

Effect of health education program-based on a health belief model on mothers' knowledge and practices regarding choking prevention and management for their children

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Abstract

Background: Foreign body aspiration (FBA) is a vital public health problem. The most dangerous complication of FBA is choking. Nurses can play a critical role in increasing education efforts through providing choking-prevention educational programs to parents and other caregivers. **Aim of the study:** evaluate the effect of a health education program based on a health belief model on mothers' knowledge and practice regarding choking for their children. **Subjects and method:** quasi-experimental research design was used. **Settings:** This study was conducted at Benha University and Benha Teaching Hospital outpatient Clinics. **Subjects:** Convenience sampling including 110 mothers was used for data collection. **Tools of data collection:** tool I: a structured questionnaire to assess mothers' knowledge and practice related to choking management and prevention. Tool II: The questionnaire expanding the concepts of HBM. **Results:** The results showed the majority of the mothers had satisfactory knowledge level after 30 days from application of educational program. There was a statistically significant difference between pre and after 30 days of health education application to the mothers. Also, after 30 days from application, nearly all of them have good FBA practice management. **Conclusion:** The study concluded that the prominence of continuing education based on HBM on mothers' knowledge and practice in management and prevention of FBA. **Recommendation:** educational programs and proposing training programs is tremendously crucial to inhibit choking and FBA.

Keyword: Health education, Health belief model, Choking prevention and management, Mothers' knowledge and practice

Introduction

Foreign body aspiration is a vital public health problem for young children and can be an emergency life-threatening

pathologic state⁽¹⁾. The most dangerous complication of foreign body aspiration is choking which is defined as the

interruption of respiration as the effect of an internal obstruction of the airway; usually this obstruction is caused by food parts or small toys among young children^(2, 3, 4). Foreign body aspiration can lead to complete airway obstruction and so, inadequate ventilation and inadequate oxygenation and as a complication brain

damage or also it may lead to brain death will happen within four minutes⁽⁵⁾. Over the course of years, death from choking has attracted the attention of health care providers, and recently, they start to focus on the importance of instructing parents, other caregivers and toy industrialists about the threats, and the prevention of choking⁽⁶⁾.

The Pediatric airway foreign body aspiration has a high rate of airway distress, morbidity, and mortality in children less than 3 years old⁽⁷⁾. Deaths from choking occur in the home environment in up to 95% of cases^(2,8). The height age for aspiration events is 1-2 years; this can be because of incomplete dentition, immature swallowing coordination, and an inclination to be easily distracted while eating. The most death related choking events were identified among children under age 5⁽⁹⁾. Food, coins, balloons, and other toys are identified as the items which have the greatest risk of choking-related injuries and death. Certain features, constituting the shape, size, and nature of certain toys and food's parts, upsurge their possibility to cause choking amongst young children. Most Choking conditions caused by food materials were occurred among children under 3 years old while the incidence of choking caused by non-food particles was happened more in the children above three years old⁽¹⁰⁾.

The most common foreign body retrieved is peanuts⁽¹¹⁾. Other aspirated items include pieces of food, like carrots, nuts, candies, grapes, seeds, popcorn, and hot dogs⁽¹²⁾. Non-Food objects include coins, pills, safety pins, marbles, ball bearings, and beads. Food items like nuts can expand and become

friable, and, as a result, they get fragmented during their removal and cause more obstruction. Peanuts can release oils and cause chemical irritation. Presenting symptoms vary from no apparent distress to impending respiratory failure, looking at the size and placement of the foreign body. Children can also present with coughing, wheezing, shortness of breath, fever, or recurrent pneumonia⁽¹³⁾.

Children less than three years old were identified by previous studies as the highest risk group for choking, which was related to their small airways. They do not have the ability to chew hard food or large pieces of food well, as the older children who have the full set of teeth, so large pieces of food may obstruct the throat and make them aspirated⁽¹⁴⁾. Furthermore, the anatomical structure of the larynx in infants shows that it is very narrow in comparison to older children and adults, which facilitates the choking hazard and increases the risk of fatal obstruction of the upper airway in infants⁽¹⁵⁾. In relation to the non-food related choking, the shortage of adequate monitoring and innate suction in infants was identified as the most common causes of choking. Whatever the object that causes choking is food or non-food material, when it gets inside the infant's mouth, it will be considered as the fatal object for example; seeds, small objects, rubber balloons etc.^(16,17).

Many nonfood-related choking accidents were caused by coins and toys among children. Parents face challenges when they think about buying toys for their children from different age stages. They wish they were able to allow their children to play together, but different ages need different toys' characteristics, different protection and different supervision⁽³⁾.

Some toys are not allowed to younger kids because they contain small parts that can increase the risk for choking. It was found that choking deaths among children younger than 6 years are mostly related to latex balloons^(16, 18). Especially danger related to un-inflated pieces of broken latex balloons as they can advance to the child's airway and lead to an impermeable seal. The examination gloves were found to have equal danger of death related choking when they were given to children⁽¹⁹⁾. At the same level of importance and danger of any round or cylinder-shaped objects such as balls, marbles, and sphere-shaped toys or small toy parts; specifically, magnets and batteries were proven to be risk factors for choking and threats to kids' life. When the diameter of these objects is equal to the width of a child's upper airway, complete airway obstruction will be the result and it will be difficult to resolve this obstruction with common rescue maneuvers^(20, 21).

Choking related food, despite its seriousness, has not received sufficient attention around the world. Al Ali, (2015)⁽²²⁾ found that 44.4% of choking cases under 3 years old were caused by food materials in comparison to 18.5 % of choking cases by non-food material in the same age group. Introduction of solid food beside or instead of breast or formula-milk feeding should be at appropriate timing (when the child is adequately developed physically and functionally), otherwise serious complications will occur^(10, 22). Exclusive breastfeeding for the most of six months of life is endorsed by the American Academy of Pediatrics (AAP) and other health organizations

⁽²³⁾. Moreover, a study by Garther et al., (2005)⁽²⁴⁾ revealed that children under 5 years were unable to chew foods adequately. It was easier for infants and young children to swallow the whole food especially if it was unfamiliar, irregular or hard food.

