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ORIGINAL ARTICLE

Foreign body aspiration in children: assessment of parent and caregiver knowledge

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Keywords:
Foreign Bodies,
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Abstract

Objectives: To analyze the knowledge of parents and caregivers about foreign body aspiration (FBA) in children. **Methods:** A descriptive and quantitative cross-sectional study with 417 questionnaires, each containing nine objective questions about FBA and socioeconomic data, was conducted. The participants were parents and caregivers in outpatient care. Spearman coefficient was used to determine the correlation between demographic and socioeconomic variables and knowledge about foreign body aspiration, with a significance level of <0.05. **Results:** The parents and caregivers lacked knowledge about foreign body aspiration: 16.31% did not recognize the main foreign bodies, which are the trigger of aspiration of foreign bodies (beans, corn and peanuts). As for the suspicion of signs of foreign body aspiration, 19.9% and 55.1% did not recognize suffocation and sudden cough, respectively. There was no significant association between demographic and socioeconomic variables and the level of knowledge. **Conclusion:** It became evident for parents and caregivers their unfamiliarity with foreign body aspiration, which was verified in 33.8% of the participants. The parents and caregivers did not mainly recognize preventive measures and signs of foreign body aspiration. There was no association between demographic and socioeconomic factors and the level of knowledge about FBA.

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INTRODUCTION

Foreign body aspiration (FBA) is a relevant cause of acute respiratory syndrome in children globally.[1-3] In Brazil, FBA ranks among the top five causes of accidents in children and is the third leading cause of death by accident.[2] Children aged three years and younger are more vulnerable and account for the majority of the cases,[4-8] while most deaths occur with infants aged less than a year.[9] In most of the cases there is an adult watching the child, and 95% of the deaths occur at home.[10-11]

Caregiver sociocultural status, including living conditions, level of education, household income, and level of vigilance usually correlate with the occurrence of accidents, since these factors indirectly affect the environment the child is in and their eating habits. Children more commonly affected present with physiological traits that make them more prone to suffering from FBA, including increased respiratory rate, immature chewing and swallowing development, and ineffective cough and laryngeal adductor reflex. All such factors work synergistically to produce an FBA event.[12,13]

Ease of access by children to objects and foods that may be aspirated is a determining factor in the occurrence of FBA. In global terms, accidents predominantly involve organic products, including peanuts, beans, seeds, and nuts. In Brazil, cases of FBA involve primarily peanuts, beans, and corn. Only 20,4% of the cases occur in connection with inorganic items, such as magnets, batteries, latex balloons, pen caps, paper clips, earrings, and small toys. Organic foreign bodies tend to cause more inflammation in the local mucosa and form granulation tissue within a few hours of aspiration.[7,8,14,15]

Early diagnosis is the primary means to minimize the occurrence of death and sequelae in individuals with FBA. Clinical signs and symptoms vary widely depending on the shape, size, type, and location of the foreign body. In general terms, clinical manifestations revolve around choking, suffocation, or sudden-onset coughing spells. Signs in physical examination may include wheezing, stridor, intercostal retractions, and halitosis. Prompt diagnosis may be difficult, since 40% of the patients do not present clear symptoms early on.[4] In addition to suspecting any potential cases, health care teams should also be aware that the longer a patient has an aspirated foreign body, the greater are their chances of developing sequelae and complications.[16,18] Complications include recurrent pneumonia, lung abscess, bronchiectasis, lung parenchyma degeneration, pneumothorax, hemothorax, bronchopleural fistula, and low weight and height for age.[16-18]

Prevention is the best strategy to avoid accidents, with environmental control standing out as a key factor. Parent and child education delivered by health care workers is an effective measure. Health education in this context aims to provide individuals with self-care and accident prevention tools and knowledge.[1,3–5,19] Since this topic has been covered by a handful of authors, our study aimed to analyze the knowledge parents have on foreign body aspiration, correlate our findings with demographic and socioeconomic variables, and propose effective preventive educational measures.

METHODS

This descriptive quantitative observational study aimed to analyze the knowledge parents and caregivers have about foreign body aspiration. The tool used in the assessment was a questionnaire adapted from the study performed by Higuchi in Toyama, Japan.[3]

The questionnaire comprised eight closed questions (yes/no questions) devised to review the knowledge mothers had of the causes and symptoms tied to foreign body aspiration Chart 1. In addition to these eight questions, our study added one item pertaining to prior experience with FBA and one question concerning the aspiration of latex balloons. In addition to the closed questions, our study collected data to assess participant in terms of sex, age, marital status, number of children, monthly household income, schooling, and degree of relatedness with the child.

