Declaration

I agree to accept responsibility for the scientific, ethical, and technical conduct of the project and for providing the required progress as per the terms and conditions of the College of Health Science in effect at the time the grant is forwarded as the result of the application.

Name of principal investigator signature Date

Dr. Brhanu Haile ---------- August 28/2025

Approval of the advisers

This research has been submitted with my approval as university advisor.

Name	Signature	Date
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MEKELLE UNIVERSITY

COLLEGE OF HEALTH SCIENCES

SCHOOL OF MEDICINE

DEPARTMENT OF- OTOLARYNGOLOGY- HEAD AND NECK SURGERY

DETERMINANTS OF PARENTAL KNOWLEDGE ON CHILDHOOD FOREIGN BODY ASPIRATION IN AYDER COMPREHENSIVE SPECIALIZED HOSPITAL, MEKELLE, ETHIOPIA.

PI: BRHANU HAILE ASGEDOM (MD)

A RESARCH THESIS TO BE SUBMITTED TO THE DEPARTMENT OF OTOLARYNGOLOGY - HEAD AND NECK SURGERY, COLLEGE OF HEALTH SCIENCES, MEKELLE UNIVERSITY IN FULFILLMENT OF THE REQUIREMENTS FOR THE SPECIALTY IN OTOLARYNGOLOGY - HEAD AND NECK SURGERY.

MEKELLE UNIVERSITY, TIGRAY, ETHIOPIA

AUGUST, 2025

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Full title of research project	Determinants of parental knowledge on childhood foreign body aspiration.
Duration of the project	3 months
Study area	Ayder Comprehensive Specialized Hospital, Tigray, Ethiopia
Total cost of project	27,760 Ethiopian Birr

Acknowledgment

First, my heartfelt gratitude goes to Mekelle University College of Health Sciences, school of medicine department of- otolaryngology- head and neck surgery, for allowing me to conduct this research, and I would like to thank Adigrat University for the generous sponsorship that has made this thesis possible.

I am especially grateful to my advisors, Dr.G/Meskel Miruts(PhD) and Dr.Yelay Kidane(MD), for their warm welcome, support, and constructive feedback. I would also like to express my heartfelt gratitude to Adigrat University colleagues, my family, and friends, who have been a source of strength and emotional support for me. I am also very thankful for my study participants

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Abbreviations and acronyms

MU; Mekelle University

CHS; College of Health Sciences

FBA; Foreign Body Aspiration

SPSS; Statistical Package for the Social Sciences

ACSH; Ayder Comprehensive Specialized Hospital

ICU; Intensive Care Unit

ED; Emergency Department

RB; Rigid Bronchoscopy

Abstract

Background: Although foreign body aspiration (FBA) is a life-threatening event with grave consequences, it is still Preventable. One of the most important risk factors for FBA-related consequences is a lack of knowledge by the caregivers. Better understanding of FBA is very essential to prevent complication and premature death due to FBA. However, there is a limited shred of evidence regarding the knowledge of FBA related among parents in Ethiopia, particularly in Tigray.

Objectives: To assess determinants of parental knowledge on childhood foreign body aspiration among clients visiting ACSH.

Methods: A facility-based, cross-sectional study was carried out among 423 parents attending Ayder Comprehensive Specialized Hospital from January to March, 2025. A pre-tested structured interviewer-administered 12 FBA-related items questionnaire is used for data collection. Descriptive frequency used to see the level of knowledge then binary logistic regression model was carried to see factors associated with parental knowledge of foreign body aspiration

Result: From the total respondent, 271(64.07%) [95% CI, 59%-68%] had good levels of knowledge on the consequences of FBA. Parents with a college degree or higher (AOR=7.19, 95% CI: 4.21–12.29),Having more than three children (AOR=2.25, 95% CI: 1.34–3.78) Parents whose youngest child was less than one year old (AOR=4.55, 95% CI: 1.71–12.10) or between one and five years old (AOR=3.03, 95% CI: 1.23–7.44) Previous experience with FBA: parents who had encountered FBA once (AOR=2.68, 95% CI: 1.30–5.54) or twice (AOR=2.97, 95% CI: 1.44–6.11) were significantly associated with parents' knowledge on the foreign body aspiration.

Conclusion: This study revealed that a majority of parents (64.07%) possess good knowledge regarding body aspiration (FBA). Higher educational attainment, having more children, younger age of the youngest child, and previous experience with FBA were all significantly associated with better parental knowledge.

Keywords: Knowledge, Foreign Body Aspiration, Ethiopia.

1 INTRODUCTION

1.1 Background

FBs are a common clinical emergency, that involves people of all ages, especially children under the age of 5 years [1].Globally, foreign bodies, including intra-ocular foreign bodies, pulmonary aspiration and foreign bodies in the airway and FBs in other body parts, are any object or substance that unintentionally penetrates the body or its cavities. The Global Burden of Disease Study (GBD) estimates reveal that the overall death rate from FBs is approximately 1.5 per 100,000 populations, and FBs are the 63rd leading cause of death and the 16th leading cause of injury worldwide, implying that FBs are a global health concern [2, 3]. In the United States, FBs are the third leading cause of accidental deaths and the second leading cause in Japan in 2019 [4].

Among the different types of FBs, the death rate-of aspirated FBs is the highest.[5] Foreign body aspiration (FBA) is defined as asphyxia, suffocation, or inhalation of items of food, such as bone and seed, and non-food, such as toys, into the respiratory tract.[6].The most commonly aspirated foreign bodies include food, coins, toys, and balloons, among which, organic foreign bodies are more common than inorganic [7-12].According to the size, entry site, and residence time of FB, there may be no clinical manifestations or choking, wheezing, dyspnea, or abnormal breath sounds in the trachea [13, 14]. The risk factors of foreign body aspiration are age, laughing and talking while eating, etc.[15,16].Various complications may occur due to anatomical location, intelligence level, treatment time, and national economic and cultural differences, and even lead to death in some cases [17, 18].Among them, The long-term complications of FBAs include atelectasis, pneumonia, and bronchiectasis, and the most serious complications are apnea caused by hypoxia, ischemic hypoxic encephalopathy, and death [19].