Previous studies revealed that most parents and caregivers have low levels of information about choking hazards. Nichols et al. (2012)⁽²⁵⁾ conducted a cross sectional survey to judge knowledge of parents about hazards of choking caused by household food and non-food items. They found that parental knowledge of choking food is incomplete. The consumption of choking hazard foods in children under 4 is significantly related to decrease parental knowledge. However, nuts were proven to be causative of choking in 40% of cases in high-income and low-middle income nations⁽²⁶⁾. Higuchi et al. (2013)⁽²⁷⁾ conducted a study on 17 Japanese mothers with children under 2 years old and their findings displayed that the mothers did not recognize whole nuts and seeds as risk factors for choking in infants and toddlers. Moreover, Susy Safe data⁽²⁸⁾, which is considered as one of the largest registries in the world, evaluated foreign body (FB) injuries in children between 0 to 14 years old they found that about nearly half of well-known food injuries were related to the absence of adult supervision while children were eating⁽²⁹⁾. While eating improper food or food prepared improperly were identified as risk factors for the remaining 60 %⁽³⁰⁾. Risk of pediatric choking should be emphasized and highlighted through comprehensive and coordinated prevention activities. Improved parental knowledge may decrease rates of choking among children.

Karatzanis et al. (2007)⁽³¹⁾ evaluated the effect of a campaign for suitable education of the general public on the hazard of foreign body aspiration in children. Their results revealed that the overall number of bronchoscopies during recent years has decreased as a result of a campaign for the correct education of the general public and particularly parents, caretakers, and families. Moreover, Bentivegna et al., (2018)⁽³²⁾ conducted a quasi-experimental study to assess the effect of an educational interference on parent knowledge of choking threats and its preventive measures. They found that parental knowledge of choking hazards and prevention was improved immediately after the brief educational video and 30 days later.

Passali et al. (2015)⁽³³⁾ conducted a review to summarize current knowledge on foreign body injuries in children. They found that there is a great possibility of nonspecific symptoms, or an entire absence of symptoms, which may cause misdiagnosis or even delayed detection. Moreover, about 15% of patients will experience acute or chronic symptoms. The previous information and the fact of the huge risk the children will suffer, educational programs as primary prevention strategies for FB injuries become urgently required. Parents are the most important population who need to be educated about which food their children should eat and what appropriate toys for their age. They have to recognize nuts and seeds and, more generally, any food items similar to a child's airway like hot dogs as risk factors for choking in kids younger than 4 years old, and to provide

adequate adult supervision when young children are playing or eating. Nurses can play a critical role in increasing education efforts through providing choking-prevention educational programs to parents and other caregivers as a vital part of preventative and management activities of choking risks. As well, because there is a great possibility of the inability to prevent all choking episodes among children, teaching parents, teachers, caregivers, about CPR and first aid of choking between infants and children, mainly children at risk of choking. Mothers are the first caregiver and mostly the 24 hours' child 'supervisor. So, it's vital to examine the mother's beliefs, knowledge, and practices in choking prevention and management after the discharge of the foremost recent and comprehensive 2021 pediatric resuscitation and choking guidelines^(34, 35).

Health belief model (HBM) is one of the most accurate and important model and is utilized to discover the link between the persons health beliefs and theirs behaviors. This model explains the cause to perform or not perform certain behavior according to individual perception of severity or susceptibility of some life-threatening health behavior^(36, 37). Elsobkey & Amer, (2019)⁽³⁸⁾ proved the effectiveness of using the health belief model as a guidance tool of health education schemes. For previous reasons, this study will evaluate the effect of health education program-based on a health belief model on mother's knowledge and practice toward prevention and management of choking among their children.

Aim of the study

The study aimed to evaluate the effect of a health education program based on a

health belief model on mothers' knowledge and practice regarding choking prevention and management among for their children.

Research hypothesis

Health education program-based on a health belief model increases the mothers' knowledge and practice toward prevention and management of choking among their children

Subjects and method

Research design: A quasi-experimental research design was used in this study.

Settings: The study was conducted at outpatient Clinics of Benha University and Benha Teaching Hospital which affiliated to ministry of health and population

Subjects: Convenience sample composed of one hundred and ten mothers (55 mothers from each hospital which affiliated to ministry of health and population) was used to gather the data for the current study. The mothers' inclusion criteria were having toddler children aged between one to three years, either female or male children.

Tool of data collection

Two tools are used by the researcher for data collection:

Tool I: A structured questionnaire was developed by the researcher after a review of the relevant literature^(33, 32, 23, 24, 34, 35, and 39). At the beginning the tool was developed in English version, then it has been translated to the Arabic language, and it entails of four parts:

First part: Socio-demographic data of mothers and their children such as the

child age and sex; mother age, educational level, mother occupation, and place of residence.

Second part: This part consisted of questions to measure the mothers' knowledge related to foreign body aspiration and choking. It consisted of 12 questions as definitions, common age, risk factors of choking, abdominal thrust, etc.

Third part: Mother's choking prevention practices consisted of 6 inquiries to measure mothers' practices to prevent choking in the step with Likert scale as start solid food in 6 months, avoid foods that pose choking risks, which are an analogous size and shape as a child's airway, at time for supper take care to serve a child's food in small bites, teach the children to take a seat during all meal times, etc.

Fourth part: Choking management practices were developed supported by the review of relevant literature to assess choking management practices among mothers. It involved of 4 Scenarios as the following:

Scenario 1: What mother will do if the child or infant coughs effectively, it includes 2 items.

Scenario 2: What mother will do if the kid remains conscious but has ineffective coughing, return blows it includes 2 items.

Scenario 3: If back blows don't relieve the airway obstruction, perform abdominal thrusts for the kid over 1 year, it includes 8 items.

Scenario 4: If the kid with foreign body airway obstruction is, or becomes, unconscious, move to treatment with the pediatric BLS algorithm, it includes 20 items.

Knowledge Scoring

To each item, a score of (2) was given when the response of the mothers was correct and complete, score (1) was given to the mother's answer when this answer was correct but incomplete and a score (0) was given when the mother's response was incorrect, or they don't know. Mothers' total knowledge score was twenty-four and the total score was classified as the following; the mothers' knowledge score which was $< 60\%$ was unsatisfactory level of knowledge and; the mothers' knowledge score, which was $\geq 75\%$ was satisfactory level of knowledge

Choking prevention practices' score

The questionnaire consists of 6 items to measure the parts that are consistent with the statement of preventing infants from choking; the mothers in the study are required to use a Likert scale of 1 to 3 points. The response never acquired (1) score, sometimes acquired (2) and always acquired (3). The overall practice score for choking prevention is 18.

