



Article

Parental Knowledge and Attitude Toward Children Foreign Body Aspiration in Saudi Arabia: A Cross-Sectional Study

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Abstract:

Background: Foreign body aspiration (FBA) causes morbidity and mortality in children. Caregivers play a major role in maintaining the children's safety and well-being. Therefore, this study aimed to assess parents' knowledge and attitudes toward children's FBA in different regions of Saudi Arabia. **Methodology:** We used an online questionnaire to assess parents' understanding of FBA, confidence in applying first aid, and details of any previous choking incidents. The data collection process started on May 2023 till July 2023. Statistical software "JMP" was used to analyze the collected data. **Results:** 60.55% of 1,280 total participants chose "1-2 years old" as the most common age group prone to choking. Most parents chose coins, toys, and button batteries as the most likely objects to cause choking, whereas only 1% chose raspberries and apples to cause choking. 72.03% of the participants believed that raspberry ingestion by children did not require immediate hospital transfer. 63.91% of the participants preferred removing objects from their children's reach to prevent choking incidents. Nevertheless, only 3.83% considered themselves very confident in applying first aid. **Conclusion:** This study revealed that many parents are aware of the life-threatening nature of FBA. Coins were the most frequently identified choking hazard. However, a few recognized raspberries and apples as choking hazards. Therefore, awareness needs to be raised by campaigns and educational workshops to correct misconceptions and increase parents' confidence in their first aid skills, as aspiration is commonly encountered in homes.

Keywords: children; foreign body aspiration; Saudi Arabia

Introduction

Food, toys, and sharp objects could obstruct the Food, toys, and sharp objects could get obstructed in the airway if swallowed. This condition is defined as foreign body aspiration (FBA), where patients experience episodes of choking and difficulty breathing due to airway obstruction caused by a foreign object. FBA is a very serious event that can result in mortality and overwhelmingly affects the global pediatric population more than the geriatric population, with most being younger than 5 years of age (1). FBA may present a clinical challenge, as the diagnosis is often delayed or misdiagnosed, especially in patients who are asymptomatic or do not present with characteristic symptoms. Life-threatening respiratory complications, such as recurrent pneumonia or airway obstruction, can quickly develop when the diagnosis is delayed, which often occurs when the physician misses a key radiographic finding or when the caregiver overlooks the symptoms of FBA (2).

Furthermore, children's caregivers play a vital role in saving the lives of those predisposed to such unpleasant incidents (3). One study found that parents' educational level was significantly associated with their knowledge of FBA. Most participants stated that they might have been unable to recognize FBA events. A study conducted by Higuchi et al. in 2013 reported that sudden coughing and choking were unfamiliar symptoms of FBA to 41.8% and 27.7% of the patients, respectively (4). Mothers with children younger than 12 months old and those with a first child were considered risk factors for inadequate knowledge about FBA (4). Another study by Mahmud A. et al. in 2017, showed that more than half of the participants acknowledged that nuts are high-risk foods for children; however, only 13.9% knew that toys and other objects could cause FBA in children (5).

A local study conducted by Bin Laswad BM et al. in 2023 in Makkah revealed that 20.6% of parents would not try to remove a foreign body using their fingers (6). In addition, a study

conducted in Al-Qassim by Almutairi et al, in 2021, reported that 60.8% of parents correctly identified high-risk age groups. However, they scored low on both mean knowledge and practice scores (7). Almutairi AT et al, 2021, concluded that only a minority of parents had sufficient knowledge regarding FBA, similar to the findings of Abu-Hasheesh et al. (7, 8). Furthermore, Al-Qudehy Z et al in Dammam, 2015, reported that 25% of their participants did not identify FAB symptoms consistent with what Higuchi et al. reported, 27.7% (4, 9). Therefore, these findings suggest that caregivers play a vital role in maintaining the children's safety and well-being, as those with low education levels and minimal knowledge of FBA can cause delayed diagnosis, incorrect management, and unpleasant consequences. Thus, this study aimed to evaluate parents' knowledge and attitudes toward children's FBAs in different regions of Saudi Arabia.