1.2. Statement of the Problem

It has been reported that young children are particularly at risk for FBA, with nearly 98% of cases less than 5 years of age [20, 21]. Compared with adults, children harbor smaller airways and greater airway resistance, rendering them more vulnerable to severe airflow obstruction. In addition, their tendency to put small objects into their mouths, often cry, shout, run, and play with objects in their mouths, do not have molars to chew certain foods adequately and high mobility and destructibility during feeding further put them at risk of FBA[8,21–24].

Children in our country are frequently exposed to different type seeds, which are typically consumed as part of meals. Where children are exposed regularly, wild seeds are also abundantly available. Additionally, one of the risk factors is parental awareness of the harmful effects of foreign body aspiration. These parents don't appear to be aware that these seeds can be harmful to youngsters [25]. Several studies have documented that inhalation of foreign bodies can result in acute or chronic complications, such as recurrent respiratory infections, chronic cough, persistent wheezing, pulmonary or segmental collapse and bronchiectasis[26].In studies conducted in our country, majority of cases, 82% of patients with FBA presented after 24hrs and only 18% reported within 24 hours of the event.

Parents or caregiver unawareness is mentioned as possible factors for delay presentation. All of them presented with different type of complications. Pulmonary infection was detected in 25% cases following aspiration of foreign bodies and other complications associated were atelectasis in 2.6% cases, pneumothorax in 2.6% cases, pulmonary infection with atelectasis in 1.3% case, pulmonary infection with pneumothorax in 1.3% case, pulmonary infection with lung collapse in 1 1.3%, lung collapse in 1.3% and other complication like minor airway edema detected clinically, throat discomfort, difficult of swallowing,…etc. account 64.5% cases,[27]. Another study in university of Gonder finds out 5.9 % of the cases, patients or their families were not aware of any kind of aspiration [25].

A study from Ethio-Swedish Children's Hospital in Addis Ababa, Ethiopia, 81% of them presented delayed after 24 hrs, 9 (11%) children died, six before, two during and one after bronchoscopy. Late presentation, delay in diagnosis and intervention as well as missed diagnosis was major causes of prolonged morbidity and high mortality [28]. procedure related consequences of FBAs rigid bronchoscopy (RB) in emergency situations carries a 4–17 % risk of consequences, with 14 % of patients without FB especially at risk (for example, desaturation, bronchospasm, airway damage,

pneumothorax, respiratory arrest, etc.). According to some articles, the prevalence of procedure associated complication including death is 6 %. Flexible bronchoscopy is being used by some, but its implementation under local anesthesia is still risky for the concerned population and necessitates the presence of an anesthesiologist; it is more of an alternative to RB in the operating theater, and some people speak of flexible tool extractions. Determining which patients—whether for a flexible or RB—should visit the operating room is still a challenge [29, 30].

These dreadful complications of FBA calls both the clinicians and the public need to be cautious about it .This shows FBA aspiration in children is one of the public health problem as it has- substantial consequences. This calls urgent investigation on parents' knowledge about foreign body aspiration.

1.3. Justification of the study

FBA is a life-threatening event with different types of consequences and one of the most common causes of mortality in children due to its different clinical presentations, lack of parental knowledge [31]. Most cases of these consequences can be prevented through different measures, so it is most important that parents, guardians, caregivers, employees of educational institutions and all those who work with children, especially under 5 years of age, adopt a certain level of knowledge on consequences related to FBA.

Prevention can be observed through multiple levels. Primary prevention implies legal frame works and regulations. The only countries which have developed regulations directed towards choking prevention are the United States and Sweden [32, 33, 34]. Manufacturers of foods containing nuts should label the same products as a potential choking hazard for children less than 3 years of age [35]. Secondary prevention involves educating parents and other caregivers about symptoms while tertiary prevention focuses on timely treatment in the event that aspiration has occurred [35].

These are some examples how parental knowledge play an integral role on consequences related to FBA. . Better understanding of FBA is very essential to prevent complication and premature death due to FBA. However, there is a limited shred of evidence regarding the knowledge of FBA among parents in Ethiopia, particularly in Tigray. Therefore, this research will fill the research gab and asses the level of knowledge of parents about the consequence of inhaling a foreign body and thus the need to implement similar projects in order to raise awareness about this important problem.

1.4. Significance of the Study

In order to reduce the incidence of foreign body aspiration and prevent complications and related consequences, emphasis should be placed on prevention. Therefore, it is important to raise public awareness and educate parents and caregivers about risk factors and behavior that increase the risk of aspiration of a foreign body as well as the correct way of providing assistance to children in the event that aspiration occurred. Our study is designed to assess parents' knowledge regarding foreign body aspiration consequences via questionnaire. The aim is to gain insight into the level of parental knowledge-and discuss developing improved individualized educational programs as well as preventive measures.

This study will help in reducing the risks of death and consequences from this serious condition, by creating public awareness, early detection and intervention, reduce mortality and morbidity of children, prevent complications .It also has significant contribution to the scientific community and great role for policy makers to introduce secondary preventive strategic policy

2. LITERATURE REVIEW

Foreign body aspiration (FBA) is a life-threatening event and one of the most common causes of mortality in children[36].Most commonly aspirated foreign bodies are food-related, mainly peanuts[37]. Tracheobronchial foreign body aspiration (FBA) can result in severe immediate and long-term complications if the foreign body is not identified and removed [38].FBA causes varying amounts of obstruction to the airway that can lead to difficulties with ventilation and oxygenation thus resulting in significant morbidity or mortality. Some institutions report the death rate from FBA is 27% [39].