Choking management practices' score

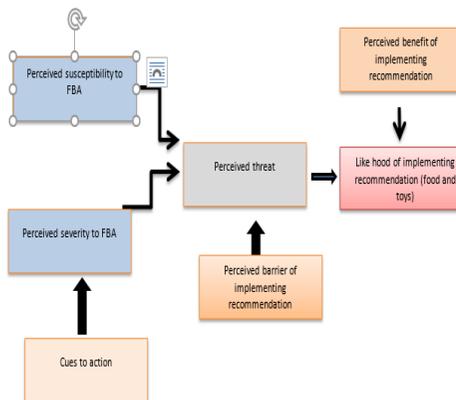
The Questionnaire consisted of 4 Scenarios, all included sub items to assess what the mother decided to do in the case of choking; each item classified as correct done was given 2 score, done but not complete was given 1 score and score 0 when the mothers are not done. The overall practice score was 64 divided as follows: the mother attained $\geq 75\%$ was given good practice, 75- $\geq 60\%$ was given average

practice and less than 60 % was given poor practice.

Tool II: Questionnaire involved questions established expanding the concepts of the health belief model (HBM). The items of HBM were perceived susceptibility, perceived severity, perceived barriers, perceived benefits and cues to action^(36, 37, 38). This tool was counted in a twenty-five item. Those 25 items were distributed as the following 5 items to measure the mothers' perceived susceptibility, 5 items to measure the mothers Perceived severity, 4 items to measure the mothers Perceived benefits, 6 items to measure the mothers Perceived barriers and five items to measure the mothers Cues to action.

Health Belief Model scoring system

A 5-point Likert scale extending from strongly to strongly disagree was used to measure the 25 health belief model items. In order to measure the mother's perception related to choking preventions (1 score for the response strongly agree. - 2 score for the response Agree acquired - 3 score for the response Natural. - 4 score for the response Disagree. - 5 score for the response strongly disagree). The minimum and maximum scores for the 5 items of the HBM were divided such as the following; a min score of five and a max score of twenty-five for the Perceived susceptibility, Perceived severity and Cues to action. A min score of four and a max score of twenty for the Perceived benefits. A min score of six and a max score of thirty for the Perceived barriers.



Method

The study was extended to three months from the start of July 2021 to the last of September 2021. An official approval to carry out this study was gained from the Dean of college of Nursing and the Directors of Benha University and Teaching Hospital. The health education program was developed in four steps: interviewing and assessment, planning, implementation, and evaluation.

The tools were sent to six experts of pediatric nursing, critical care, and nursing education departments (2 professors from each department) to test the content validity and they agreed on the content. As for reliability, the reliability coefficient alpha was checked by the tools' questions and it was 0.76.

Pilot study was conducted on 10% of the studied sample (11 mothers) to test the clarity and applicability of the tools and those piloted mothers that were excluded from the studied sample.

Data collection: data was collected by:

Assessment Phase

To collect the baseline data from mothers, the researchers conducted an interview with each mother. The researchers greeted the mother's participation at the start of the interview, introduced themselves to each mother, clarified the study purpose, the duration, and took their written consent. Each interview was around half an hour. The average number of interviews conducted was 11 mothers/day. The sample was divided into 10 groups containing 5 participants for each session for each hospital. A pretest was conducted in order to collect the mothers' knowledge and practice before the intervention.

Planning Phase

Based on baseline data that are acquired from the assessment phase and significant literature, the researchers designed a health education booklet about choking prevention and management. This booklet was prepared according to the mothers' educational level and language to outfit their comprehension

Implementation Phase

The researchers go to the two hospitals four days/week two days in each hospital, from 9.00 Am to 12.00 Pm. The health education program was held in four sessions and each session was 45 min to an hour. The health education program exemplified The Arabic booklet and pictures in guidelines to add to mothers' knowledge, prevention, and management practices for Choking. Health education included five sessions. The first one; each mother was given a brief explanation related to foreign body aspiration among young children and importance of prevention. - The second was about how to manage choking with demonstration and re-demonstration to make sure the mothers are able to manage a child with choking. –

The third one about improper beliefs and behavior about FBA and false perception that may hinder FBA appropriate practice and behaviors. - The fourth was about encouraging the mothers to be attentive about the FBA and complications and consequences if they're not doing the correct practice in upcoming (perceived susceptibility) and serious awareness of problems, which will happen from risky practices (perceived severity). - The fifth one was about the advantages of healthy eating habits, appropriate toys used for children and a safe environment (perceived benefits. At the beginning of each session, mothers' feedback about the preceding session was obtained and likewise the objectives of the new session were stated. At the conclusion of each session, mothers' point of view and acquired knowledge were discussed to correct any misinterpretation. Modified lectures and group discussions, demonstration and re-demonstrations were the strategies of teaching that are used. A colored poster about FBA management also was used as a suitable instructional media.

Evaluation Phase

A post test was conducted after a month of the carrying out of the health education program in order to measure the mothers' knowledge, choking prevention and management practice and health belief model using tool 1 (third, fourth and fifth part) and tool 11.

Ethical considerations

After explaining the study aim an official permission to conduct the study was obtained from the director of Benha University Hospital and Benha

Teaching Hospital. A written and oral description about the nature of the study, aim, voluntary participation was conducted for each participating mother. Privacy and confidentiality issues were assured in this study. The mother's right to withdraw from the study at any time and buoyed the crucial moral principle of beneficence was assured.

Statistical analysis

Data was entered to the pc and dissected utilizing IBM SPSS programming bundle variant 20.0. (Armonk, NY: IBM Corp) descriptive statistics was revealed consuming number and percent. Relations were illustrated consuming mean, variance, chi square, student t test and ANOVA test. Significance of the results was absolute at the five hundred levels.

Results

Table 1 revealed that half (50%) of mothers aged less than 20 years. Most of them (85.5%) didn't have any previous training about FBA. This table also showed that 40% of their children aged between 18 < 24 months and 70.0% of them were male.

Figure (1) illustrates that half (50.9%) of mothers didn't work and 63.6% of them were from the rural areas.

Figure (2) revealed that half of mothers 50.9% graduated from primary school while 15.5% of them have bachelor degrees.

