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The effect of Foreign Body Aspiration training on the knowledge level of pupils☆

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KEYWORDS
Foreign Body Aspiration (FBA);
Nurse;
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Abstract
Introduction: Educators dealing with 0–6 years old children must be individuals who are willing to take all kind of measures in order to ensure the safety of children in educational institutions and playgrounds, providing protection from diseases, and who are able to apply first aid measures in case of an accident.
Objective: In this study, we aimed to determine the level of knowledge of all students continuing their education in the department for child development, regarding Foreign Body Aspiration (FBA) and the effect of FBA training on their knowledge level.
Methods: This semi-experimental study was carried out on high-school students ($n = 123$) continuing their education in the department for child development in Corum, Turkey. The data was evaluated with appropriate statistical methods, and $p < 0.05$ was determined as statistically significant.
Results: Before the training, 80% of the high-school children knew the importance of age factor in cases of FBA, improving to 92% after training. The increase in the number of students who were aware of the importance of age factor was statistically significant ($p < 0.05$).
Conclusion: As a result of the training, the visual presentation and training on models related to FBA have led to an increase in the knowledge level of the students.

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PALAVRAS CHAVE
Aspiração de corpo estranho (ACE);
Enfermeiro;
Treinamento;
Criança

Efeito do treinamento em aspiração de corpo estranho no nível de conhecimento de estudantes

Resumo
Introdução: Os educadores que lidam com crianças de 0-6 anos devem ser pessoas dispostas a usar todos os tipos de medidas que assegurem a segurança das crianças em instituições educacionais e em *playgrounds*, proporcionando proteção contra doenças e aplicando medidas de primeiros socorros em caso de acidentes.
Objetivo: Neste estudo, objetivamos determinar o nível de conhecimento de estudantes em um departamento de desenvolvimento infantil, com relação à aspiração de corpo estranho (ACE), e o efeito do treinamento para ACE em seu nível de conhecimento.
Métodos: Realizamos estudo do tipo semiexperimental em todos os estudantes ($n = 123$) que estavam dando continuidade à sua educação no departamento de desenvolvimento infantil de uma instituição de educação secundária em Corum, Turquia. Os dados foram avaliados com métodos estatísticos apropriados. Adotamos $p < 0,05$ como nível estatisticamente significante.
Resultados: Antes do treinamento, 80% dos escolares tinham conhecimento da importância do fator idade nos casos de ACE; depois do treinamento, esse percentual se elevou para 92%. Houve aumento estatisticamente significante no número de estudantes que percebiam a importância do fator idade ($p < 0,05$).
Conclusão: Como resultado do treinamento, a apresentação visual e o treinamento em modelos com relação à ACE levaram a um aumento no nível de conhecimento dos estudantes.

Introduction

Foreign Body Aspiration (FBA) is the act of inhaling or breathing foreign bodies/objects into the respiratory tract. Children put these objects themselves into their mouths or the objects are given to them by others. As a result nearly complete obstruction/embolization or even hypoxia may occur and symptoms and findings occur according to the level of obstruction.[1,2] Foreign Body Aspiration symptoms arise in 70% in children under 2 years, while children between 1 and 3 years constitute more than 75%.[3]

The reasons why Foreign Body Aspiration is seen frequently among 1–3 aged group children are as follows; the fact that children try to put everything (nuts, toy parts, candy and coins) into their mouths in order to acknowledge their environment, perform activities like running, playing, laughing during eating, have not developed their back teeth for eating, have not received education for eating, eat on their own, possess immature neuromuscular mechanisms, anatomical structure of larynx and epiglottis and low socioeconomic level.[1,4,5] Apart from the factors related to the patient, the structural specifications of the aspirated object are also important. The aspiration risk of small, smooth surface, round or cylindrical shaped objects is higher.[6]

If the diagnosis of children who have aspirated a foreign body is established early. Usually minimal complications develop, whereas if in spite of early diagnosis no intervention is carried out serious and different complications like recurrent pneumonia, pulmonary abscess and bronchiectasis may appear.[6,7] If protection is considered as the most important factor of FBA and the related complications, the main principles of protecting children from FBA are as mentioned below: to keep objects which can be aspirated away from children, and to take prior to the event measures like nutrition education etc. or related measures during the event (education of family and other adults taking care of children regarding appropriate intervention to the child who has aspirated foreign bodies etc.).[8]

In this respect, the educators who are giving education to 0–6 year old children must be individuals who are taking definitive measures in order to ensure the safety of children in educational institutions and playgrounds, providing protection from disease and are capable of doing first aid applications in case of eventual accidents. As a result of that the importance of creating public awareness and training of educators responsible for childcare is increasing.[8–10] It is proposed that the Foreign Body Aspiration training task of families and individuals responsible for baby care should be fulfilled by nurses who have a counseling and educational role.[11]

Considering the training and motivation of individuals responsible for childcare this present study aimed to determine the knowledge level of pupils who are studying in the department for child development regarding FBA and the effect of FBA training on their knowledge level.