The main cause of death has been attributed to hypoxic-ischemic brain injury and less commonly, pulmonary hemorrhage [40,41]. Other consequences include recurrent pneumonia, bronchiectasis, lung abscess, and atelectasis can occur from a missed foreign body aspiration. Bronchial stenosis is also a well-known complication of chronic foreign bodies in the airway. However, nearly universal, tracheal lacerations are the most commonly reported complication among affluent countries. Pneumonia is the most common complication among countries with a poorer socioeconomic status. In a retrospective study evaluating risk factors associated with a missed diagnosis of foreign body aspiration, the incidence of a major complication was often seen to be increased the longer a foreign body was present in the airways. Obstructive emphysema was found to be the most common complication for foreign bodies discovered >3 days after the initial event. Importantly, it should be noted that a normal radiography with absent physical findings does not exclude the possibility of an aspirated foreign body. Furthermore, patients on bronchodilators and steroid may suppress reactive respiratory symptoms [39, 42].

Necrotizing pneumonia (NP) is a rare but serious complication that occurs after foreign body retention. One case report shows a case of severe NP in an infant caused by foreign body retention in the airway with no choking history [43].FBA should always be considered in the differential diagnosis of chronic or recurrent respiratory diseases, even in the absence of a previous choking event [38].The standard of care for managing this situation is endoscopic retrieval using rigid bronchoscopy. However, in resource-limited settings rigid bronchoscopy may not be available [42]. Delay in treatment placed patients at a significant higher risk of developing complications both during the bronchoscopic procedure and in the long-term [44]. Mechanical complications of bronchoscopy are primarily related to airway manipulations or bleeding [45].

Open surgery may be required when lung abscess has occurred[38].one study shows average duration of the foreign body retention was 2.60 years (2 months to 9 years), A misdiagnosis of asthma was made in five patients[38]. For prevention of foreign body aspiration in children and its mortality should be taken two strategies: non-medical (alterations in product design and public education campaigns) and medical (education of medical staff and improvement of equipment [39].As it has different clinical presentations, parental knowledge is essential for early management to prevent complications [36]. Others advice public safety campaigns targeted at school aged children [40]. The CHOP community intervention trial study protocol was designed in Italy with the aim of educating families and teaching staff through the school system. Lectures intended for children and their parents or guardians on the dangers of aspiration of foreign bodies, could be implemented as part of the compulsory curriculum in schools [46]. Given the obligatory primary and secondary education in our country, in this way a greater number of parents and children would be included in this educational program. Evaluation of a media campaign conducted through newspaper articles, television and medical educational programmers in community pediatric care centers in Israel in the 1980s, aimed at raising awareness of foreign body aspiration, showed a 35% reduction in the incidence of foreign body aspiration over a two-year period, which demonstrates the effectiveness of the media for educational purposes [47].

Some countries, such as Canada, recognized the importance of the Internet as a medium available to the general population. BC Children's hospital in collaboration with the University of British Columbia (a BC Children's Hospital / UBC Initiative) have created an educational website that is publicly available and free and targets school-age children and all those who care for them with the aim of raising awareness of the dangers of foreign body aspiration [48].

The University of Padua and the Garrahan Hospital of Buenos Aires have developed "SafeFood4Children", a project aimed at preventing food choking in children, by posting videos in which experts inform all caregivers on this topic [49]. International cooperation and exchange of experiences between experts is also important. For example, "The Global Injury Research Collaborative (GIRC) ", founded as a NGO, serves as a register into which medical professionals can enter data about their patients who had suffered an inhalation event. The application then gathers data from medical professionals from all over the world and analyzes it in order to help prevent future injuries [50].

Differences between regions may be related to the rapid development of social and economic conditions, further improvement of basic health care preventive measures, and regional differences in

culture. In recent years, the current research mainly focuses on how to use new technologies and methods to identify and deal with FBs more effectively, reduce the impact of FBs on the body, and explore the potential impact and complications of FBs on the body; With the development of medical technology, minimally invasive surgery, nanotechnology, etc. are gradually concerned about FBs [51-53].

The most important goal is to improve public awareness and emergency knowledge of FBs through publicity methods, such as the internet or offline activities, and to improve laws and regulations. There is good evidence, Most FB cases can be prevented by effective measures. These include raising public awareness and emergency knowledge through publicity, improving laws and regulations, striving to strengthen the care of children, caring for elderly individuals, and other measures. Additionally, different age groups need different targeted measures, such as strengthening the care of children, caring for elderly individuals, improving necessary monitoring programs and reporting systems, conducting effective hazard assessments, and publicity and education activities.

3. OBJECTIVES

3.1. General objective

To assess the determinants of parental knowledge on childhood foreign body aspiration among parents In ACSH, Mekelle, Ethiopia, 2025.

3.2 Specific objectives

To determine the magnitude of parental knowledge of foreign body aspiration among parents in ACSH, Mekelle, Ethiopia, 2025.

To identify factors associated with parental knowledge of foreign body aspiration among parents in ACSH, Mekelle, Ethiopia, 2025.

4. STUDY METHOD

4.1 Study area and period

MU, CHS, Ayder comprehensive specialized hospital (ACSH), Mekelle, Northern Ethiopia, from January –March 2025. ACSH is a teaching tertiary hospital under Mekelle University. With over 3000 staff, it provides preventive, curative and rehabilitative service to catchment population of around 6 million; it is the only tertiary hospital providing bronchoscope service for FBA.the teaching hospital is the largest hospital in the Tigray Region and the second largest hospital in Ethiopia.

4.2 Study Design

A facility-based cross-sectional survey on parents of children visiting ACSH during the study period.

4.3 Study population

Parents or guardians of pediatric age child come for routine medical service and checkup in ACSH during study period.

4.4 Inclusion and Exclusion criteria

Inclusion criteria; were met if the parents of pediatrics age were referred for clinical examination due to various indications who are willing to provide verbal informed consent.

Exclusion criteria; critically ill parents; whose children were severely ill (admitted to ICU or ED (Red).

4.5 Sample Size Determination

The sample size is calculated using the single population proportion formula: $n = z^2p\ (1\text{-}p)\backslash d^2$ with 95% confidence level and 5% margin of error. Where n = sample size, z = 1.96, and d = 0.05 since we could not find study conducted in our country. To get maximum sample size we used P = 0.5, so, the n value is 384 and after adjusting 10% for possible non-response rate, the final sample size is 423.