Table 2: Displayed the total mothers' knowledge about FBA, more than half (58.2, 61.8, 52.7, 60.0, 67.4 &64.5 % respectively) of mothers had incorrect knowledge about the definition of FBA, emergency situations, the most common age, abdominal thrust, object that causes

the most serious injury and food represent in choking respectively. To measure the knowledge retention amongst those mothers later, one month of health education carrying out, 66.4, 68.2, 63.6, 59.1 and 60.0% respectively of mothers had accurate answers in the same questions and there was a statistically significant difference between before and after 30 days of carrying out of the educational program of the mothers' knowledge level in those items whereas ($p < 0.001$).

Table 3: The study results proved that 65.5%, 67.3%, 69.1, 63.6 and 79.1% respectively had never reported choking prevention methods such as avoiding food that poses choking, serving child food in small bits, sitting-down and don't laugh or talk with food in their mouth, checking the flattened balloons, metal coins, beads, trifling toy slices and batteries to be away from children, Lying on the floor and choosing safe age-appropriate toys. But one month after implementing the education program, they always mentioned the same items of prevention. There was a statistically significant difference in the prevention of choking substances amongst pre health education carrying out and later 30 days from carrying it whereas ($p < 0.001$).

Table 4: Indicated that before the implementation of the educational program 52.7, 80.0, 97.3 and 95.5 respectively had poor management practices related to the scenario of "if the child coughs effectively, if the child is still conscious but has ineffective coughing, perform abdominal thrust and BLS steps. While one month after receiving a health education program,

most of mothers obtained good choking management practices in the same steps. While one month after receiving a health education program, most of them (84.5 and 86.5) obtained good management practices in the same steps.

Table 5: Confirmed that there was a statistically significant variance between pre and 30 days later health education carried out whereas ($p < 0.001$). As for the health belief model items, the table also disclosed that there is an increase in the mean score of all items after 30 days from the carrying out of the health education program. The table also revealed the mothers' total knowledge with regard to FBA, the results of this study demonstrated that almost all mothers had an unsatisfactory level of knowledge before the carrying out of the health education. Furthermore, the mothers' knowledge mean score was 5.73 ± 3.68 . To measure the knowledge retention amongst mothers after 30 days of health education carried out, the identical tables confirmed that the bulk of them had satisfactory knowledge and correspondingly the mothers' knowledge mean score was 18.70 ± 4.18 . The results also demonstrated that there was a statistically significant difference between pre and after 30 days of carrying out a health education program whereas ($p < 0.001$).

Table 6: Displayed the mothers' total knowledge with regard to FBA, the results of this table showed that almost all (95.5%) of mothers had an unsatisfactory level of knowledge before the carrying out of the health education. Furthermore, the mothers' knowledge mean score was 5.73 ± 3.68 . To measure the knowledge retention amongst mothers after 30 days of

health education carried out, the similar table confirmed that the bulk (86.4%) of them had satisfactory knowledge and correspondingly the mothers' knowledge mean score was 18.70 ± 4.18 . The results also demonstrated that there was a statistically significant difference between pre and after a 30 days of carrying out of health education program whereas ($p < 0.001$) The similar table also exhibited the total mother's reported practice, it indicated

that nearly all (95.5%) of them have FBA poor practice management before the implementation of health education. While, after one month of the implementation nearly all (93.6%) of them had a good FBA practice management. The possible explanation of the study results is that the appliance of educational programs is taken into account as an efficient tool in increasing the knowledge and the practice among the instructed group.

Table (1): Percentage distribution of mothers and their children related to their of baseline characteristics

Mothers characteristics and their children	N (110)	%
Mother age:		
<20	55	50.0
20-<30	33	30.0
30-<40	12	10.9
40 and more	10	9.1
Previous training:	94	85.5
No	16	14.5
Yes		
Child age:		
12<18 month		
18< 24 month	29	26.4
24 < 30 month	44	40.0
30 ≤ 36 month	22	20.0
	15	13.6
Child gender:		
Male	78	70.9
Female	32	29.1

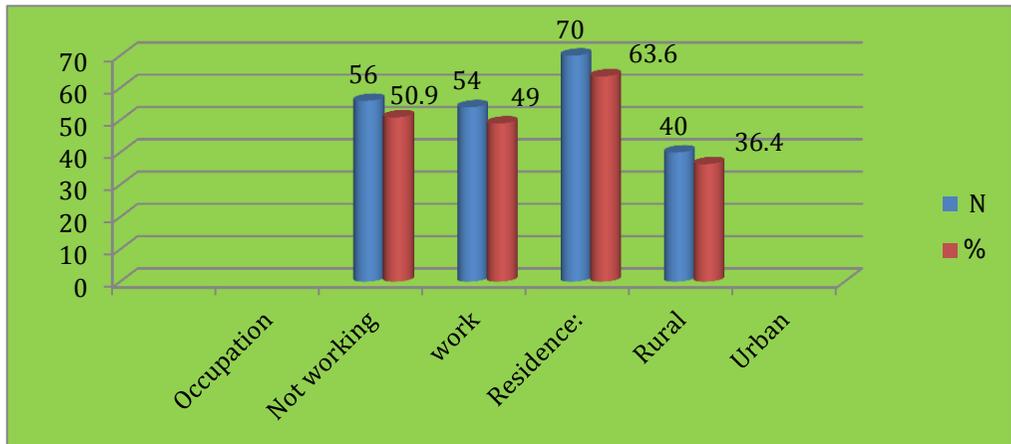


Figure (1): distribution of mothers according to personnel characteristics

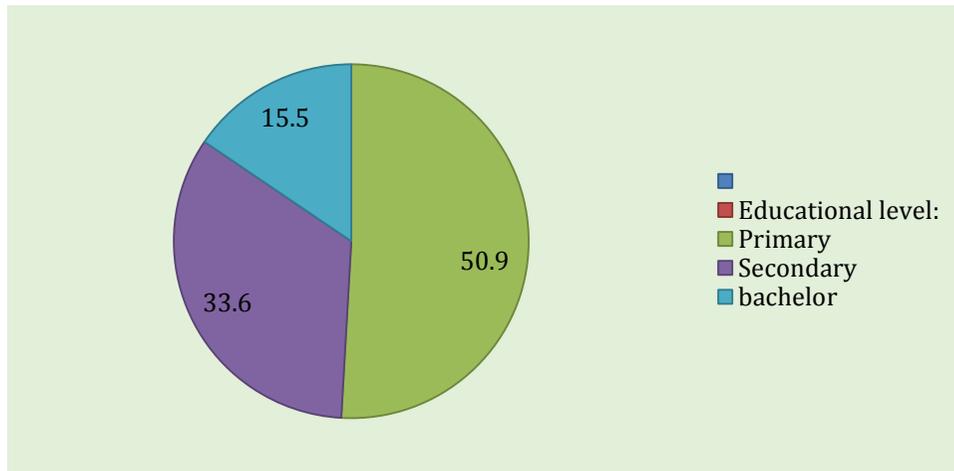


Figure (2): Educational level of mothers

Table (2): Mother’s knowledge about fba before health education implementation and after1 month from health education implementation