Methods

Preparation

The study was carried out as cross-sectional and semi-experimental type. It was conducted between September 2014 and February 2015 in the department for child development at a high school in Corum, in Turkey. The sample of

the study consisted of 123 pupils continuing their education at high school in the department for child development. No sample selection was performed and all pupils were included in the study. The study was conducted on 100 voluntary pupils (100/123). Success rate of obtaining the sampling within the study was 81.3%. Before starting the study, the approval of the Provincial Directorate of Education and (20.10.2014/4674732) Ankara Numune Education and Research Hospital ethics committee (05.11.2014/E-14-325) have been obtained. Apart from that voluntarily participating pupils have been informed about the purpose of the study and written consent was obtained.

Variables of the research

Independent variables consist of descriptive characteristics of the students of the child development department and whether or not they completed training about FBA before. The dependent variable was the training about FBA given to the students of child development.

Instruments

Questionnaire

Data collection questionnaire was developed in accordance to the with researcher and the literature information.[4,12–14] It consisted of questions about pupils' defining characteristics, knowledge level related to Foreign Body Aspiration (ear–nose and respiratory) and knowledge about protection from FBA. The pre-application was rehearsed on 10 pupils, necessary corrections were made according to the obtained responses and the final document comprised the questionnaire. 10th grade pupils who performed the pre-application of the study and did their nursery school training between the dates of study were excluded. Questionnaires were applied before the training and one month after; taking approximately15 min under the supervision of a researcher

Foreign Body Aspiration (ear, nose and respiratory tract) training

It was carried out by the researcher in two stages as a visual presentation and model.

Visual presentation

Prepared in line with literature[4,12–14] and lasting approximately 45 min, the visual training subject has included the answers to questions like; ''What are FBAs (ear, nose and respiratory tract)? What is the frequency of FBA, the gender and age group? What are the common causes for FBA on children? What are the most common aspirated food and substances by children? Which symptoms can be seen in the case of partial and complete obstruction of the respiratory tract by foreign bodies? What should comprise first aid in the case of complete and partial obstruction of respiratory tract by foreign body in a more than one year old and conscious child? What should comprise first aid in the case of complete obstruction of respiratory tract by foreign body in an under or over one year old and unconscious child? What are the first symptoms of foreign bodies in ear (insects, legumes, small particles toys) and what should comprise first aid? What are the first symptoms of aspirated foreign bodies in the nose and how should they be treated? How should children be protected from FBA?'' The applied training has been carried out on one infant and child model. Every student performed the training on the model. In the training it was demonstrated what first aid intervention should be and applied in case of partial and complete obstruction of respiratory tract due to FBA in <1 year and >1 year children and complete obstruction of respiratory tract in <1 year and >1 year unconscious children.

Statistical analysis

After the preliminary test (before training) and the final test (after training) were applied, the responses to open-ended questions in the questionnaire have been coded and information given in visual presentation has been accepted as accurate information.

Evaluation of the data obtained from the questionnaire results was performed in computer environment by using the SPSS 17.0 (Statistical Package for Social Science) packet program. In the data evaluation chi-square was used in order to evaluate the differences among age groups during data analysis and determine percentage distribution and averages in order to examine the encountered age groups and genders, defining characteristics of pupils, confrontation with FBA and perception and the McNemar test was carried out in order to examine the effect of FBA training and information of FBA (ear, nose, respiratory tract) seen on children's knowledge level. $p < 0.05$ was accepted as statistically significant.

Results

The average age of pupils participating in the study was 17.01 ± 0.73. It was observed that 99% ($n = 99$) of the pupils had not attended to any seminar/course related to FBA.