4.6 Sampling technique

Convenient sampling method used to enroll in this study.

4.7 Study Variables

4.6.1 Dependent variables; level of knowledge

Poor knowledge

Good knowledge

4.6.2 Independent variables; socio-demographics factors (age, sex, educational status etc.)

4.7 Operational Definitions

Critically ill: Those who are admitted to PICU and at ED (red patients)

Foreign body aspiration: Is inhaling or breathing foreign bodies into the air or aero digestive system

Good knowledge: A participant who scored a mean and above for 12 knowledge questions

Illiteracy: Unable to read and write.

Poor knowledge: A participant who scored below the mean for 12 knowledge questions.

4.8 Data collection tool and procedures

The data were collected from clients by face to face interview using structured questionnaire tool adopted from litterateurs with similar study and modified to coincide with this research objectives.

The first section collects personal and socio-demographic data, including age, gender, education, etc. the second section covers participants' knowledge and perceived seriousness of FBA. The data collectors are 3 residents, 4 Nurses. One day training was given to the data collectors on how to fill the tool by the principal investigator.

4.8. Data progressing and analysis

Evaluation of a parental knowledge towards FBA is determined by 12 questions. A correct answer for each question is coded as 1, while incorrect answer is coded with 0. The total knowledge score was calculated by adding the scores for all 12 questions. The higher the score, the higher a parental knowledge of FBA. Using the mean score as a cutoff point to determine the knowledge level, parents are classified as having poor or good knowledge.

The data is analyzed using the Statistical Package of Social Sciences (SPSS) version 27.0. Uni-variate and bi-variate analyses between dependent and independent variables are performed using binary logistic regression. Microsoft Excel 2019 is used to make graphs and charts. In this study, all tests with a P value <0.05 are considered statistically significant. The result is presented using charts, tables, and texts..

4.9. Data quality control and assurance

To maintain the good quality, thorough training of data collectors and Supervision was undertaken by principal investigator and pretesting was done to see data completeness.

Data quality is assured by checking the data collection sheet for completeness by supervisors, and necessary correction was made immediately. The internal consistency of the knowledge scale was tested using cronbach's alpha, which yielded a value of 0.75, indicating acceptable reliability.

4.10. Ethical consideration

Permission letter was obtained from College of Health Sciences, Mekelle University; Parents were informed about the aim, benefits, and possible inconveniences of the study.

They were assured the information they give will be confidential. Before data collection begins, verbal consent-was obtained, and participants could withdraw at any time if the need arises.

4.11. Plan for dissemination of results

The finding of this study will be disseminated to Mekele University College of Health Sciences Department of Otolaryngology – Head & Neck Surgery, Ayder Comprehensive Specialized Hospital. Findings will also be presented for different work-shops and seminars and will be published in a peer reviewed journal.

5. Result

5.1. Sociodemographic characteristics

A total of 423 parents were included in this study, with a 100% response rate. The majority of respondents were female (76.83%), and more than half (52.48%) were aged 35 years or younger. The majority of parents (59.10%) had an educational status of secondary or below, while 40.90% held a college degree or higher. Regarding the Number of children, 56.97% of respondents had between one and three children, and 43.03% had more than three children. The majority of respondents (70.45%) reported no previous experience with foreign body aspiration (FBA), while 14.18% had experienced it once and 15.37% twice (Table1).

Table 1: socio-demographic of parents participate on foreign body aspiration study in Ayder Hospital, Tigray 2017 N=423.

Variables	Categories	Frequency	Percent
Age	≤35 years	222	52.48
	>35 years	201	47.52
Gender	Female	325	76.83
	Male	98	23.17
Educational status	Secondary or below	250	59.10
	College degree or higher	173	40.90
Number of children	1 to 3	241	56.97
	>3	182	43.03
Age of the youngest child	<1 year	116	27.42
	1-5 years	221	52.25
	6-10 years	55	13.00
	>10 years	31	7.33
Previous FBA Experience	No	298	70.45
	Once	60	14.18
	Twice	65	15.37
Have you heard about FBA	No	51	12.06
	yes	372	87.94

5.2. Responses of the participants to knowledge items regarding foreign body aspiration

Our study revealed that while 70.69% of respondents correctly identified that peanuts and nuts can cause FBA in children, and 86.29% recognized corn, popcorn, and beans as potential aspiration hazards, only 32.62% knew that these foods should not be given to children under 5 years. Only 33.33% of parents were aware that small toys could be inhaled into a child's airway, despite 92.67% acknowledging the need for caution when removing toys from small children. Although 70.21% correctly identified that FBA is most common in children aged 0-5 years, less than half (45.86%) recognized that FBA may cause death, and only 44.21% understood that inhaling a foreign body has life-threatening consequences Table 2.

Table 2: Responses of the participants to knowledge items regarding foreign body aspiration

Variables	**Categories**	**Frequency**	**Percent**
Do peanuts and nuts cause FBA in children	No	124	29.31
	yes	299	70.69
Can corn, popcorn, and beans cause aspiration?	No	58	13.71
	yes	365	86.29
Can small toys be inhaled into a child's airway?	No	282	66.67
	yes	141	33.33
Did you know that foreign body inhalation is most common in children aged 0-5	No	126	29.79
	yes	297	70.21
Did you know that Peanuts and nuts should not be given to children under 5 years	No	285	67.38
	yes	138	32.62
Did you know that you should be careful when taking out a toy from a small children	No	31	7.33
	yes	392	92.67
Did you know that a child should not walk, run, or jump while feeding?	No	261	61.70
	yes	162	38.30
Should a child suspected of inhaling a foreign body have the object removed	No	249	58.87
	yes	174	41.13
Do you know that FBA may cause death?	No	229	54.14
	yes	194	45.86
Do you think inhaling a foreign body has life-threatening consequences?	No	236	55.79
	yes	187	44.21
Do you know what the symptoms of	No	135	31.91

foreign body inhalation in children are?	yes	288	68.09
Do you know what to do when you suspect a child has |inhaled a foreign body?	No	160	37.83
	yes	263	62.17

5.3. Parents' over all knowledge of the of a foreign body aspiration

Of the studied parents, 271(64.07%) [95% CI, 59%-68%] had good levels of knowledge on the consequences of FBA.