Items	Pre Health Education						After one month from Health Education						X ²	P
	Incorrect		Correct but incomplete		Correct complete		Incorrect		Correct but incomplete		Correct complete			
	N	%	N	%	N	%	N	%	N	%	N	%		
Definition of FBA	64	58.2	42	38.2	4	3.6	10	9.1	27	24.5	73	66.4	4.3	<..005
FBA emergency case	68	61.8	38	34.5	4	3.6	9	8.2	26	23.6	75	68.2	12.9	
Common age	58	52.7	44	40.0	8	7.3	8	7.3	32	29.1	70	63.6	11.7	<..001
When should it be assumed that a child has inhaled a foreign what should be done	52	47.3	44	40.0	14	12.7	8	7.3	25	22.7	77	70.0	13.7	<..005
Abdominal thrust	66	60.0	39	35.5	5	4.5	4	3.6	36	32.7	70	63.6	10.9	<..005
Causes for risk of choking	56	50.9	52	47.3	2	1.8	13	11.8	16	14.5	81	73.6	2.4	>.005
Time Should Call the Doctor or Go to the ER	55	50.0	51	46.4	4	3.6	9	8.2	30	27.3	71	64.5	4.8	<..005
Items are commonly associated with choking in infants and children	57	51.8	53	48.2	0	0.0	15	13.6	30	27.3	65	59.1	17.2	<..001
objects cause the most serious and fatal injuries	74	67.3	34	30.9	2	1.8	14	12.7	26	23.6	70	63.6	8.7	<..005
food represents a high risk of choking to children	71	64.5	38	34.5	1	1.0	13	11.8	32	29.1	64	59.1	1.6	>..005
What should children do during meals and when eating	66	60.0	39	35.5	5	4.5	7	6.4	37	33.6	66	60.0	6.8	<..005
particular food preparation techniques help to reduce the risk of choking	55	50.0	55	50.0	0	0.0	10	9.1	25	22.7	75	68.2	.77	>.005

Table (3): The Mothers' choking prevention Practice before Health Education Implementation and after 1 Month from Implementation

The Mothers' choking prevention Practice	Pre Health Education		After one month from Health Education		X ²	P
	No	%	No	%		
Start introduction of solid food beside breastfeeding at age of six months: Never Some times Always	78 24 8	70.9 21.8 7.3	5 30 75	4.5 27.3 68.2	15.6 2	<0.001
Avoid foods that pose choking risks which are a similar size and shape as a child's airway: Never Some times Always	72 29 9	65.5 26.4 8.2	9 31 70	8.2 28.2 63.3	5.8	<0.05
At mealtime, be sure to serve a child's food in small bites: Never Some times Always	74 27 9	67.3 24.5 8.2	10 27 73	9.1 24.5 66.4	27.1	<0.001
Teach kids to sit down for all meals and snacks and not to talk or laugh with food in their mouths: Never Some times Always	70 24 16	63.6 21.8 14.5	9 29 72	8.2 26.4 65.5	6.7	<0.001
Beware of deflated balloons, coins, beads, small toy parts, and batteries. Get down on the floor often to check for objects that kids who are learning to walk or crawl could put in their mouths and choke on Never Some times Always	76 27 7	69.1 24.5 6.4	9 25 76	8.2 22.7 69.1	7.1	<0.05
Choose safe, age-appropriate toys. Always follow the manufacturer's age recommendations : Never Some times Always	87 19 4	79.1 17.3 3.6	5 9 96	4.5 8.2 87.3	15.5 5	<0.001

Table (4): Mothers' reported practice about FBA before Health Education Implementation and after1 Month from Health Education Implementation

Items	Pre Health Education						After one month from Health Education						X ²	P
	Good		Average		Poor		Good		Average		Poor			
	N	%	N	%	N	%	N	%	N	%	N	%		
Scenario 1: If the child or infant is coughing effectively	13	11.8	39	35.5	58	52.7	93	84.5	17	15.5	0	0.0	49.9	<..001
Scenario 2: If the child is still conscious but has ineffective coughing, give back blows	11	10.0	11	10.0	88	80.0	95	86.4	6	5.5	9	8.1	12.0	<..005
Scenario 3: Perform abdominal thrusts for children over 1	0	0.0	3	2.7	107	97.3	93	84.5	17	15.5	0	0.0	38.4	<..001
Scenario 4: If the child/infant with foreign body airway obstruction is, or becomes, unconscious, move to treatment with the pediatric BLS algorithm.	0	0.0	5	4.5	105	95.5	93	84.5	11	10.0	6	5.5	72.0	<..001

Table (5): Comparison of Mothers' Health Belief Models Mean score before Health Education Implementation and after1 Month from Implementation.

Items	Pre Health education	After one month	t test	P value
	Mean ± SD	Mean ±SD		
Perceived Susceptibility	9.50 ± 1.83	20.70 ± 1.98	-49.50	<0.001
Perceived Severity	10.94 ± 2.07	17.50 ± 3.34	-17.44	<0.001
Perceived Barriers	12.40 ± 1.38	24.05 ± 4.50	-26.54	<0.001
Perceived Benefits	8.70 ± 1.39	15.82 ± 3.73	-21.70	<0.001
Cues to Action	11.90 ± 1.81	20.35 ± 3.11	27.81	<0.001

Table (6): Comparison between the Total Mean Score of Mothers' knowledge & choking Practice management before Health Education Implementation and after 1 Month from Implementation

Items	Pre Health education		After one month		t test	P
	N	%	N	%		
Total Knowledge about FBA						
Satisfactory	5	4.5	95	86.4	-33.77	<0.001
Unsatisfactory	105	95.5	15	13.6		
Mean ±SD	5.73 ± 3.68		18.70 ± 4.18			
Total reported practice						
Good	0	0.0	103	93.6	-57.88	<0.001
Average	5	4.5	7	6.4		
Poor	105	95.5	0	0.0		
Mean ±SD	14.90 ± 6.10		52.86± 3.97			

Discussion

Foreign body aspiration (FBA) is a risky condition with astonishing morbidity, primarily if interference is delayed. Children who are below three years old are at the prodigious intimidation level of FBA⁽⁴⁰⁾. In addition to their significant role of reporting FBA urgently, mothers' attentiveness about prevention and management of aspiration is crucial in the commencement of management. It's been found that mothers' education integrates a main role in reducing the occurrence of FBA and re-treating the vulnerability of complications allied with late diagnosis for instance pneumonia and bronchitis^(41, 42).

