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Food Allergies and Intolerances in Early Childhood Education: A Study in Municipal Schools of Simões Filho, Bahia

Alergias e intolerâncias alimentares na educação infantil: Um estudo em escolas municipais de Simões Filho, Bahia

Abstract

Objective: To assess the availability of information on food allergie (FA) and food intolerances (FI) among children in early childhood education in the municipal public school system of Simões Filho, Bahia. ***Methods***: A cross-sectional study was conducted using data collected from 19 schools, covering approximately 1,607 students, and responses obtained from a questionnaire provided to the guardians of children enrolled in the school with the highest number of students. ***Results***: A prevalence of 57.9% was identified among schools that conducted investigations into food allergies and intolerances. There was a prevalence of 1.3% of cases of food allergies or intolerances among schoolchildren, and 3.4% in the school with the highest number of students. The prevalence was higher among males in daycare, with food allergies primarily involving milk. ***Conclusion***: Encouraging public practices aimed at investigating adverse food reactions is essential to promote the allocation of public funds for purchasing items that meet the nutritional needs of these schoolchildren.

Keywords: Food Hypersensitivity. Food Intolerance. School Meals. Early Childhood Education.

Resumo

Objetivo: Avaliar a disponibilidade de informações sobre alergia alimentar (AA) e intolerância alimentar (IA) em crianças da educação infantil na rede pública de ensino municipal de Simões Filho-BA. ***Métodos***: Pesquisa transversal realizada com dados adquiridos em 19 unidades escolares, contemplando 1.607 alunos e respostas obtidas por questionário fornecido aos responsáveis das crianças matriculadas na escola com maior número de estudantes. ***Resultados***: Identificou-se prevalência de 57,9% de unidades com investigação sobre reação adversa alimentar (RAA). Prevalência de 1,3% de casos de AA ou IA entre os escolares e 3,4% na unidade com maior quantidade de alunos, com prevalência maior entre o sexo masculino, da creche, com RAA envolvendo leite. ***Conclusão***: O incentivo de práticas públicas que visem à investigação de RAA é essencial para promover o direcionamento

de verbas públicas à compra de itens que contemplem as necessidades nutricionais desses escolares.

Palavras-chave: Hipersensibilidade Alimentar. Intolerância Alimentar. Alimentação Escolar. Educação Infantil.

INTRODUCTION

Adverse food reactions (AFRs) refer to any abnormal manifestation caused by the ingestion of food or food additives.[1] Depending on the mechanisms involved, they can be immunological or non-immunological. Immunological reactions trigger food allergies (FAs), which result from a disruptive response to the body's homeostasis after ingestion and/or contact with certain foods.[2] Non immune reactions represent food intolerances (FIs), whose mechanisms are not yet well established, but are known to result from a pharmacological, metabolic, mixed, or idiosyncratic reaction.[3]

Food allergies and intolerances have been gaining significant importance in the scientific community. They can be considered a public health issue due to their growing prevalence, impact on the lives of diagnosed individuals, and demand on the government health sector. Studies have shown an increase in cases of FA and FI in the population, estimating that the current prevalence is greater than 1-2% and less than 10% in the world population in the case of allergies, and varying from 15-20% for intolerances.[3,4]

Among AFRs and according to the Brazilian Consensus on Food Allergy, FA is more common in children and seems to have increased in recent decades, affecting approximately 10% of the world population, with 6% in children under three years of age and 3.5% in adults. It is estimated that most allergic reactions in these children occur outside the home, including schools and educational institutions, indicating a risk and severity.[2,5]

Currently, there is still no cure for FAs. Regardless of the type of clinical manifestation, the consensus is to avoid ingesting the allergen in question and, in the event of accidental contact, seek immediate medical treatment. For FIs, the condition is no different; the best way to treat it is also through a restrictive diet with nutritional guidance to avoid nutritional deficiencies.[6,7]

Allergic reactions can range from mild to severe, so careful handling of food, especially for children, is essential.[8] Aiming to maintain adequate nutritional status and quality of life for children with dietary restrictions, the National Fund for Education Development (FNDE), through the National School Feeding Program (PNAE), made a law in 2014 mandatory adaptation of school meal menus for students with special dietary needs, which is reinforced by FNDE Resolution No. 06/2020.[9,10]

Considering the increasing prevalence and importance of meeting dietary needs, especially among children with food allergies and intolerances, this study aims to investigate the availability of information on FA and FI in children aged 0 to 5 years enrolled in full-time early childhood education in municipal schools in the municipality of Simões Filho, Bahia.