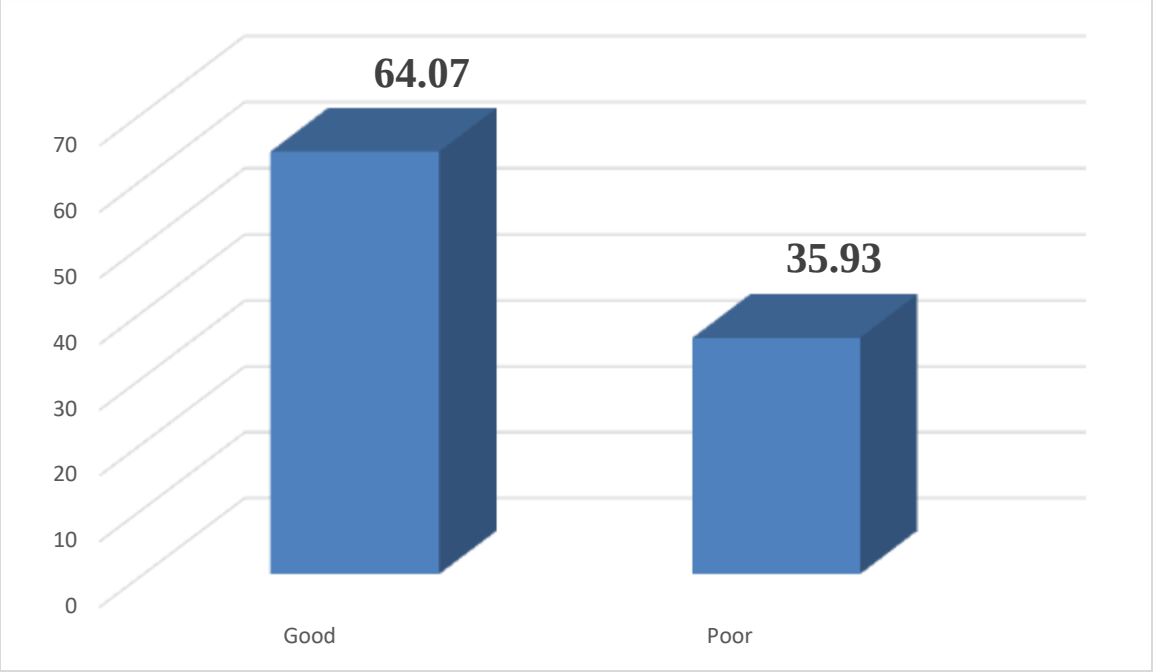

Figure 1: parents knowledge foreign body aspiration in Ayder comprehensive specialized hospital, Tigray 2017 N=423

5.4. Factors associated to Parents' knowledge on foreign body aspiration

Based on the multivariable binary logistic regression analysis, several factors were found to be significantly associated with parents' knowledge on the consequences of foreign body aspiration (FBA). Parents with a college degree or higher were 7.19 times more likely (AOR=7.19, 95% CI: 4.21–12.29) to have good knowledge compared to those with secondary education or below. Having more than three children was also significantly associated with better knowledge (AOR=2.25, 95% CI: 1.34–3.78) compared to parents with one to three children. Parents whose youngest child was less than one year old

(AOR=4.55, 95% CI: 1.71–12.10) or between one and five years old (AOR=3.03, 95% CI: 1.23–7.44) were significantly more likely to be knowledgeable about FBA consequences than those whose youngest child was over ten years. Previous experience with FBA also played a significant role: parents who had encountered FBA once (AOR=2.68, 95% CI: 1.30–5.54) or twice (AOR=2.97, 95% CI: 1.44–6.11) demonstrated higher knowledge compared to those with no such experience.

Table 3: Factors associated with parents' knowledge on foreign body aspiration in Ayder Comprehensive Specialized Hospital, Mekelle, Ethiopia.

Variables	Categories	COR,95% CI	AOR,95% CI
Age	≤35 years	1	1
	>35 years	1.52(1.02-2.28)	1.40(0.80-2.46)
Gender	Female	1	1
	Male	2.30(1.36-3.88)	1.47(0.78-2.75)
Educational status	Secondary or below	1	1
	College Degree or higher	6.95(4.19-11.51)	7.19(4.21-12.29)***
Number of children	1 to 3	1	1
	>3	2.32(1.52-3.53)	2.25(1.34-3.78)**
Age of the youngest child	<1 year	3.07(1.36-6.94)	4.55(1.71-12.10**
	1-5 years	2.69 (1.25-5.79)	3.03(1.23-7.44)*
	6-10 years	1.92(0.78-4.70)	1.69(0.61- 4.67)
	>10 years	1	1
Past History of FBA	No	1	1
	Once	2.37(1.25-4.50)	2.68(1.30-5.54)**
	Twice	2.89(1.50-5.53)	2.97(1.44-6.11)**
Have you heard about FBA	No	1	1
	yes	1.54 (0.85-2.79)	0.76(0.38-1.53)
*** p = < 0.001 ** p = <0.01,*p= <0.05			

6. Discussion

The present study found that 64.07% (95% CI: 59%–68%) of parents demonstrated good knowledge regarding the consequences of foreign body aspiration (FBA). This level of knowledge is moderately high and indicates a substantial awareness among parents, which is crucial for early recognition and prevention of FBA-related complications.

The proportion of parents with good knowledge in this study is lower than those reported by Laswad BM et al (36), where 66% of parents demonstrated good knowledge, possibly due to targeted educational interventions in their study area. The variation in knowledge levels across studies may be attributed to differences in socioeconomic status, educational opportunities, and public health awareness campaigns.