A pilot study was run with ten participants to adjust the wording of the questionnaire to the target audience. The parents and caregivers of children awaiting consultation in two hospitals, one public (Santa Casa de Misericórdia de Goiânia - SCMG) and one private (Hospital da Criança de Goiânia - HC), answered the questionnaire subsequently. A total of 234 questionnaires were answered at the SCMG and 243 at the HC. Questionnaires with incomplete data, answered by individuals aged 17 or younger, and questionnaires from individuals who refused to sign the informed consent form were excluded. A total of 417 questionnaires – 202 from the SCMG and 215 from the HC – were ultimately included in the study.

The Research Ethics Committees of the Santa Casa de Misericórdia de Goiânia and of the Hospital da Criança approved the study (certificate no.: 69913917.0.0000.5081). The participants included in the study signed informed consent forms.

Data were processed on Microsoft Excel 2016® and correlations analyzed with the aid of software program MatLab®. Spearman's rank correlation coefficient was used to look into the associations between two variables, whether they were continuous or ordinal.[20] The correlations were validated by means of statistical hypothesis testing with a significance level < 0.05.

Chart 1. See the questions (Q) below:

Q.1: Did you know that foods such as beans, corn, peanuts, and nuts might cause accidents as children aspirate them and choke?

Q.2: Did you know that children might aspirate small toys and choke?

Q.3: Did you know that party balloons might cause children to suffocate?

Q.4: Did you know that a child who stops breathing (suffocating) might have aspired objects/food?

Q.5: Did you know that a child that suffers from a cough spell might have aspirated an object or food?

Q.6: Did you know that aspirating food and objects is a more frequent event in children aged between two months and two years?

Q.7: Did you know that you should not give peanuts to children under the age of three years?

Q.8: Did you know that you should not make a child with a toy in their mouth cry?

Q.9: Did you know that you should not let children walk or laugh when they are eating?

RESULTS

Table 1 shows the demographic characteristics of study participants and the number of participants. Table 2 presents the socioeconomic characteristics of study participants and other data including degree of relatedness with the child they take care of and past experience with FBA episodes. A total of 417 parents and caregivers answered the questionnaire, 202 seen in a public hospital (SCMG) and 215 in a private hospital (HC).

Figure 1 shows the proportion of individuals who answered "no" to each of the questions divided by the service at which they answered the questionnaire. Lack of knowledge was 33.8% on average.

Table 3 shows the correlations between demographic/socioeconomic variables and knowledge of each of the questions and overall knowledge.

No significant correlations wee seen between knowledge and variables age, sex, marital status, number of children, care provided at a public or private hospital, schooling, household income, or past experience with FBA.

Table 1. Study population demographic characteristics.

Participant Profile	Service					
	Public		Private		Total	
	n	(%)	n	(%)	n	(%)
Sex						
Male	43	21.3	53	24.7	96	23
Female	159	78.7	162	75.3	321	77
Age						
≤ 20 years	18	8.9	5	2.3	23	5.5
21-30 years	81	40.1	76	35.3	157	37.6
31-50 years	92	45.5	117	54.4	209	50.1
≥ 51 years	11	5.4	17	7.9	28	6.7
Marital Status						
Single	76	37.6	31	14.4	107	25.7
Married	110	54.5	165	76.7	275	65.9
Divorced	16	7.9	17	7.9	33	7.9
Widowed	0	0	2	0.9	2	0.5
Number of children						
0 (None)	12	5.9	7	3.3	19	4.6
1	69	34.2	102	47.4	171	41
2	66	32.7	67	31.2	133	31.9
3	39	19.3	31	14.4	70	16.8
4 or more	16	7.9	8	3.7	24	5.8

DISCUSSION

Parents and caregivers did not have knowledge about some of the factors involved in FBA in children. Lack of knowledge was also reported in similar studies,[3,21,22] including the one published by Higuchi *et al*., from which the data collection tool used in our study was derived. The Japanese study assessed the responses of 1490 mothers answering the questionnaire and found that only 4.3% were unaware that small toys might cause FBA. However, they also found that 48.1% of the respondents did not know that they should not give peanuts to children aged three years and younger. The authors also saw that 27.1% and 41.8% of the mothers did not recognize suffocation and coughing spells as manifestations tied to FBA.[3] Although Japan is a more developed nation than Brazil, average percent lack of knowledge was similar in both countries.