Materials and Methods

This was a cross-sectional study in which an online questionnaire was filled out by parents across different regions in Saudi Arabia. An online structured questionnaire was administered to parents in Saudi Arabia. Data collectors were recruited from each region. They distributed the questionnaire to the region. Specific instructions were provided to each data collector to ensure the proper distribution and representation of the data. Data was collected between May 2023 and July 2023. After completion of data collection, the data was revised to ensure proper representation of the sample. Participants who were either "single" or "do not have children" were excluded from the study. The inclusion criteria were married, divorced, or widowed parents. The sample size was calculated using Raosoft, Inc. presuming a 5% margin of error, 95% confidence interval, 20000 as the population size, and 50% as the response distribution. The minimum recommended sample size was calculated to be 377 participants.

The questionnaire was structured based on several aspects inspired by Almtutairi et al. and

Al Qudehy et al. and was modified accordingly by the research team to ensure appropriateness to the target population and the aim of the study (7, 9). Content validity was carried out to assess the clarity of the questionnaire and ensure the relevance of the questions to the research objectives. For that, several expert and non-expert opinions were sought. In addition, a pilot study was conducted by distributing the questionnaire to a specific number of similar target populations; however, these were not included in the final data of the current study. Feedback and suggested modifications were considered, and the questionnaire was modified accordingly. Ethical approval was issued by King Abdullah by the King Abdullah International Medical Research Center (KAIMRC) with an IRB number of IRB/1021/23.

Participation was optional, and they were not obliged to complete the research, as withdrawal would not impact them. To ensure confidentiality and privacy, no personal information was collected from the participants, as they remained anonymous. First, the participants' demographics were collected, including age, gender, education, and caregiver occupation. Next, the participants were asked questions to test their knowledge of FBA. This section included questions related to objects to be aspired by children, the danger of FBA, the most common age of FBA, and the symptoms of choking. Subsequently, caregivers' attitudes toward FBA were considered by asking them questions related to the actions they would perform if they encountered a child aspiring to a foreign body. An example of these questions is as follows: "In a child below 1 year old, do you think it is safe to: insert a finger into the child's mouth looking for the toy and trying to remove it?" with "Yes," "no," and "I don't know" as answers to these questions. The final section of the questionnaire was specific to parents who dealt with choking incidents. Each caregiver was asked for related information about the situation, including the age, the gender of the choked child, the child's social

status, the object that caused the choking, the location of the incident, whether there was supervision at the time of the incident, and the outcomes of the incident. Statistical analysis was carried out using JMP Pro 15 software. We used the chi-square test to analyze the variables. Pearson's test was used to find associations between variables, and a p-value of less than or equal to 0.05 was considered significant.

Results

The demographics of the participants are shown in (Table A). A total of 1,280 parents participated in the questionnaire, of which 781 (61.02%) were females. The western and central regions constituted the majority (523 (40.86) and 428 (33.44 %), respectively. Additionally, 667 (52.11%) parents were between 36 and 50 years old. Regarding parents' academic degrees, 846 (66.09%) were university students and 72 (5.63%) had less than a high school education. Most participants were employed.

Table A: Participants' Demographics:

Demographics	N(%)
Gender	
Female	781(61.02)
Male	499(38.98)
Region	
Western	523(40.86)
Central	428(33.44)
Southern	251(19.61)
Eastern	63(4.92)
Northern	15(1.17)
Age	
20-35 years	376(29.38)
36-50 years	667(52.11)
More than 50 years	237(18.52)
Marital Status	
Married	1141(89.14)
Divorced	91(7.11)
Widow	48(3.75)
Education Level	
Less than high school	72(5.63)
High school	232(18.13)
University	846(66.09)
Higher degrees	130(10.16)
Occupation	
Employee	690(53.91)
Self-employed	86(6.72)
Unemployed	224(17.50)
Retired	151(11.80)
Others	129(10.08)

Most parents stated that FBA is life-threatening. The most frequently chosen objects to cause choking were coins, followed by toys and button batteries, with percentages of 34%, 18%, and 10%, respectively. However, only 1% of the parents chose raspberries and apples as objects that

However, more than half of the participants considered that raspberries and grapes did not require immediate hospital transfer 922 (72.03%) and 878 (68.59%), respectively. Furthermore, 775 (60.55%) parents chose the 1–2-year-old age group, as they are the most prone to choking.

might cause a child to choke. Moreover, coins, sharp objects, button batteries, bottle caps, and toys required immediate transfer to hospitals if they were ingested by children (94.22 %, 93.91 %, 92.34 %, 91.02%, and 90 %, respectively) (Table B).