Our multivariable logistic regression analysis identified several significant predictors of good parental knowledge. Parents with a college degree or higher were over seven times more likely to have good knowledge compared to those with secondary education or below (AOR=7.19, 95% CI: 4.21–12.29). This finding aligns with previous research indicating that higher educational attainment enhances health literacy and the ability to comprehend medical information. Education likely facilitates access to information sources and improves understanding of health risks such as FBA.this result correlates with finding Almutairi,et al (31) which demonstrated education level affects parents knowledge on FBA.

Having more than three children was also associated with better knowledge (AOR=2.25, 95% CI: 1.34–3.78). This may reflect increased parental experience and exposure to child health issues over time, consistent with findings by Almutairi,et al (31), who reported that multiparous parents tend to be more aware of pediatric emergencies.

The age of the youngest child significantly influenced knowledge levels. Parents whose youngest child was less than one year old (AOR=4.55) or between one and five years old (AOR=3.03) were more knowledgeable than those with children over ten years. This trend is expected since younger children are at higher risk for FBA, prompting parents to seek relevant information actively. This observation concurs with the study by Molla YD et al (25), which emphasized heightened parental vigilance during early childhood.

Previous experience with FBA incidents also significantly increased knowledge. Parents with one or two prior FBA episodes had higher odds of good knowledge (AOR=2.68 and 2.97, respectively). This is consistent with the concept that direct experience with health emergencies enhances awareness and learning, as reported by Belete KG et al (48).

The variations observed in knowledge levels and associated factors across studies may be influenced by cultural differences, availability of health education programs, and healthcare access. For example, regions with active community health initiatives tend to have parents with better awareness. Additionally, recall bias and differences in study methodologies, such as the definition of "good knowledge," may contribute to discrepancies.

Implications

These findings underscore the importance of targeted educational interventions, especially for parents with lower educational levels and fewer children. Health promotion strategies should focus on young parents and those without prior FBA experience to improve early recognition and prevention of FBA complications.

Limitations of the study

Potential recall or reporting bias from self-reported data. Furthermore, the study may not be generalizable beyond the specific population studied due to cultural and regional differences.

7. Conclusion

This study revealed that a majority of parents (64.07%) possess good knowledge regarding the consequences of foreign body aspiration (FBA). Higher educational attainment, having more children, younger age of the youngest child, and previous experience with FBA were all significantly associated with better parental knowledge. These findings highlight that knowledge is not uniformly distributed and is influenced by both demographic and experiential factors.

Recommendations

Targeted health education programs should be developed to improve knowledge among parents with lower educational levels and fewer children, as they are at higher risk of inadequate awareness about

foreign body aspiration (FBA). Awareness campaigns must focus on parents of infants and young children, who are more vulnerable to FBA incidents. Additionally, sharing experiences from parents who have encountered FBA can enhance community understanding and preparedness. Integrating FBA prevention and management information into routine pediatric and maternal healthcare visits is essential, especially for new and less experienced parents. Regular assessments of parental knowledge should be conducted to identify gaps and measure the effectiveness of interventions. These strategies will help reduce FBA-related risks and improve child safety.

8. References

1. Dwivedi P, Singh G, Ahmad S. Undiagnosed accidental blister pack pill ingestion in elderly. Cureus. 2021 Aug;13(8).

2. Vos T, Lim SS, Abbafati C, Abbas KM, Abbasi M, Abbasifard M, Abbasi-Kangevari M, Abbastabar H, Abd-Allah F, Abdelalim A, Abdollahi M. Global burden of 369 diseases and injuries in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019. The lancet. 2020 Oct 17;396(10258):1204-22.

3. Collaborators GB, Ärnlöv J. Global burden of 87 risk factors in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019. The Lancet. 2020;396(10258):1223-49.

4. Igarashi Y, Norii T, Sung-Ho K, Nagata S, Yoshino Y, Hamaguchi T, Nagaosa R, Nakao S, Tagami T, Yokobori S. Airway obstruction time and outcomes in patients with foreign body airway obstruction: multicenter observational choking investigation. Acute Medicine & Surgery. 2022 Jan;9(1):e741.

5. Zhan J, Du Y, Wu J, Lai F, Song R, Wang Y, Xie Z, Lu Y. The global, regional, and national burden of foreign bodies from 1990 to 2019: a systematic analysis of the global burden of disease study 2019. BMC Public Health. 2024 Jan 31;24(1):337 .

6. Gregori D, Salerni L, Scarinzi C, Morra B, Berchialla P, Snidero S, Corradetti R, Passali D, ESFBI Study Group. Foreign bodies in the upper airways causing complications and requiring

hospitalization in children aged 0–14 years: results from the ESFBI study. European archives of oto-rhino-laryngology. 2008 Aug;265(8):971-8.

7. Hariri L, Rehman A. Estradiol. StatPearls. Treasure Island (FL): StatPearls PublishingCopyright© 2022. Stat-Pearls Publishing LLC. 2022.

8. Aslan N, Yıldızdaş D, Özden Ö, Yöntem A, Horoz ÖÖ, Kılıç S. Evaluation of foreign body aspiration cases in our pediatric intensive care unit: Single-center experience. Turkish Archives of Pediatrics/Türk Pediatri Arşivi. 2019 Mar 1;54(1):44.

9. Samarei R. Survey of foreign body aspiration in airways and lungs. Global journal of health science. 2014 Dec;6(7):130.

10. Saki N, Nikakhlagh S, Rahim F, Abshirini H. Foreign body aspirations in infancy: a 20-year experience. International Journal of Medical Sciences. 2009;6(6):322.

11. Chinski A, Foltran F, Gregori D, Ballali S, Passali D, Bellussi L. Foreign bodies in children: A comparison between Argentina and Europe. International journal of pediatric otorhinolaryngology. 2012 May 14;76:S76-9.

12. Foltran F, Ballali S, Rodriguez H, van As AB, Passali D, Gulati A, Gregori D. Inhaled foreign bodies in children: a global perspective on their epidemiological, clinical, and preventive aspects. Pediatric pulmonology. 2013 Apr; 48(4):344-51.