No significant association was observed between knowledge about FBA and demographic/socioeconomic characteristics of parents and caregivers. Similarly, an Argentinian study enrolling 100 parents did not find associations between lack of knowledge about FBA and schooling.[21] The absence of correlations in this area compounded by the considerable levels of lack of knowledge seen in our study (33.87%) warrant the introduction of measures to educate parents and caregivers regardless of socioeconomic status and schooling. Most of the individuals included in the study claimed they had knowledge about the risks of children aspirating small toys (98.8%). In contrast, the Argentinian study cited above found that 82.5% of participants were unaware of such risk.[21] This difference may be associated with the hazard warning printed in the packaging of toys sold in Brazil, as required by industry standards (NBR 11.786/98 and ABNT ISO/TR 8124-8:2017).[23,24]

However, finding more effective ways of educating parents on the hazards and risks of FBA is needed, as cases of FBA involving small toys still occur. Parents should also be advised about more specific elements of playtime, such as preventing their children from placing toys in their mouths, since 46.52%

Table 2. Study population socioeconomic characteristics and past experience with FBA.

Participant Profile	Service					
	Public		Private		Total	
	n	(%)	n	(%)	n	(%)
Service						
Public	202	100	0	0	202	48.4
Private	0	0	215	100	215	51.6
Schooling						
Incomplete middle school	36	17.8	10	4.7	46	11
Complete middle school	13	6.4	3	1.4	16	3.8
Incomplete high school	44	21.8	11	5.1	55	13.2
Complete high school	74	36.6	70	32.6	144	34.5
Incomplete higher education	22	10.9	33	15.3	55	13.2
Complete higher education	13	6.4	88	40.9	101	24.2
Income						
1 to 2 minimum wages	157	77.7	63	29.3	220	52.8
3 to 4 minimum wages	41	20.3	81	37.7	122	29.3
5 to 10 minimum wages	4	2	44	20.5	48	11.5
10 to 18 minimum wages	0	0	13	6	13	3.1
18 minimum wages or more	0	0	14	6.5	14	3.4
Relatedness						
Mother	134	66.3	143	66.5	227	66.4
Father	36	17.8	45	20.9	81	19.4
Caregiver/Other	32	15.8	27	12.6	59	14.1
Have you even seen a child aspirate an object/food?						
Yes	81	40.1	82	38.1	163	39.1
No	121	59.9	133	61.9	254	60.9

were unaware of the risk of FBA when a child cries with a toy in their mouth. In regard to latex balloons, 35.2% of the parents and caregivers were unaware of the risk of aspiration, despite the warning message printed on balloon packaging. Since balloons are omnipresent in children's parties, they are often handled by individuals of various ages and children potentially at greater risk of aspiration as the balloon bursts. Balloons are the objects more strongly correlated wit death by aspiration[25] and require additional attention from parents.

In regard to food items, 16.3% of the parents and caregivers did not know that beans, peanuts, corn, and nuts might be aspirated and were a significant risk factor for children aged three years and younger. Brazilian and international literature contain multiple accounts of aspiration of seeds and fruit.[21,22,26] Parents and caregivers must be educated about the need to slice or crush hard foods before offering them to children and to prevent children aged five years and younger from having access to seeds, grains, and hard candy. The eating habits of children may also affect the risk of FBA. Many parents and caregivers are unaware of the risks tied to inappropriate behavior during feeding. A study analyzed 417 cases of FBA involving children and found that 80% of the cases of FBA occurred when children were eating by themselves and 14% when they were eating under the supervision of a caregiver.[27] Therefore, it is important that adults be advised to educate children during meals, encourage proper behavior that includes eating in a seated position, not talking with food in their mouths, and chewing foods well.

Early diagnosis decreases the risk of complications and improves the prognosis of FBA patients. Parents and caregivers play a pivotal role in the prompt diagnosis of FBA, since suspicion is based on the observation of signs and symptoms. Approximately 50% of the cases of FBA are diagnosed within the first 24 hours of the event.[2] Our study found that many parents were unaware of the symptoms commonly seen in FBA, which include suffocation (19.9%) and sudden-onset coughing spells (55.1%). This finding was also reported in an Indian study that assessed the knowledge adults had about FBA in children. The authors found that 46% of 63 caregivers included in the study were unable to recognize episodes of FBA.[22]

The findings related to lack of knowledge about FBA in children seen in this study were similar to the findings reported in other similar studies. One of the limitations of this study is that the included population does not represent the general population, since only parents and caregivers attending appointments with pediatricians were included. We believe that lack of knowledge is more pronounced than indicated in our study. The knowledge of parents about maneuvers to clear the airways of children was not assessed. Additional studies are required to better understand the factors connected with lack of knowledge about FBA in the general population.