Furthermore, 1,217 (95.08%) parents chose cyanosis as a common sign of FBA, followed by difficulty breathing and difficulty talking. Nevertheless, 658 (51.41%) parents reported that the absence of clinical symptoms indicated reassurance, ruling out FBA (Table C).

Table B: Parents' knowledge regarding FBA requiring hospital transfer

Which of the following requires going to the hospital immediately if ingested by a child?	Should go to the hospital immediately	No need to go to the hospital
	N(%)	
Coins	1206(94.22)	74(5.78)
Sharp objects	1202(93.91)	78(6.09)
Button batteries	1182(92.34)	98(7.66)
Bottle caps	1165(91.02)	115(8.98)
Toys	1152(90)	128(10)
Plastic , paper , rubber - balloons	1055(82.42)	225(17.58)
Nuts	692(54.06)	588(45.94)
Almonds	638(49.84)	642(50.16)
Peanuts	570(44.53)	710(55.47)
Apples	424(33.13)	856(66.88)
Dates	421(32.89)	859(67.11)
Grapes	402(31.41)	878(68.59)
Raspberries	358(27.97)	922(72.03)

Table C: FBA Symptoms:

Which symptom would make you suspect FBA?	N(%)	
	It is a sign of FBA	It is not a sign of FBA
Cyanosis	1217(95.08)	63(4.92)
Difficulty breathing	1215(94.92)	65(5.08)
Difficulty talking	1139(88.98)	141(11.02)
Loss of consciousness	1125(87.89)	155(12.11)
Holding the neck	1091(85.23)	189(14.77)
Wheezing	999(78.05)	281(21.95)
Bloody cough or bloody vomit	848(66.25)	432(33.75)
Coughing	797(62.27)	483(37.73)
Throat or chest pain	774(60.47)	506(39.53)
Crying	620(48.44)	660(51.56)
Vomiting	532(41.56)	748(58.44)

Parental attitude and perception of dealing with an FBA case is displayed in (Table D). 818 (63.91%) participants preferred to remove objects from their children's reach to prevent choking. Most participants (62.89%) would immediately start first aid management if the child choked, whereas only 187 (14.61%) would take the child to the hospital immediately. Only 3.83% considered themselves very confident to apply first aid,

whereas 19.53% were very unconfident. Of those who considered themselves unconfident, 177 (70.80%) did not take first-aid courses. 33 (67.35%) of those who were very confident possessed first-aid skills. The sources of information about first-aid skills for rescuing choked children were mainly social media 375 (29.30%) and first-aid courses 313 (24.45%)

Table D: attitude on FBA:

Statement	N(%)
What do you think is the best way to prevent a child from swallowing a dangerous body ?	
Remove things that could be swallowed out of his reach	818(63.91)
Educate the child	191(14.92)
Supervise the child at all times	177(13.83)
There is no way to prevent it	51(3.98)
I don't know	43(3.36)
How would you manage if a child swallowed a foreign body?	
Perform first aid of choking	805(62.89)
Try to remove the foreign body myself first	229(17.89)
Take the child to the hospital immediately	187(14.61)
Inform the GP on the next visit	19(1.48)
I don't know	40(3.13)
What would you do if a child had a change in the usual state of health after an incident of FBA ?	
Take the child to the hospital immediately	1045(81.64)
Inform the GP on the next visit	110(8.59)
Continous observation of the child	72(5.63)
I don't know	53(4.14)
What is your source to obtain information about FBA ?	
Social media	375(29.30)
First aid workshops and sessions	313(24.45)
Personal experience	160(12.50)
Television	110(8.59)
Health workers	97(7.58)
Others (Family , friends, etc)	118(9.22)
No information	107(8.36)
What is your preicieved confidence with your first aid abilities when a child suffocates in front of you ?	
Very Confident	49(3.83)
Confident	183(14.30)
Neutral	474(37.03)
Unconfident	324(25.31)
Very Unconfident	250(19.53)