13. Gendeh BS, Gendeh HS, Purnima S, Comoretto RI, Gregori D, Gulati A. Inhaled foreign body impaction: a review of literature in Malaysian children. The Indian Journal of Pediatrics. 2019 Feb 21;86:20-4.

14. Hsieh A, Hsiehchen D, Layne S, Ginsberg GG, Keo T. Trends and clinical features of intentional and accidental adult foreign body ingestions in the United States, 2000 to 2017. Gastrointestinal endoscopy. 2020 Feb 1;91(2):350-7.

15. Yuan M, Lu Q. Trends and disparities in the incidence of intraocular foreign bodies 1990–2019: a global analysis. Frontiers in Public Health. 2022 Jun 20;10:858455.

16. Suzuki T, Shimada H. Esophageal foreign body. Kyobu geka. The Japanese Journal of Thoracic Surgery. 2022 Sep 1;75(10):895-900.

17. Zhan J, Du Y, Wu J, Lai F, Song R, Wang Y, Xie Z, Lu Y. The global, regional, and national burden of foreign bodies from 1990 to 2019: a systematic analysis of the global burden of disease study 2019. BMC Public Health. 2024 Jan 31;24(1):337.

18. Rose D, Dubensky L. Airway foreign bodies. InStatPearls [Internet] 2023 Aug 7. StatPearls Publishing.

19. Ginter D, Johnson KT, Venettacci O, Vanderlaan RD, Gilfoyle E, Mtaweh H. Case report: foreign body aspiration requiring extracorporeal membrane oxygenation. Frontiers in Pediatrics. 2023 Jul 10; 11:1189722.

20. Lea E, Nawaf H, Yoav T, Elvin S, Ze'ev Z, Amir K. Diagnostic evaluation of foreign body aspiration in children: a prospective study. Journal of pediatric surgery. 2005 Jul 1; 40(7):1122-7.

21. Cramer N, Jabbour N, Tavarez MM, Taylor RS. Foreign body aspiration. StatPearls. Treasure Island (FL).

22. Bekele A. Aerodigestive foreign bodies in adult ethiopian patients: a prospective study at tikur anbessa hospital, ethiopia. International journal of otolaryngology. 2014;2014(1):293603.

23. Cohen S, Goldberg S, Springer C, Avital A, Picard E. Foreign body aspiration in children. Harefuah. 2015 Mar 1;154(3):175-7

24. Tang LF, Xu YC, Wang YS, Wang CF, Zhu GH, Bao XE, Lu MP, Chen LX, Chen ZM. Airway foreign body removal by flexible bronchoscopy: experience with 1027 children during 2000–2008. World Journal of Pediatrics. 2009 Aug;5(3):191-5.

25. Molla YD, Mekonnen DC, Beza AD, Alemu HT, Selamawi AE. Foreign body aspiration in children at University of Gondar Comprehensive Specialized Hospital, a two year retrospective study. Heliyon. 2023 Oct 1;9(10).

26. Chantzaras AP, Panagiotou P, Karageorgos S, Douros K. A systematic review of using flexible bronchoscopy to remove foreign bodies from paediatric patients. Acta Paediatrica. 2022 Jul;111(7):1301-12.

27. Tadesse A, Hailemariam B. Management of foreign body aspiration in pediatric patients: an experience from a tertiary hospital in Ethiopia. East and Central African Journal of Surgery. 2014 Sep 16;19(2):36-43.

28. Melaku G. Foreign body aspiration in children: experience from Ethiopia. East African medical journal. 1996 Jul 1;73(7):459-62.

29. Pitiot V, Grall M, Ploin D, Truy E, Khalfallah SA. The use of CT-scan in foreign body aspiration in children: a 6 years' experience. International journal of pediatric otorhinolaryngology. 2017 Nov 1;102:169-73.

30. Ciftci AO, Bingöl-Koloğlu M, Şenocak ME, Tanyel FC, Büyükpamukçu N. Bronchoscopy for evaluation of foreign body aspiration in children. Journal of pediatric surgery. 2003 Aug 1;38(8):1170-6.

31. Almutairi, Aisha T.1,; Alharbi, Fahad S.2. Parental knowledge and practices toward foreign body aspiration in children in the Al Qassim region of Saudi Arabia. Journal of Family Medicine and Primary Care 10(1):p 199-204, January 2021.|DOI: 10.4103/jfmpc.jfmpc_1500_20

32. Harris M, Lyng JW, Mandt M, Moore B, Gross T, Gausche-Hill M, Donofrio-Odmann JJ. Prehospital Pediatric Respiratory Distress and Airway Management Interventions: An NAEMSP Position Statement and Resource Document. Prehospital Emergency Care. 2022 Jan 4;26(sup1):118-28.

33. Casalini AG, Majori M, Anghinolfi M, Burlone E, D'Ippolito R, Toschi M, Pisi G, Barantani D, Ghasempour D, Monica M. Foreign body aspiration in adults and in children: advantages and consequences of a dedicated protocol in our 30-year experience. Journal of bronchology & interventional pulmonology. 2013 Oct 1;20(4):313-21.

34. Belete KG, Tamire T, Sisay A, Asmare M, Dessie B, Muluadam B, Adamu A, Dessalegn K, Yalew GA, Oumer KE. Knowledge attitude and practice towards foreign body aspiration management among kindergarten teachers in south-west Amhara, rural Ethiopia. Annals of Medicine and Surgery. 2024 Nov 1;86(11):6482-7.

35. Committee on Injury, Violence, and Poison Prevention. Prevention of choking among children. Pediatrics. 2010 Mar 1;125(3):601-7.

36.Laswad BM, Alsulaimani HM, Alomairi MM, Alsulami RR, Alobaidi SF, Aljabri H, Alsaidi ST, Ageel MH. Parental knowledge and practices related to foreign body aspiration in children in Makkah, Saudi Arabia. Cureus. 2023 Feb;15(2).