METHODS

A cross-sectional study was conducted with students in municipal early childhood education in Simões Filho, approved by the Research Ethics Committee of the UFBA School of Nutrition, under number 62453822.0.0000.5023. To conduct the research, schools in the municipality of Simões Filho, Bahia (BA), that served children in daycare (0-3 years) and preschool (4-5 years) on a full-time basis, and consequently benefited from the supplementary financial resources provided by the PNAE for school meals.[11]

To compose the research data, secondary data from student records were used, providing information on cases of FA and FI from all full-time early childhood education units in the municipality of Simões Filho. In addition, a convenience sample was conducted with the parents or legal guardians of children enrolled in the full-time unit with the highest number of students, according to data from the Municipal Department of

Education. For this group, a questionnaire addressing cases of AFRs was applied. In parallel, a careful analysis was conducted in collaboration with the education department to assess whether nutritional information forms had been completed or not.

The form is not mandatory in schools, but it is common practice in some schools, with no standard format for those that use it. These forms refer to a questionnaire used to gather information about students' diets. They are filled out at the time of enrollment, based on the answers provided by the person responsible for the enrollment.

The first phase of data collection was carried out through visits to schools or by telephone and/or messaging app contact with the principals of the 19 full-time early childhood education schools in the municipality. The research was presented, and questions were asked about the number of students enrolled, the presence or absence of specific questions regarding dietary restrictions in the students' files, and, finally, the existence, in that file or according to parents' reports, of any cases of FA or FI. If so, the child's name and date of birth were collected, as well as the type of FA or FI and whether the institution had any medical reports to prove it.

At the same time, a request was made for the unit that serves the largest number of children, according to the municipality's census spreadsheet of enrolled students, to participate in the study. To develop the self-administered questionnaire with open and closed questions about food allergies and intolerances, used as an instrument in this stage of data collection, a bibliographic search on the topic was conducted to identify studies that evaluated the prevalence of FA and FI among children. Journals from the Coordination for the Improvement of Higher Education Personnel (CAPES), scientific articles from the MEDLINE/PubMed and Scopus databases, and the SciELO electronic library were included. The search was conducted in August 2022, with a focus on the last five years. The provisions of RDC No. 26/2015 were also taken into consideration.[12]

After approval by the school principal, notices were sent to the students' parents through their class teachers, informing them about the research, as well as the Free and Informed Consent Form (FICF) and the printed questionnaire that needed to be completed. The data generated from the questionnaire responses were organized into a database and transferred to Microsoft Excel® version 2010. A descriptive analysis was performed, with results presented in absolute numbers and percentages. The analysis considered the age cutoff determined by the Ministry of Education through the National Education Council, which is the age up to March 31 for students to be eligible to enter the stages of public education.

RESULTS

Overview of municipal schools in Simões Filho, Bahia, and records of adverse food reactions

In 2022, the municipality of Simões Filho had 90 municipal schools, grouped into six location hubs by the municipality's Central Canteen. Of these, 50 served children, with 19 operating full-time (18 offering early childhood education—daycare and preschool—and one exclusively daycare). The information obtained from contact with the principals of these 19 schools is presented in Table 1.

Table 1. Use of specific forms for RAA and frequency of AA or IA cases in full-time school units in the Simões Filho Municipal Education Network, Bahia, 2022.

Unit	Specific file	Active students (n)	Active students with AA/IA n(%)
Pole Unit 01			
a	Yes	28	0
b	Yes	48	0
c	Yes	64	0
d	Yes	43	2(4.65)
Pole Unit 02			
e	Yes	143	70(4.90)
f	Yes	62	30(4.84)
g	Yes	65	0
h	Yes	163	1(0.61)
i	No	17	0
j	No	53	0
Pole Unit 03			
k	No	88	0
Pole Unit 04			
l	No	60	0
m	No	93	1(1.08)
n	No	167	2(1.20)
o	No	122	0
p	Yes	107	0
Pole Unit 05			
q	Yes	123	1(0.81)
r	Yes	90	2(2.22)
Pole Unit 06			
s	No	71	2(2.82)

a = Pole Unit 01 - School 1; b = Pole Unit 01 - School 2; c = Pole Unit 01 - School 3; d = Pole Unit 01 - School 4; e = Pole Unit 02 - School 5; f = Pole Unit 02 - School 6; g = Pole Unit 02 - School 7; h = Pole Unit 02 - School 8; i = Pole Unit 02 - School 9; j = Pole Unit 02 - School 10; k = Pole Unit 03 - School 11; l = Pole Unit 04 - School 12; m = Pole Unit 04 - School 13; n = Pole Unit 04 - School 14; o = Pole Unit 15; p = Pole Unit 04 - School 16; q = Pole Unit 05 - School 17; r = Pole Unit 05 - School 18; s = Pole Unit 06 - School 19.