Our results indicated that more than half of mothers had incorrect knowledge about the definition of FBA, emergency situations, the most common age, abdominal thrust, object that causes the most serious injury and food represented in choking respectively. To measure the knowledge retention amongst those mothers later, one month of health education carrying out, more than half of the mothers had accurate answers in the same questions and there was a statistically significant difference between before and after 30 days of carrying out of the educational program of the mothers' knowledge level in those items whereas ($p < 0.001$). The results endorse the study hypothesis and these results could also be because of the fact that the given education was simpler in enlightening mothers' knowledge and practice around the

prevention and management of foreign body aspiration and to condense choking in kids than mothers who weren't educated about FBA aspiration.

The results of this study are in harmony with Higuchi et al. (2013)⁽⁴³⁾ who displayed that the majority of mothers did not have correct knowledge about clinical signs and causes of FBA. Also, 27.7% and 41.8% of mothers didn't discern that impulsive choking and impulsive coughing were clinical signs intending FBA, respectively. Moreover, Al-Qudehy et al. (2015)⁽⁴⁴⁾ results displayed that with respect to the clinical manifestation of foreign body aspiration, more than one tenth and one-quarter of mothers respectively, didn't discern that impulsive choking and coughing were indicators intending FBA. The knowledge of the clinical data of FBA was low amongst the studied groups.

The results of this study also displayed that the majority of mothers had never reported choking prevention such as avoiding food that poses choking, serving child food in small bits, sitting-down and don't laugh or talk with food in their mouth, checking the flattened balloons, metal coins, beads, trifling toy slices and batteries to be away from children, Lying on the floor and choosing safe age-appropriate toys. But one month after implementing the education program, they always mentioned the same items of prevention. There was a statistically significant difference in the

prevention of choking substances amongst pre health education implementation and later 30 days from carrying out whereas ($p < 0.001$).

The results of the current study are agreed with Higuchi et al. (2013)⁽⁴³⁾ who displayed that only 4.3% [95% CI 3.3–5.3] of mothers recognize that avoiding food that poses choking, serving child food in small bits as a preventative method of FBA, while 20.2% [95% CI 18.2–22.2] didn't know that children must sit down and don't laugh or talk with food in their mouth, check deflated balloons, metal coins, beads, trifling toy fragments, and batteries, and 48.1% [95% CI 45.5–50.6] failed to know that they ought to not give peanuts to a toddler younger than 3 years old.

On the opposite hand, Maalim et al. (2021)⁽⁴⁵⁾ results revealed that more than one-third of kindergarten teachers recognize the communal risk factors for choking for example disastrous mastication of food particles, undeveloped teeth, running, and jerking with food particles in their mouth, and the ravenous feature of young kids. More than half of kindergarten teachers spots that coin structures are approaching for triggering a choking intimidation while uncut grapes (16.6%) and popcorn (5.9%) were the minimum things that grounds choking. The majority of kindergarten teachers countered two minutes as a first-rate time for handling the child however (6.7%) said an hour. As for clinical manifestation of complete airway obstruction, the majority of the applicants were

experienced and well-defined it as inability to convey sound and cough. This contradiction between the study result and also the previous study results is also thanks to the difference of the topic whereas our subjects were mothers, not kindergarten teachers.

The present study results signposted that previously the carrying out of the educational program the bulk of mothers had poor management practices related to the scenario of “if the child coughs effectively, if the child is still conscious but has ineffective coughing, perform abdominal thrust and BLS steps. While one month after receiving a health education program, most of mothers obtained good management practices in the same steps. The results of this study are agreed with Koramangala (2014)⁽⁴⁶⁾ who displayed that almost all (51.4%) of the study population stated poor management skills as water should run to drink to a one that was choking. Twenty-nine percent of mothers said that they need to softly tap on the back of the kid with head down and chest up. Some mothers said that they offer bananas to eat or simply pat on the head and chest.

The results of the current study are agreed with Megahed et al. (2016)⁽⁴⁷⁾ who displayed that there was a remarkable heightening in participants' managing practice of household injuries (causes, prevention, and first aid) after the program ($P < 0.001$) paralleled there with before the program. Furthermore, they

concluded that the mean knowledge score was statistically highly significant after the application of the program whereas ($P < 0.001$). Moreover, the current study results inveterate that there was a statistically significant variance between pre and 30 days later health education carried out whereas ($p < 0.001$). As for the health belief model items, the table also disclosed that there is an increase in the mean score of all items afterward, the carrying out of health education

The current study results are in agreement with Jeihooni et al. (2017)⁽⁴⁸⁾ results which indicated that the investigational group exhibited a foremost upsurge in all items of the health belief model four months afterwards, the interference. Furthermore, Elsobkey & Amer, (2019)⁽³⁸⁾ and Gamal Eldeen et al. (2020)⁽⁴⁹⁾ proved the effectiveness of using the health belief model as a guidance tool of health education programs.

Also, the study results were in step with Jeihooni, et al. (2015)⁽⁴⁸⁾ results which indicated that approximately six months later, the investigational group displayed a significant rise in all items of the health belief model matched to the control group.

The current study results revealed the mothers' knowledge with regard to FBA, the results of this study demonstrated that almost all mothers had an unsatisfactory level of knowledge before the carrying out of the health education. Furthermore, the mothers' knowledge mean

score was 5.73 ± 3.68 . To measure the knowledge retention amongst mothers after 30 days of health education carried out, the identical tables confirmed that the bulk of them had satisfactory knowledge and correspondingly the mothers' knowledge mean score was 18.70 ± 4.18 . The results also demonstrated that there was a statistically significant difference between pre and after 30 days of carrying out a health education program whereas ($p < 0.001$).