37.Mohammad M, Saleem M, Mahseeri M, Alabdallat I, Alomari A, Qudaisat I, Shudifat A, Alzoubi MN. Foreign body aspiration in children: a study of children who lived or died following aspiration. International journal of pediatric otorhinolaryngology. 2017 Jul 1;98:29-31.

38. Rance A, Mittaine M, Michelet M, Blondel AM, Labouret G. Delayed diagnosis of foreign body aspiration in children. Archives de Pédiatrie. 2022 Aug 1;29(6):424-8.

39. Brkic F, Umihanic S, Altumbabic H, Ramas A, Salkic A, Umihanic S, Mujic M, Softic L, Zulcic S. Death as a consequence of foreign body aspiration in children. Medical Archives. 2018 Jun;72(3):220.

40.Pediatrics AA. Prevention of choking among children. Pediatrics. 2010;125(3):601-07.

41. Wu X, Wu L, Chen Z, Zhou Y. Fatal choking in infants and children treated in a pediatric intensive care unit: A 7-year experience. International journal of pediatric otorhinolaryngology. 2018 Jul 1;110:67-9.

42.Tamiru T, Gray PE, Pollock JD. An alternative method of management of pediatric airway foreign bodies in the absence of rigid bronchoscopy. International Journal of Pediatric Otorhinolaryngology. 2013 Apr 1;77(4):480-2.

43.Wang Y, Zhou Y, Pan F, Wang Y. An unusual presentation of necrotizing pneumonia caused by foreign body retention in a 20-month-old child: A case report and literature review. Frontiers in Pediatrics. 2023 Jun 15;11:1203103..

44. Anton-Pacheco JL, Martin-Alelu R, Lopez M, Morante R, Merino-Mateo L, Barrero S, Castilla R, Cano I, Garcia A, Gomez A, Luna-Paredes MC. Foreign body aspiration in children: Treatment timing and related complications. International Journal of Pediatric Otorhinolaryngology. 2021 May 1;144:110690.

45.Stahl DL, Richard KM, Papadimos TJ. Complications of bronchoscopy: A concise synopsis. International journal of critical illness and injury science. 2015 Jul 1;5(3):189-95.

46. Lorenzoni G, Azzolina D, Baldas S, Messi G, Lanera C, French MA, Da Dalt L, Gregori D. Increasing awareness of food-choking and nutrition in children through education of caregivers: the CHOP community intervention trial study protocol. BMC public health. 2019 Dec;19:1-7.

47. Sadan N, Raz A, Wolach B. Impact of community educational programmes on foreign body aspiration in Israel. European journal of pediatrics. 1995 Oct;154:859-62.

48. Belete KG, Tamire T, Sisay A, Asmare M, Dessie B, Muluadam B, Adamu A, Dessalegn K, Yalew GA, Oumer KE. Knowledge attitude and practice towards foreign body aspiration management among kindergarten teachers in south-west Amhara, rural Ethiopia. Annals of Medicine and Surgery. 2024 Nov 1;86(11):6482-7.

49. Begović I, Štefanović IM, Vrsalović R, Geber G, Kereković E, Lučev T, Baudoin T. Parental Awareness of the Dangers of Foreign Body Inhalation in Children. Acta Clinica Croatica. 2022 Oct;61(Suppl 4):26.

50. The Global Injury Research Collaborative (GIRC) [internet] [cited 28.11.2021] Available from: https://www.globalirc.org

51. Zhan J, Du Y, Wu J, Lai F, Song R, Wang Y, Xie Z, Lu Y. The global, regional, and national burden of foreign bodies from 1990 to 2019: a systematic analysis of the global burden of disease study 2019. BMC Public Health. 2024 Jan 31;24(1):337.

52. Dodson H, Sharma S, Cook J. Foreign body airway obstruction. InStatPearls [Internet] 2024 Jul 17. StatPearls Publishing.

53. Cui H, Sun HX, Wang ZZ, Liu L, Wang S, Qu JC, Chen ZM. Analysis of the incidence and burden of intraocular foreign bodies in China based on age-period-cohort model. [Zhonghua yan ke za Zhi] Chinese Journal of Ophthalmology. 2023 Aug 1;59(8):650-6.

9. Appendixes

Dear Participant,

In my study I investigate parental knowledge on the consequences of childhood foreign body aspiration.

In the context of this thesis, I request your participation in a 10 minute interview. Your personal contact data and your name is not included in this questionnaire. You can withdraw such consent at any time. If you have any questions, please feel free to tell me about them at any time. Regardless of your signature, you are always free to withdraw your consent to be interviewed.

Thank you for your trust and your participation.

Sincerely, [Brhanu]

Part1; Socio-demographic characteristics of study sample	
Age	≤35 years
	>35 years
Gender	Female
	Male
Educational status	Secondary or below
	College Degree or higher
Number of children	1 to 3
	>3
Age of the youngest child	<1 year
	1-5 years
	6-10 years
	>10 years
Past History of FBA	No
	Once
	Twice
Have you heard about FBA	No
	yes
Part2; Parental knowledge on consequence related to aspirate FA among the Study Sample (yes/no)	
Do peanuts and nuts cause FBA in	No
children	yes
Can corn, popcorn, and beans cause aspiration?	No
	yes
Can small toys be inhaled into a child's airway?	No
	yes
Did you know that foreign body inhalation is most common in children aged 0-5	No
	yes
Did you know that Peanuts and nuts should not be given to children under 5 years	No
	yes

Did you know that you should be careful when taking out a toy from a small children	No
	yes
Did you know that a child should not walk, run, or jump while feeding?	No
	yes
Should a child suspected of inhaling a foreign body have the object removed	No
	yes
Do you know that FBA may cause death?	No
	yes
Do you think inhaling a foreign body has life-threatening consequences?	No
	yes
Do you know what the |symptoms of foreign body inhalation in children are?	No
	yes
Do you |know what to do when you suspect a child has |inhaled a foreign body?	No
	yes