Source: Secondary Research Data, 2022.

Among the units, 11 (57.9%) had a specific question or form in the student's file related to dietary restrictions, covering FA and FI. These forms were filled out and signed at the time of annual enrollment. However, even in units that did not use this method of obtaining information, some guardians spontaneously reported when children had some dietary restrictions. Based on the data provided by the school principals, the school units had a total of 1,607 active students during the research period, with 52.3% of them in daycare and 47.7% in preschool. In total, 21 (1.3%) cases of students with FA or FI were reported. Of these, 76.1% were flagged in the units based on questions asked during enrollment.

The population with FA or FI consisted of 13 male and eight female children. However, two of the students had more than one allergy, one with five allergies and the other with two, totaling 25 reactions, as shown in Table 2. In daycare, there were 13 cases of children with adverse reactions to food, representing a prevalence of 1.5%. In preschool, there were eight cases, resulting in a prevalence of 1.0%. Among the AFRs, 47.6% were attributed to allergies, and 52.4% were attributed to food intolerances. The prevalence of FA was 0.62% (n = 10), and that of FI was 0.68% (n = 11). Of all the cases reported in the educational units, only one had a medical report; the others were reports from guardians to the school units.

Table 2. Frequency of ARAs among students enrolled in full-time schools in the Simões Filho Municipal Education Network, Bahia, 2022.

Variables	Categories	Total (n)	Daycare n (%)	Preschool n (%)
Número de RAA	Single	19	11(52.4)	8 (38.1)
	Multiple	2	2 (9.5)	0
Tipos de RAA	Lactose intolerance	11	8 (32.0)	3 (12.0)
	Milk allergy	2	1 (4.0)	1 (4.0)
	Pineapple allergy	3	2 (8.0)	1 (4.0)
	Food coloring allergy	2	1 (4.0)	1 (4.0)
	Chocolate powder allergy	1	0	1 (4.0)
	Egg allergy	1	1 (4.0)	0
	Corn allergy	1	1 (4.0)	0
	Popcorn allergy	1	0	1 (4.0)
	Okra allergy	1	1 (4.0)	0
	Chicken allergy	1	1 (4.0)	0
	Plum allergy	1	1 (4.0)	0

Source: Survey data, 2022.

In analyzing the files of students from the educational unit with the highest number of students, 123 files were examined, all of which included a separate form for nutritional information. However, 89 (72.4%) had incomplete forms (49 from daycare and 40 from preschool). The prevalence of completed forms was higher in daycare, with 39.5% of forms being fully completed. In preschool units, this percentage dropped to 4.8%.

Characterization of the sample and identification of adverse food reactions in the school with the highest number of students

In October 2022, 123 printed questionnaires were distributed to students at the school with the highest number of students in the municipality. Of these, 29 completed questionnaires were returned (17 were from daycare and 12 from preschool), corresponding to 23.6% of the students. Of the 29 questionnaires, seven students were in the 5-year-old age group (24.1%), five were aged 4 (17.2%), four were aged 3 (13.8%), six were aged 2 (20.7%), and seven were aged 1 (24.1%), with 15 boys and 14 girls.

Only one student presented AFR, representing 3.4% of the sample. This student was 3 years old and had a milk allergy, with symptoms of shortness of breath and vomiting, but without a medical report. The educational institution analyzed had a form for nutritional information that included questions about food allergies and intolerances; however, it should be noted that this information was not specifically present in this student's file.

DISCUSSION

This study identified the low availability of information regarding FA and FI among students enrolled full-time in early childhood education in Simões Filho, Bahia, as well as the absence of a standardized and easily accessible system for recording and accessing this information when it was available. In the units where data on FA and FI were available, they were communicated informally by parents or guardians directly to the principals at the time of enrollment, but without the requirement of supporting tests or medical reports.