Almost half of the participants (583 (45.54%)) reported that they had dealt with a pediatric choking incident (Table E), most of which occurred among boys 366 (62.77%) and 260 (44.59%) among 1–2-year-old children, Food/fluids (n = 247, 42.36%) and coins (n = 106, 18.18%) were the most common causes behind the occurrence of such events in children. Choking

occurred mainly inside the house in 499 (85.59%) cases, of which 428 (85.77%) occurred in the living rooms or bedrooms and 61 (12.22%) in the kitchens. Only 84 (14.40%) incidents occurred outside the house: 36 (42.85%) of them in gardens, 16 (19.04%) in shopping malls, 14 (16.68%) in cars, and 12 (14.28%) in schools. Furthermore, 308 (52.83%) and 202 (34.64%) reported events that

occurred during the daytime and at night, respectively. In addition, after aspiration, 512 (87.82%) children recovered, 24 (4.11%) developed serious complications, and seven (1.20)

died. Almost half of those who reported death as a result of the choking incident were among the 1-2-year-old group, with a p-value of 0.0001.

Table E: Dealing with a choking incident. Reported information on the witnessed choking incident:

Statement	N(%)
Did you deal with a child that choked with a foreign body?	
Yes	583(45.54)
No	697(54.45)
Gender of the child	
Male	366(62.77)
Female	217(37.22)
Age of the child	
<1 years old	115(19.72)
1-2 years old	260(44.59)
3-5 years old	150(25.72)
6-8 years old	44(7.54)
≥ 9 years old	14(2.40)
Social status of the child	
The child lives with both parents	527(90.39)
The child lives with one of the parents	56(9.60)
Object that caused choking	
Food/Fluid	247(42.36)
Coins	106(18.18)
Toys	77(13.20)
Plastic,Paper,Rubber	51(8.74)
Batteries	26(4.46)
Sharp objects	16(2.74)
Bottle caps	7(1.20)
Beads	2(0.34)
I don't remember	51(8.74)
Choking setting	
Inside the house	499(85.59)
Outside the house	84(14.40)
Was the child under supervision during the incident?	
Yes, under the parents' supervision	325(55.74)
Yes, under the supervision of the sitter	41(7.030)
Yes, under the supervision of someone else	53(9.09)
No	164(28.13)
When did the choking incident occur ?	
In the daytime	308(52.83)
At night	202(34.64)
In the morning	73(12.52)
Result of the incident	
Recovery	512(87.82)
The need of medications from the doctor	40(6.86)
Serous complications	24(4.11)
Death	7(1.20)

FBA is a significant threat to children's safety worldwide. In the United States, approximately 2.5 million children are affected annually, with a tracheal-bronchial FBA mortality rate of around 1% (10). This study aimed to assess

parents' knowledge of and attitudes toward childhood FBAs across all regions of Saudi Arabia. In our findings, coins, toys, and button batteries were identified as the most common choking hazards; by identifying these common choking

hazards, caregivers can be educated about the specific objects to monitor around their children and manufacturers can be encouraged to create toys that prioritize safety. Laswad BM reported that most participants thought nuts and plastic toys were commonly aspirated, aligning with prior studies (4, 6–8). However, in our study, parents frequently cited food, fluids, and coins as the objects involved in the choking incidents they observed. The high percentage of food-related cases accentuates the necessity for enhanced awareness of food safety and choking risks during mealtimes. Similarly, Cramer et al. identified food, toys, coins, and balloons as the most frequent causes of FBA in 2023 (11).

The clinical presentation of FBA varies, and timely diagnosis can be challenging. A study in Arar, Saudi Arabia, found that most participants felt reassured by the absence of clinical symptoms, mirroring our results, where half of the participants shared this belief, which contrasts with the findings of Laswad BM et al. (6, 12). This finding highlights a common misconception among parents regarding the relationship between FBA and choking symptoms, emphasizing the importance of identifying FBA without symptoms and developing guidelines for healthcare professionals to enhance the assessment of potential FBA cases. It's important to note that the absence of choking does not rule out FBA but may contribute to diagnostic delays (13). The reasons behind parents equating a lack of symptoms with the exclusion of FBA should be further explored, as FBA symptoms can often be confused with other respiratory conditions like asthma or croup (11, 14). There is a clear need for healthcare systems to focus on educating both parents and healthcare professionals, as misdiagnoses may arise due to insufficient history-taking or inadequate clinical evaluations (14).