As for the mother's reported practice, the finding signposted that nearly all of them have FBA poor practice management before the implementation of health education. While, after one month of the implementation nearly all of them had a good FBA practice management. The possible explanation of the study results is that the appliance of educational programs is taken into account as an efficient tool in increasing the knowledge and the practice among the instructed group.

The results are agreed with Behboudi et al. (2021)⁽⁵⁰⁾ results indicated that the mean scores of knowledge ($n = 45$, $M = 13.48$, $SD = 1.85$) and practice ($n = 45$, $M = 8.53$, $SD = 1.31$) of applicants immediately and mean several knowledge ($n = 45$, $M = 14.69$, $SD = 1.99$) and practice of participants ($n = 45$, $M = 9.57$, $SD = 2.16$) one month later the educational interferences, within the study group, were statistically significantly in excess of the control group. Intragroup contrast of the mean vast knowledge and practice immediately and one

month later educational interference disclosed that merely in the study group did the mean scores have a statistically significant upsurge, ($p < 0.05$).

The results were also congruent with Almutairi and Alharbi (2021)⁽⁵¹⁾ which displayed that the mean and standard deviation knowledge score was 4.99 (1.44)/9 opinions and the practice score was 12.6 (2.15)/21 opinions. Fathers and mothers were more than half and Fathers and mothers with good knowledge were more than one third also, fathers and mothers with poor practices were 55.6% and fathers and mothers with good practices 44.9%.

Conclusion

The results of this study showed the prominence of continuing education and its effect on mothers' knowledge and practice in the management and prevention of FBA. The results of this study showed that education continued with a health belief model can increase the knowledge, practice, and all items of the health belief model. The results showed that the majority of mothers had an unsatisfactory level of knowledge before health education employment however after a month from health education employment the same tables and data verified that the majority of the mothers had satisfactory knowledge level. There was a statistically significant difference between pre and after a 30 days of health education application to the mothers whereas ($p < 0.001$). Also, the results displayed that

nearly all the mother's conveyed practice has poor practice management before health education joining. However, after 30 days from application, nearly all of them have good FBA practice management.

Recommendations

Based on the current study finding, it can be recommended that given educational programs throughout this concern for mothers, parents, and other child caregivers and proposing training programs in abundant math media networks is tremendously crucial to inhibit vigorous risk problems similar to choking and FBA. Also, improved attentiveness of the parents, teachers, concierges, and health care providers can play an essential role so as to lessen the hazard of this possibly life threatening situation. Moreover, based on the study results further researches about the development of guidance for protocols regarding management and prevention of choking and should be disseminated in different media channels.

References:

1. Health Canada. Canadian injury data: Mortality 2005 and hospitalizations. 2011.
2. Guyer B. For the safety of Canadian children and youth. from injury data to preventive measures.: Produced by Health Canada. (PP 291.) minister of public works and government services, Canada, 1997. available from Canadian Government Publishing-PWGSC, Ottawa, Ontario,

- Canada K1A 0S9
(<http://publications.pwgsc.gc.ca>). ISBN 0-660-17066-3. Injury Prevention. 1999;5(2):159
3. Tarrago SB. Prevention of choking, strangulation, and suffocation in childhood. Medical Society of Wisconsin. 2020;99(9).
 4. Smith SA, Norris B. Reducing the risk of choking hazards: Mouthing behaviour of children aged 1 month to 5 years. Injury Control and Safety Promotion. 2003;10(3):145–54.
 5. Norris, B., & Smith, S. Research into the mouthing behavior of children up to 5 years old: Executive summary. 2002.
 6. Cyr C. Preventing choking and suffocation in children. Paediatrics & Child Health. 2012;17(2):91–2.
 7. 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;76.
 8. Paulozzi LJ, Ballesteros MF, Stevens JA. Recent trends in mortality from unintentional injury in the United States. Journal of Safety Research. 2006;37(3):277–83.
 9. Stafford L. Don't Let Your Child Get All Choked Up. 2006.
 10. Abdullat EM, Ader-Rahman HA, Al Ali R. Choking among infants and young children. Jordan Journal of Biological Sciences. 2015;8(3):205–9.
 11. Mohammad M, Saleem M, Mahseeri M, Alabdallat I, Alomari A, Za'atreh A, et al. Foreign body aspiration in children: A study of children who lived or died following aspiration. International Journal of Pediatric Otorhinolaryngology. 2017;98:29–31.
 12. Sih T, Bunnag C, Ballali S, Lauriello M, Bellussi L. Nuts and seed: A natural yet dangerous foreign body. International Journal of Pediatric Otorhinolaryngology. 2012;76.
 13. Katzung BG, Trevor A, Anthony D, Houck PJ, Haché M. New in the library. Anesth Analg. 2015;20(2):364–70.
 14. Sidell DR, Kim IA, Coker TR, Moreno C, Shapiro NL. Food choking hazards in children. International Journal of Pediatric Otorhinolaryngology. 2013;77(12):1940–6.
 15. Collins, DL. Childhood asphyxiation by food. JAMA. 1984;251(17):2231.
 16. Rimell FL. Characteristics of objects that cause choking in children. JAMA: The Journal of the American Medical Association. 1995;274(22):1763–6.
 17. Mallick MS. Tracheobronchial foreign body aspiration in children: A continuing diagnostic challenge. African Journal of Paediatric Surgery. 2014;11(3):225.
 18. Ryan CA. Childhood deaths from toy balloons. Archives of Pediatrics & Adolescent Medicine. 1990;144(11):1221.