The absence of formal records of FA and FA cases may contribute to the underreporting of adverse food reactions, making it difficult to estimate the prevalence of AFR in early childhood education in Simões Filho, Bahia. Even in this scenario, the data obtained in this study corroborate the findings of Guimarães et al.,[13] who reported a prevalence of 0.59% of FA, as confirmed by laboratory tests, in preschoolers in Uberlândia, Minas Gerais. However, this prevalence is lower than that found in most of the literature for different population contexts, which report FA prevalence in children between 1% and 10%.[2-4]

Among the cases identified, most students had a single restriction, with a predominance of cow's milk-related AFR, including lactose intolerance and cow's milk allergy, with an emphasis on cases of lactose intolerance, which accounted for more than half of the reactions presented. Generally, most children with restrictions were male and under the age of three. These same findings were observed in the studies by Santos et al.[14] and Soares et al.[8]

Tedner et al.[1] cite milk as the most common allergen in children. The high prevalence of reactions to cow's milk in children under three years of age is often associated with early weaning and the subsequent introduction of milk drinks. Although infants have immature immune and gastrointestinal systems, making them susceptible to hypersensitivity, exclusive breastfeeding in the first months of life has a protective effect, reducing the incidence of FA.[14,15]

It should be noted that some of the allergens mentioned, such as pineapple, okra, chicken, and plums, are not considered common and are therefore not included in RDC No. 26/2015,[12] which regulates the mandatory declaration of allergens on food labels in Brazil. This omission makes it difficult to clearly identify the presence of these ingredients in food products, increasing the risk of accidental exposure and allergic reactions in vulnerable children. Studies show that the lack of accurate information on labels can significantly compromise food safety, exposing children to unnecessary risks and reducing the effectiveness of allergy prevention strategies.[12,16]

In cases of food allergy, the only treatment, after identifying the causal factor, is the total exclusion of the allergen to prevent reactions or reverse symptoms. In the event of accidental ingestion, emergency treatment should be administered with medication. In cases of food intolerance, a restrictive diet is also the best recommendation, although many patients can tolerate small amounts of the offending food. In both cases, the restriction should be accompanied by nutritional guidance to avoid any deficiency that could interfere with the child's development. [2,6,7]

The symptoms associated with food reactions, particularly when exposure occurs without the guidance of a nutritionist, can range from mild gastrointestinal and/or skin symptoms in intolerance to episodes of anaphylaxis in allergies, where symptoms appear rapidly and can be life-threatening. The severity, especially of allergic reactions, will depend significantly on the type, frequency, and amount of food ingested. Therefore, in the case of children, observation and vigilance on the part of those responsible for them is essential, since they are naturally the ones who provide food. [15]

It is estimated that many allergic reactions experienced by children occur outside the home, including in educational settings, possibly due to a lack of attention or inadequate warning to caregivers.[5] Therefore, especially in daycare centers, it is essential to communicate with those responsible for the child regarding the occurrence of any allergic reactions, to avoid episodes that could endanger the child's health and life.

This study found a high prevalence of schools that do not have a protocol for investigating dietary restrictions at the time of enrollment. The difficulty in obtaining data that would provide epidemiological information about food allergies has already been mentioned by Correia.[17] This information is essential for recognizing local cases of food allergies and, consequently, providing targeted care for children.

Most cases of food allergies and intolerances were identified in schools with forms for recording nutritional information in student files, which highlights the usefulness of this resource for initial screening. Although supporting medical reports are not required when answering this question, and self-reports may sometimes not provide accurate information, the information itself is an important data point for screening. It enables initial attention to be given to children with AFR.[17]

Identifying AFR based on a formal diagnosis is essential to ensure that children's health and school life are not compromised. The lack of adequate guidance can lead to overprotection by parents, which may interfere with the child's health and school attendance.[17] Excessively restrictive diets imposed on children with suspected FA or FI can result in nutritional deficiencies that compromise growth, child development, and dietary autonomy. The GALEN Guideline (2022) emphasizes the importance of establishing restrictions only when necessary, preferably with the support of a health professional, to minimize harm to child development.[15,18]

Additionally, the lack of clear information on the minimum amounts of allergens that can trigger adverse reactions makes it difficult to plan adequate and balanced diets. The study by Westerhout et al.[19] highlighted that, in many cases, small amounts of potentially allergenic foods can be tolerated without significant reactions in cases of FA. Understanding individual thresholds enables the adoption of less restrictive

nutritional strategies, thereby reducing the impact of limited diets on child growth and development, as well as preventing damage to food security and the quality of life for children.[19]