Patients with FBA typically present with a combination of signs and symptoms. Coughing, wheezing, and breathlessness are common, with diminished breath sounds on the affected side being a frequent sign (15). In our study, 95% of

parents identified cyanosis as a sign of FBA, followed by difficulty breathing and holding the neck. This insight establishes a foundation of knowledge indicating that parents are aware of the severe consequences of FBA, which guides future research towards exploring how this awareness influences their responses in emergencies. FBA symptoms can vary and mimic conditions such as intermittent bronchitis, recurrent pneumonia, or asthma, leading to potential misdiagnoses. In some cases, children may be treated with antibiotics and steroids, which can mask their symptoms and delay diagnosis (15). A nationwide survey in Japan reported that diagnoses of inhaled foreign bodies were delayed by more than 24 hours in about half of the cases. However, symptoms like choking episodes and sudden coughing were present in roughly 65% of the cases (4). Morbidity in FBA cases is linked to diagnostic delays and delays in seeking expert medical help (16).

A study by Ghosh et al. found that 51% of primary caregivers intended to try removing the foreign body themselves, which could delay proper management (17). Similarly, our study showed that more than half of the parents (62.89%) immediately applied first aid when their child choked, a result that aligns with Laswad BM et al., where 92.7% used first aid methods such as back slaps or abdominal thrusts (6). Despite 62.89% of participants in our study stating that they would perform first aid for choking, only 3.83% felt "very confident" in their ability to do so. The lack of confidence may hinder parents' ability to respond effectively to FBA events, pointing out the need for improved educational courses that provide practical, hands-on training. By understanding the gap between willingness and confidence, researchers can create interventions that address these concerns, enhancing parental preparedness in emergency incidents. Several factors may explain this, including the sources of information on FBA. In our study, 375 participants indicated "social media" as their primary source of information about FBA. With the widespread use of social media, misinformation can easily spread, despite

efforts to provide accurate information through certain social media accounts. Awareness of FBA and its associated risks remains insufficient in the community. Ghosh et al. found that caregivers with lower education levels were 7.5 times more likely to lack knowledge of FBA compared to those with higher education (17). Furthermore, parents of children in high-risk groups often displayed more ambivalence and took fewer preventive measures to avoid FBA incidents at home. In this study, the most common preventive measure reported by parents was keeping small objects out of children's reach, which aligns with findings from Ghosh et al. (17). Future research can build on this finding by investigating the efficiency of preventive strategies and identifying other measures that parents can execute to decrease choking risk.

Our study had several limitations. The cross-sectional design and the fact that most participants were university-educated, employed, and from the Western and Central regions of Saudi Arabia could limit the generalizability of the findings. Future research should target larger and more diverse populations, including teachers, who interact with children in schools; waiters, who work in environments where pediatric FBA incidents may occur; and medical students, as the public expects them to provide first aid for choking confidently and effectively.

Conclusion:

This cross-sectional study explored the epidemiology of parental knowledge, attitudes, and experiences related to pediatric FBA in Saudi Arabia. This study shows that many parents are aware of the life-threatening nature of FBA in their children, with coins being the most identified choking hazard. However, there are evident gaps in knowledge, especially regarding less-recognized choking hazards, such as raspberries and apples. Most parents preferred preventative measures, such as keeping objects out of the children's reach.

However, a remarkably small percentage expressed more confidence in administering first aid during a choking incident. Elevating awareness of FBA within the community has demonstrated significant benefits in terms of reducing morbidity, mortality, and the overall incidence of the disease. Given the substantial risk of morbidity and mortality associated with FBA, it is imperative to enhance awareness across the general population (18). Furthermore, considering the widespread use of social media as an information source, educational campaigns should leverage these platforms to accurately spread information.

Author Contributions: This study was conducted in accordance with the Declaration of Helsinki. MJ, BA, LK, AA, BA, HA, and NA were responsible for data collection. LK provided statistical advice and study design and analyzed the data. BA, LK, AA, BA, HA, and NA drafted the manuscript. MJ took responsibility and supervised the study. All authors reviewed the study. All the authors have read and approved the final version of the manuscript and agree to be accountable for all aspects of the work.

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Informed Consent Statement: Written informed consent was obtained from all subjects involved in the study.

Conflict of interest: The authors declare that there are no conflicts of interest associated with this publication

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