The questionnaire used in this study is a means to deliver health education. As participants answered the questions, they were advised of the risks related to foreign body aspiration. Our results confirmed the high incidence and late diagnosis of FBA and the need to educate parents and caregivers as a measure to decrease the number of cases of FBA, minimize morbimortality, and reduce health care costs with related procedures.[1-3] Information conveyed properly by medical doctors during appointments and through media campaigns are relevant ways to educate the population.[1–3,8,18,28] Data from North America indicate that teaching parents and caregivers techniques to clear the airways decreased child mortality by FBA by 60%.[19] The "Child's Leaflet" distributed by the Brazilian Government may also serve as a means to warn parents of the risks and teach them how to recognize and what to do in cases of FBA.

It is the duty of health care workers to help parents and caregivers to understand the relevance of modifying the environment at home, adopting safe behaviors, and being vigilant. Information on how to identify high risk objects and food items and the signs and symptoms of FBA, along with basic notions

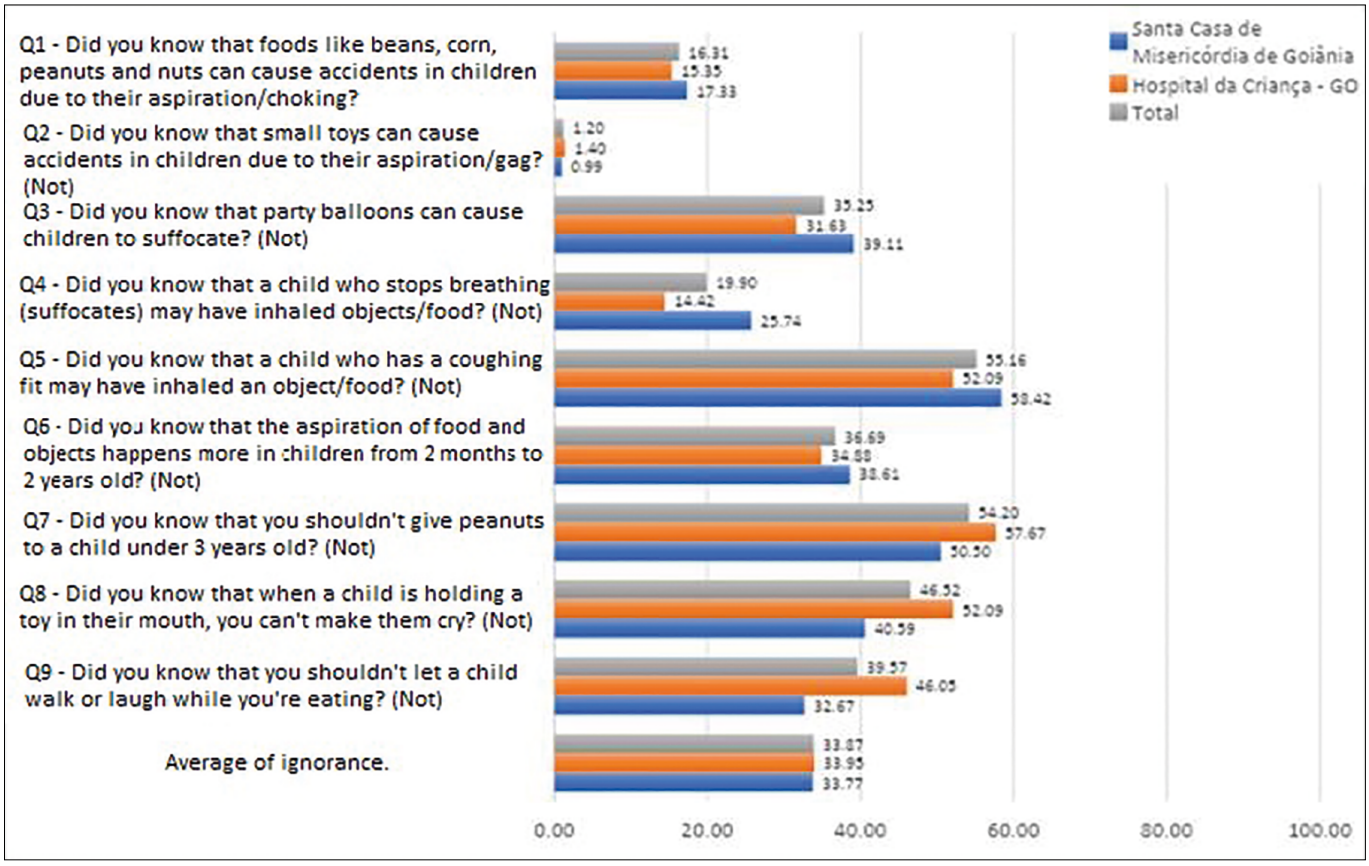


Figure 1. Legenda 1: Percentage of ignorance about FBA in children (%).