Furthermore it was found that 80% of the participating school children knew the importance of the age factor in cases of FBA before training and 92% after training; 8% knew the importance of the quality of FBA object and the appearing symptoms before training (36% after training), 57% were aware of the importance of the symptoms of partial and complete obstruction of respiratory tract in case of Foreign Body Aspiration before training (80% after training) and 2% knew why to consult the physician after the object has been taken out in case of FBA, whereas the number increased to 35% after training. Between the before-training and after-training groups no statistically significant difference was found ($p > 0.05$), whereas it was stated that the increase of the number of pupil awareness of the importance of age factor and inhaled object quality, the appearing symptoms and the signs of partial and complete obstruction of respiratory tract and the consulting of the physician after object has been taken out in case of FBA is statistically significant ($p < 0.05$) (Table 1). The number of school children who knew the risky behaviors leading to FBA and the emergency case number in comparison to before and after training increased; this increase was not statistically significant ($p > 0.05$) (Table 1).

Table 1 Comparison of knowledge levels of students in case of FBA (nose–ear–respiratory track) before and after the training.

Knowledge level	Before the training 11th–12th grade Total (%)	After the training 11th–12th grade Total (%)	Statistical analysis
The importance of age factor for FBA			
Knowing	80	92	$p = 0.029$[b]
Not knowing	20	8	
	$p = 0.193$[a]	$p = 0.575$[a]	
The importance of the quality of FBA object			
Knowing	8	36	$p = 0.000$[b]
Not knowing	92	64	
	$p = 0.575$[a]	$p = 0.102$[a]	
The appearing symptoms in FBA			
Knowing	8	36	$p = 0.000$[b]
Not knowing	92	64	
	$p = 0.575$[a]	$p = 0.102$[a]	
The symptoms of partial obstruction of respiratory tract			
Knowing	57	80	$p = 0.000$[b]
Not knowing	43	20	
	$p = 0.035$[a]	$p = 0.483$[a]	
The symptoms of complete obstruction of respiratory tract			
Knowing	57	80	$p = 0.000$[b]
Not knowing	43	20	
	$p = 0.035$[a]	$p = 0.483$[a]	
The risky behaviors leading to FBA			
Knowing	94	97	$p = 0.508$[b]
Not knowing	6	3	
	$p = 0.879$[a]	$p = 0.630$[a]	
Consulting the physician after object has been taken out in case of FBA			
Knowing	2	35	$p = 0.000$[b]
Not knowing	98	65	
	$p = 0.179$[a]	$p = 0.284$[a]	
Emergency case number			
Knowing	98	100	–
Not knowing	2	–	
	$p = 0.129$[a]	–	

FBA, Foreign Body Aspiration.
[a] Chi-square.
[b] McNemar test.

In Table 2, the number of pupils aware of the importance of the age factor regarding the first aid intervention in case of FBA and who knew the first aid intervention for unconscious children who have inhaled foreign bodies increased after training compared to before training; this increase was not statistically significant ($p > 0.05$). Furthermore it was determined that 8% of school children participating in the study knew the first aid intervention if aspirated body can be seen in the respiratory tract before training and 36% after training, 57% knew the first aid intervention in case of partial obstruction of respiratory tract before training and 80% after training, 2% were informed of first aid intervention in case of complete obstruction of respiratory tract on <1 year and >1 year old children before-training and 35% after-training. No statistically significant difference was found among the before-training and after-training group ($p > 0.05$), nevertheless the increase of knowing first aid intervention of pupils in case of an aspirated body can be seen in respiratory tract, partial obstruction of respiratory tract, complete obstruction of respiratory tract among <1 year and >1 year old children in case of FBA was statistically significant ($p < 0.05$) (Table 2).

We observed that 27% of pupils participating in the study were aware of first aid intervention in case of aspirated body in the nose before training, 67% after training; 2% if the aspirated body can be seen inside the ear before training and 27% after training, if a sharp object is inserted into the ear 75% of pupils knew the first aid intervention before training and 87% after training; 23% were informed about the first aid intervention if a legume has entered into the ear before training and 48% after training and 48% were aware of first aid intervention in case of insect has entered into the ear before

Table 2 Comparison of first-aid knowledge levels of students in case of FBA in respiratory track before and after the training.

