	Foods	Material	Procedures
Taste	To stimulate children's sense of taste To identify the basic tastes of the foods To encourage children to associate flavors and foods	Carrot rolls with white beans with beets *pâtè* sandwich	Disposable gloves, alcohol gel and napkins	After tasting the sandwiches, the children were encouraged to describe how they appreciated the preparation. Children were asked which foods the taste of the sandwich reminded. The ingredients were revealed.

At the beginning of each workshop, children were invited to sit in a semicircle, facing the workshop's facilitator, which explained the activities that would be developed. Then, they were called to participate in the proposed experiment. After each workshop, they were invited again to sit in a semicircle facing the mural in the room displaying images of the foods that were the focus of the workshop in crops (farms), in the shopping environment (street-markets, grocery stores), and different preparations (dishes). Then, the children were encouraged to make comments on the images and interact with the foods that were available to be touched, smelled, and handled. After the presentation, the images were kept on the classroom mural, and at each new meeting, they were used as a reminder of the previous workshop. In each session, the team took notes regarding the children's behavior.

To encourage the involvement of parents/guardians, the project team elaborated an electronic cookbook with recipes for dishes based on vegetables, legumes, and fruits. The recipes were simple and practical, and there were indications on how to involve children in the preparation of the dishes.

DISCUSSION

This article describes the procedures applied in sensory-based workshops developed within the scope of a food and nutrition education project in a public early childhood education school, focusing on vegetables, legumes, and fruits.

In Brazil, no studies have adopted sensory workshops based on the SAPERE method in nutritional interventions with preschoolers. In European countries, this method has been widespread and is even part of the curricular activities of French elementary schools [12]. Similar studies with preschoolers were carried out to reduce neophobia and improve the quality of the diet in Denmark [13], Norway [14] and Finland [7,8].

Sansolios and Mikkelsen [13] described an intervention protocol, carried out in 2008, in a preschool involving 46 children aged 3 to 6 years old. Similarly to the present study, the intervention was based on sensory workshops. It aimed the increasing of knowledge, exposure, and interest on new foods, with a view to changing eating habits. They proposed five workshops dedicated to the senses concentrated the meetings on a single week. Similar to what was observed in this intervention, the authors emphasized the need to present food in its natural form, given that most children in this age group are not familiar with the process of acquiring and preparing food.

In Norway, Helland *et al.* [14] also described the methods applied in a multicomponent intervention involving 16 early childhood schools involving children with an average of 2 years old at baseline (intervention group: n=69; control group: n=47). The intervention was developed over 3 months and the SAPERE method was applied in 27 sessions to promote the experimentation of new foods, served to children in school meals.

With children separated into small groups (about six participants), the five senses were addressed in each workshop while just one food was the focus. Furthermore, the experience differs from the one described in the present study since it was a longer intervention with a greater number of educational sessions and involved younger children than the ones investigated in this study.

In Finland, two intervention studies applied the SAPERE method to encourage the consumption of vegetables and fruits among children aged 3 to 6 years-old in early childhood education units. Hoppu *et al.* [7] found an increase in the willingness to taste fruits and vegetables by the children in the intervention school (n=44) compared to those in the control school (n=24) when they were exposed to samples of five types of vegetables and three varieties of fruit [7]. Kähkönen et al. [8] evaluated the implementation of the nutrition education initiative based on the sensory method in six early childhood education units, including 68 children (3-5 years), in comparison to a reference group made up of three other units (n=62 children). The authors found that, compared to the reference group, the children involved in the educational actions more frequently selected and tasted the 11 different types of vegetables and fruits displayed at a buffet.

These studies showed that applying the sensory-based method in food and nutrition education programs in the school environment can reduce neophobia and promote healthy eating in early childhood. These studies also suggest the need for longer-lasting interventions and the implementation of activities with small groups, with a maximum of 10 children per session. In this way, time with children is better used and their attention is better directed.

One of the limitations of this study was the failure to hold a cooking workshop, one of the most frequent requests from children. The lack of an appropriate infrastructure led to the decision of addressing the taste by means of food tasting. Furthermore, since the SAPERE method indicates that each child individually carries out all activities and considering that the average number of students per class varied from 20 to 30, some workshops were longer than initially planned. Therefore, it is recommended to have two instructors and to divide the class into two groups to make better use of the time with the children, to reduce dispersion and the waiting time to participate in the activity. Nevertheless, the preschoolers were very interested in and keened on the proposed activities, always showing enthusiasm for new meetings. In fact, the children gladly accepted the proposed activities and it is noteworthy that the hearing session particularly aroused their interest, perhaps because of its connection to musical instruments. In addition, the teachers and school staff also showed interest in the workshops.

The proposed workshops also have strengths. For example, the use of low-cost, recycled, and reusable materials and the focus on foods served in the school meals. These characteristics can favor the acceptance of school meals and provide conditions for the sustainability of actions. Moreover, the debriefing sessions carried out at the closing of each workshop were especially important, as at this moment, the children felt compelled to interact with the workshop team and to handle the foods freely. Thus, it enabled the team to evaluate the children's degree of involvement and satisfaction with the activities.

Additionally, the proposed sensory-based workshops strengthen the public policies aimed at this age group and are in line with the Brazilian policy on schools meals, which are provided free of charge to all students in basic education, prioritizing local foods and emphasizing that food and nutrition education must be approached transversally in the school curriculum [15].

CONCLUSION

The main contribution of this study is to demonstrate the applicability in the school environment of low-cost sensory-based workshops to promote healthy eating habits and increase the food repertoire

in preschoolers. The proposed activities do not require sophisticated material or specialized personnel for implementation and can be incorporated into the school routine. Promoting healthy eating in young children can be an efficient strategy to face the nutrition epidemiological scenario in Brazil, characterized by high rates of overweight and inadequate food consumption. As a food and nutrition education activities, the sensory workshops are inserted into the framework of national food and nutrition policies, in particular, those focused on school health, and among their potential benefits are the appreciation of food, the achievement of autonomy about feeding, and the encouragement of healthy eating.

CONTRIBUTORS

CP COURA, LS MONTEIRO, ML DE CNOP and RA PEREIRA conceived the study. CP COURA, LS MONTEIRO, ML DE CNOP and DA MINUZZO designed the dynamics and the material used in the workshops. CP COURA drafted the manuscript. LS MONTEIRO and RA PEREIRA performed a critical revision of the manuscript; all authors approved the final version of the manuscript.

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