Table 3. Correlation between demographic/socioeconomic variables and knowledge about FBA in children.

	Age	Sex	Service	Marital Status	Schooling	Income	No. of children	Experience with FBA
Have you ever seen a case of FBA?	r:-0.029 p:0.550	r:-0.041 p:0.402	r:0.020 p:0.683	r:-0.081 p:0.101	r:-0.004 p:0.934	r:0.000 p:0.995	r:-0.071 p:0.149	1
Question 1	r:-0.009 p:0.861	r:0.144 **p:0.003**	r:0.027 p:0.586	r:0.027 p:0.588	r:0.082 p:0.095	r:0.012 p:0.804	r:0.060 p:0.221	r:-0.101 **p:0.040**
Question 2	r:0.004 p:0.941	r:-0.008 p:0.872	r:-0.019 p:0.705	r:-0.073 p:0.135	r:0.022 p:0.647	r:0.013 p:0.788	r:-0.006 p:0.898	r:-0.088 p:0.072
Question 3	**r:0.170** **p:0.000**	r:-0.058 p:0.239	r:0.078 p:0.111	r:0.140 **p:0.004**	r:0.068 p:0.165	r:0.054 p:0.270	r:0.078 p:0.113	r:-0.025 p:0.606
Question 4	r:0.111 **p:0.023**	r:-0.101 **p:0.038**	r:0.142 **p:0.004**	r:0.114 **p:0.020**	r:0.200 **p:0.000**	r:0.206 **p:0.000**	r:-0.013 p:0.798	r:-0.165 **p:0.001**
Question 5	r:0.018 p:0.720	r:-0.034 p:0.491	r:0.064 p:0.195	r:0.050 p:0.307	r:0.158 p:0.001	r:0.087 p:0.078	r:0.039 p:0.425	r:-0.137 **p:0.005**
Question 6	r:-0.038 p:0.438	r:0.080 p:0.102	r:0.039 p:0.431	r:-0.045 p:0.362	r:0.002 p:0.965	r:0.010 p:0.839	r:0.056 p:0.253	r:-0.151 **p:0.002**
Question 7	r:0.011 p:0.819	r:0.057 p:0.247	r:-0.072 p:0.142	r:0.044 p:0.371	r:-0.026 p:0.599	r:-0.117 p:0.017	r:0.075 p:0.128	r:-0.013 p:0.788
Question 8	r:0.036 p:0.466	r:0.072 p:0.140	r:-0.115 **p:0.019**	r:-0.005 p:0.917	r:-0.132 **p:0.007**	r:-0.205 **p:0.000**	r:0.028 p:0.574	r:0.012 p:0.815
Question 9	r:-0.043 p:0.383	r:0.093 p:0.057	r:-0.137 **p:0.005**	r:-0.010 p:0.840	r:-0.099 **p:0.043**	r:-0.112 **p:0.022**	r:0.080 p:0.102	r:-0.065 p:0.183
Overall knowledge	r:0.067 p:0.170	r:0.060 p:0.218	r:-0.014 p:0.778	r:0.067 p:0.173	r:0.040 p:0.415	r:-0.038 p:0.442	r:0.096 p:0.051	r:-0.148 **p:0.002**

Nº: number; FBA: foreign body aspiration; r: Spearman's rank correlation coefficient; p: *p*-value; In bold type: *p*-valor <0.05.

on how to clear one's airways, should be conveyed to parents and caregivers during medical appointments.[1–3,12,19] The advice given to parents and caregivers should be repeated periodically to strengthen the adoption of the conveyed instructions.

CONCLUSION

About a third (33.8%) of the parents and caregivers included in our study showed lack of knowledge about FBA. Deficiencies were seen mostly in preventive measures and symptoms of foreign body aspiration. No significant correlations were observed between socioeconomic variables and level of knowledge about FBA.

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