First-aid knowledge level	Before the training 11th–12th grade Total (%)	After the training 11th–12th grade Total (%)	Statistical analysis
Importance of age factor in terms of first-aid intervention for FBA			
Knowing	86	89	$p = 0.678$[b]
Not knowing	14	11	
	$p = 0.136$[a]	$p = 0.454$[a]	
First-aid intervention to be done, when aspirated object is seen in respiratory track			
Knowing	8	36	$p = 0.000$[b]
Not knowing	92	64	
	$p = 0.575$[a]	$p = 0.102$[a]	
First-aid intervention to be done in case of a partial obstruction of respiratory track			
Knowing	57	80	$p = 0.000$[b]
Not knowing	43	20	
	$p = 0.035$[a]	$p = 0.483$[a]	
First-aid intervention to be done in case of a complete obstruction of respiratory track of <1 year children			
Knowing	2	35	$p = 0.000$[b]
Not knowing	98	65	
	$p = 0.179$[a]	$p = 0.284$[a]	
First-aid intervention to be done in case of a complete obstruction of respiratory track of >1 year children			
Knowing	2	35	$p = 0.000$[b]
Not knowing	98	65	
	$p = 0.179$[a]	$p = 0.284$[a]	
First-aid intervention to be done in case of an obstructed foreign body in the respiratory track of an unconscious child			
Knowing	–	16	–
Not knowing	100	84	
	$p = 0.550$[a]	$p = 0.003$[a]	

FBA, Foreign Body Aspiration.
[a] Chi-square.
[b] McNemar test.

training and 64% after training. No statistically significant difference was found among the before-training and after-training group ($p > 0.05$), nevertheless the increase of pupils' knowledge about first aid intervention in case of developing symptoms when a foreign body has entered into the nose, or if a foreign body can be seen in the ear canal, a legume or insect has entered the ear was determined to be statistically significant ($p < 0.05$) (Table 3). In Table 3 it can be observed that the number of pupils aware of the appearing symptoms when any foreign body has entered into the ear has increased after training in comparison to the ones before training. This increase was statistically insignificant ($p > 0.05$).

Discussion

The findings obtained in this study show that the training about FBA given to the pupils in the department for children development has lead to an increase in the knowledge level of the school children.

In order to protect children from FBA the individuals responsible for childcare must be trained. They have to be trained individually or in groups regarding the measures to be taken in case of situations creating a risk for aspiration according to their developmental age and the measures to be taken in order to avoid aspiration.[11,15] In the study carried out by Çelik and Arıkan it was reported that the participation rate of high school and university pupils is low (8.2%).[11] Bölükbaş et al. reported in their study that 12.7% of the pupils received first aid training.[10] Our study is revealing that the FBA seminar and course participation rate is low (1%), and thus in line with the literature there is training necessity in this regard.

In reported studies it is stated that FBA is one the major reasons leading to morbidity and mortality in pediatric age groups and that FBA is mainly identified between the age group of 0 and 3.[5,7,16] In our study it was determined that after relevant training, the number of pupils knowing the age factor importance in FBA increased significantly ($p < 0.05$) (Table 1). We believed that this fact was due to the performed training.

If a foreign body enter the ear canal, nose and respiratory tract, it is important to know the characteristics of the foreign body (drilling-cutting, cylindrical, legume, insect) before its removal. In addition, it is reported that the most frequent symptoms in FBA are as follows; sudden asphyxia during alimentation or playing with toys, bruising, cough and rattle.[17–19] In our study there was an increase of the number of school children knowing the importance of the

Table 3 Comparison of first-aid knowledge levels of students in case of FBA (nose–ear) before and after the training.

First-aid knowledge level	Before the training 11th–12th grade Total (%)	After the training 11th–12th grade Total (%)	Statistical analysis
The appearing symptoms in case of aspirated body in nose			
Knowing	27	67	$p = 0.000$[b]
Not knowing	73	33	
	$p = 0.096$[a]	$p = 0.289$[a]	
First aid intervention in case of aspirated body in nose			
Knowing	27	67	$p = 0.000$[b]
Not knowing	73	33	
	$p = 0.096$[a]	$p = 0.289$[a]	
The appearing symptoms if any foreign body has entered into the ear			
Knowing	87	90	$p = 0.684$[b]
Not knowing	13	10	
	$p = 0.260$[a]	$p = 0.384$[a]	
First aid intervention in case of aspirated body in ear			
Knowing	2	27	$p = 0.000$[b]
Not knowing	98	73	
	$p = 0.932$[a]	$p = 0.096$[a]	
First-aid intervention in case of sharped object is steeped in ear			
Knowing	75	87	$p = 0.023$[b]
Not knowing	25	13	
	$p = 0.298$[a]	$p = 0.209$[a]	
First-aid intervention in case of a legume stuck in ear			
Knowing	23	48	$p = 0.000$[b]
Not knowing	77	52	
	$p = 0.070$[a]	$p = 0.153$[a]	
First-aid intervention in case of an insect stuck			
Knowing	48	64	$p = 0.048$[b]
Not knowing	52	36	
	$p = 0.860$[a]	$p = 0.973$[a]	

FBA, Foreign Body Aspiration.
[a] Chi-square.
[b] McNemar test.

nature of the aspirated object in FBA and being aware of the FBA symptoms ($p < 0.05$) (Table 1). The knowledge about this issue after training is an important reality in terms of child health. Furthermore in our study it was seen that the number of pupils knowing the symptoms in case of partial and complete obstruction of respiratory tract has increased after training ($p < 0.05$) (Table 1). The fact that the majority of pupils were aware of these symptoms after training is significant in terms of providing first aid to children.