The socialization of children diagnosed with AFR is also impacted due to isolation by peers during social situations involving food, which can cause stress and make children susceptible to bullying, with difficulty in sharing integrated experiences and dynamics essential to their development. [20]

Dietary restrictions also impose significant cultural barriers, as food is a central element of parties, celebrations, religious rituals, and even everyday family gatherings. Children with AFR are often excluded from these cultural interactions. Exclusion can limit access to experiences that are important for social development and identity building, intensifying feelings of isolation and contributing to emotional difficulties such as anxiety and low self-esteem. The cultural impact, therefore, goes beyond the nutritional aspect, influencing the psychological well-being and sense of social belonging of these children. [21]

Furthermore, school meals for some students, especially those from less privileged socioeconomic backgrounds, represent a significant portion of their daily caloric intake, as they are often the students' main or only meals. Therefore, ensuring food security for students is essential for their intellectual and social development, proper growth, and continued attendance at school.[10]

The PNAE aims to guide and ensure that the nutritional needs of schoolchildren are generally met. Therefore, it guarantees the mandatory provision of special menus for students with any special dietary needs, including those with FA and FI, as recommended in Law No. 12,982/2014[9] and reinforced in Resolution No. 06/2020.[10] For these menus, the food allergen must be excluded entirely and replaced. For example, whole milk powder must be replaced for students with allergies or intolerance to cow's milk, which is present in porridge and mungunzá, currently offered on the menu.

The nutritionist responsible for Food and Nutrition in the School Environment, recognized as an area of practice of the profession by Resolution No. 600/2018 of the CNF,[22,23] is essential for the adaptation and implementation of the PNAE. Therefore, it is incumbent upon them to encourage the identification of students with specific nutritional needs, as well as the preparation of special menus to exclude foods that cause AFR, while ensuring that energy, macronutrient, and micronutrient needs are met, and to monitor their implementation. In addition to ensuring that the adoption of special menus does not pose any risk to other children.[21]

The PNAE also provides for Food and Nutrition Education in the teaching and learning process. Therefore, promoting periodic training programs for food handlers, staff, and students, especially in schools with cases of food allergies, is essential to ensure the safe inclusion of these students in the school, since contact with the food causing the reaction can also occur indirectly. For example, cross-contamination may occur when sharing equipment during meal preparation, as all schools must receive a special menu. Still, the preparation method will differ from that of other students, according to Resolution No. 06/2020.[10]

Although the PNAE mandates special menus, funds are only allocated for the purchase of items proposed by the program's nutritionists when the school notifies the municipal school food management department.[10] This requires effective communication between departments and awareness among parents and administrators of the importance of this information. This is especially true when there are no supporting medical reports, as seen in the data from this study for almost all cases of AFR.

Laboratory tests are therefore essential for the accurate diagnosis of food reactions and are necessary to direct the funds allocated by the PNAE to students with FA or FI. This ensures their right to special meals.

Collares et al.[20] discuss the importance of requesting both medical reports and laboratory tests to avoid false notifications, in which parents may only suspect allergies or intolerances without medical proof. For this reason, since these are public schools, it would be essential to partner with the health department to enable families to access laboratory tests and, consequently, implement special PNAE menus with adequate nutritional content, prepared by nutritionists.

It is essential to clarify that the results obtained to determine prevalence were based on self-reports from guardians for both proposals, without requiring a medical diagnosis. Therefore, it is not possible to verify that the children have the reported allergies and intolerances. Printed questionnaires were used due to the profile of the sample to be investigated, which consisted mainly of families with lower purchasing power. Despite the use of this strategy, the return rate of the questionnaires remained low, which may have affected the number of children with FA and FI identified.

CONCLUSION

The availability of information regarding FA and FI among students enrolled in the full-time municipal school system in Simões Filho, Bahia, is very low, since most schools do not have or do not use specific forms for collecting information regarding AFR. Among the cases reported, the study showed a higher prevalence of lactose intolerance, followed by allergy to pineapple and food coloring.

Further studies are recommended on the availability of information and the prevalence of adverse reactions to food among elementary school students in the public school system. The development of public policies that encourage the collection of data on AFRs and the implementation of laboratory tests or medical follow-up as standard practice within the health department, in partnership with PNAE nutritionists, is essential for providing adequate and safe food to children with special dietary needs.

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Contributors

Figueredo CS participated in the study conception, data collection and analysis, manuscript writing, and final revision. Machado ML participated in the study conception, data analysis, manuscript writing, and final revision.

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