19. Friedman EM. Tracheobronchial Foreign Bodies. *Otolaryngologic Clinics of North America*. 000;33(1):179–85.
20. Brown JC, Otjen JP, Drugas GT. Pediatric magnet ingestions: The dark side of the force. *The American Journal of Surgery*. 2014;207(5):754–9.
21. Buttazzoni E, Gregori D, Paoli B, Soriani N, Baldas S, Rodriguez H, et al. Symptoms associated with button batteries injuries in children: An epidemiological review. *International Journal of Pediatric Otorhinolaryngology*. 2015;79(12):2200–7.
22. Al Ali R. Choking among infants and young children. *Jordan Journal of Biological Sciences*. 2015;8(3).
23. Eidelman AI. Breastfeeding and the use of human milk: An analysis of the American Academy of Pediatrics 2012 breastfeeding policy statement. *Breastfeeding Medicine*. 2012;7(5):323–4.
24. Gartner LM, Eidelman AL, Schanler RJ, O'Hare D, Naylor AJ, Lawrence RA, et al. Breastfeeding and the use of human milk. *Pediatrics*. 2005;115(2):496–506.
25. Nichols BG, Visotcky A, Aberger M, Braun NM, Shah R, Tarima S, et al. Pediatric exposure to choking hazards is associated with parental knowledge of choking hazards. *International Journal of Pediatric Otorhinolaryngology*. 2012;76(2):169–73.
26. Hanba C, Cox S, Bobian M, Svider PF, Gonik NJ, Shkoukani MA, et al. Consumer product ingestion and aspiration in children: A 15-Year review. *The Laryngoscope*. 2016;127(5):1202–7.
27. Higuchi O, Adachi Y, Adachi YS, Taneichi H, Ichimaru T, Kawasaki K. Mothers' knowledge about foreign body aspiration in young children. *International Journal of Pediatric Otorhinolaryngology*. 2013;77(1):41–4.
28. The Susy Safe Project Overview after the first four years of activity. *International Journal of Pediatric Otorhinolaryngology*. 2012;76.
29. Gregori D. The Susy Safe Project. *International Journal of Pediatric Otorhinolaryngology*. 2006;70(9):1663–4.
30. Cichero, J. A. (2018). Age-related changes to eating and swallowing impact frailty: Aspiration, choking risk, modified food texture and autonomy of choice. *Geriatrics*, 3(4), 69.
31. Karatzanis AD, Vardouniotis A, Moschandreas J, Prokopakis EP, Michailidou E, Papadakis C, et al. The risk of foreign body aspiration in children can be reduced with proper education of the general population. *International Journal of Pediatric Otorhinolaryngology*. 2007;71(2):311–5.
32. Bentivegna KC, Borrup KT, Clough ME, Schoem SR. Basic choking education to improve parental knowledge. *International*

- Journal of Pediatric Otorhinolaryngology. 2018;113:234–9.
33. Passali D, Chotigavanich C, Ballali S, Foltran F, Bellussi L, Gregori D. Foreign bodies injuries in children: Analysis of thailand data. *International Journal of Pediatric Otorhinolaryngology*. 2015;76.
34. Skellett, S., Maconochie, I., Bingham, B., Worrall, M., Scholefield, B. R., Johnson, M., & Hampshire, S. *Pediatric basic life support Guidelines*. 2021.
35. Van de Voorde P, Turner NM, Djakow J, de Lucas N, Martinez-Mejias A, Biarent D, et al. *European Resuscitation Council guidelines 2021: Paediatric life support. Resuscitation*. 2021;161:327–87.
36. Glanz, K., Rimer, B. K., & Viswanath, K. (Eds.). *Health behavior and health education: theory, research, and practice*. John Wiley & Sons. 2008.
37. Rosenstock IM, Strecher VJ, Becker MH. Social learning theory and the health belief model. *Health Education Quarterly*. 1988;15(2):175–83.
38. Elsobkey FA, Amer SAM. Mothers' Health Education Based on Health Belief Model to Prevent Vitamin D Deficiency in Children with Cerebral Palsy. *American Journal of Nursing*. 2019;7(5):879–88.
39. Rodríguez H, Cuestas G, Botto H, Nieto M, Cocciglia A, Passali D, et al. Complicaciones debido a la aspiración de cuerpos extraños en niños. *Acta Otorrinolaringológica Española*. 2016;67(2):93–101.
40. Williams A, George C, Sam S, Shukla S, Atul PS. An audit of morbidity and mortality associated with foreign body aspiration in children from a tertiary level hospital in Northern India. *African Journal of Paediatric Surgery*. 2014;11(4):287.
41. Saquib Mallick M, Rauf Khan A, Al-Bassam A. Late presentation of tracheobronchial foreign body aspiration in children. *Journal of Tropical Pediatrics*. 2005;51(3):145–8.
42. Xuechang L, Richard E, Swai H. Airway Foreign Body Aspirations in Children at Muhimbili National Hospital, Dar es Salaam-Tanzania. *East and Central African Journal of Surgery*. 2011;16(2).
43. Higuchi, O., Adachi, Y., Adachi, Y. S., Taneichi, H., Ichimaru, T., & Kawasaki, K. Mothers' knowledge about foreign body aspiration in young children. *International journal of pediatric otorhinolaryngology*. 2013; 77(1), 41-44.
44. AlQudehy Z. Parental knowledge of foreign body aspiration: A comparative study between Saudis and other nations. *Journal of Otolaryngology-ENT Research*. 2015;2(1).
45. Maalim Issack A, Jiru T, Wubetie Aniley A. Assessment of knowledge, attitude and practice on first aid management of choking and associated factors among kindergarten

- teachers in Addis Ababa Governmental Schools, Addis Ababa, Ethiopia. A cross-sectional institution-based study. PLOS ONE. 2021;16(7).
46. Koramangala B. Knowledge and assessed practice regarding first aid among mothers of under 15 years children–A community based study in a rural area of south India.. Indian health journal. 2014;5(7).
47. Megahed MA, Khalil NA, Ibrahim RA, El Disoki RS. Knowledge, attitude and practice of rural mothers towards home injuries among children under 5 years of age in Menouf District-Menoufia Governorate, Egypt. . Menoufia medical journal. 2016;29(4):1033.
48. Jeihooni AK, Jamshidi H, Kashfi SM, Avand A, Khiyali Z. The effect of Health Education program based on health belief model on oral health behaviors in pregnant women of Fasa City, Fars Province, south of Iran. Journal of International Society of Preventive and Community Dentistry. 2017;7(6):336.
49. Ali Gamal El-deen A, Bahgat R, Awany M, Sharshour S. Effect of educational intervention based on health belief model for mothers about prevention of sudden infant death syndrome. Tanta Scientific Nursing Journal. 2021;20(1):105–34.
50. Behboudi F, Pouralizadeh M, Yeganeh MR, Roushan ZA. The effect of education using a mobile application on knowledge and decision of Iranian mothers aboprevention of foreign body aspiration and to relieve choking in children: A quasi-experimental study. Journal of Pediatric Nursing. 2022;62.
51. Almutairi AT, Alharbi FS. 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. 2021;10(1):199.
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