As the aspirated foreign body may irritate the nose, ear and respiratory tract or the bacteria on foreign body may cause an infection Bren (2005) emphasizes consult a doctor necessarily after the foreign body removal.[20] It is an encouraging finding that the number of pupils being aware of consulting a doctor after the foreign body has been removed increased after training ($p < 0.05$) (Table 1). Our study showed that almost (98%) all pupils knew the phone number to call in case of emergency before training and all after training (Table 1). It may be due to the fact that they are constantly facing such situations in their daily life.

According to the literature, if the aspirated foreign body can be seen in the respiratory tract, the action of removing the foreign body with the index finger can cause displacement of the foreign body further down the pharyngeal-tracheal passage in case of babies and children, therefore it is emphasized to perform this maneuver with the little finger instead.[19–21] The increase of 28% of awareness of first aid intervention, when an aspirated foreign is seen in the respiratory tract, and 23% of people knowing first aid intervention if the respiratory tract is partially obstructed after-training lead us to conclude that it was a result of the obtained training ($p < 0.05$) (Table 2). As the first aid application should be known by all pupils who will perform the first aid, the increase of knowledge in relation with this issue is an important finding in terms of having achieved the training purpose.

In literature it is stated that in cases of complete obstruction of respiratory tract on <1 year old children, 112 must be called immediately due to their small respiratory tract. Respiratory tract obstruction based on FBA can have life

threatening consequences.[21,22] Our study demonstrated that the number of pupils knowing the first aid intervention in case of total obstruction of respiratory tract on <1 year and >1 year old children increased after training in comparison to the before training status ($p < 0.05$) (Table 2). As the applied first aid method is lifesaving, it is essential for child development department graduates to have this knowledge. Furthermore it was seen that before training no pupil knew the first aid intervention if the child is unconscious and has aspirated a foreign body, it was 16% after-training (Table 2). It is thought that the increase in number of pupils answering correctly arises from the provided training.

If any foreign body enters the nose, the following symptoms can be seen: nosebleeds, breathing difficulties, oral breathing, nasal speech, sneezing, nasal pain; if the aspirated body remains for a long time in the nose, symptoms like purulent bloody nasal discharge may appear.[21–23] It is emphasized that if the aspirated foreign body is not the result of drilling or cutting, the patient should be encouraged to close his/her nose and blow strongly without deep inhalation before blowing, if the object does not exit, the patient should be brought to a health facility without intervening with tools like tweezers or pliers.[11,23] To carry out these applications incorrectly poses a threat to the child's first aid intervention importance. In order to be able to perform the first aid intervention early the individuals looking after the child should know these symptoms and the proper first aid intervention. In our study, we observed that the number of pupils knowing the symptoms in case of foreign body entering into the nose and the related first aid intervention increased after training, which is desirable ($p < 0.05$) (Table 3).

If any foreign body has entered into the ear, this can lead to pain, drainage and hearing loss.[21,23] If the entered foreign body can be seen in the ear canal, it should not be removed with tools like tweezers and pliers, rather the head of the individual should be turned to the side and down or the outer ear should be pulled outwards in order to remove the object, if the object does not exit, the patient should be brought to a health facility.[11,23]

It is encouraging that the number of pupils knowing the symptoms in case of foreign body entering the ear is high (87%). In our study, an increase has been observed after training ($p > 0.05$) (Table 3). Additionally, the number of pupils knowing the first aid intervention if the foreign object can be seen in the ear canal increased 25% after training ($p < 0.05$) (Table 3). Furthermore, after training, there was an increase in the number of pupils who knew the first aid intervention if a drilling object, a legume or an insect has entered the ear ($p < 0.05$) (Table 3). This result shows the effectiveness of the training.

Conclusion

Visual presentation and training on models related to FBA has led to an increase in the knowledge level of pupils. Based on these results, it can be proposed that nurses should train families and individuals responsible for childcare regarding protection from FBA and first aid intervention at regular intervals and standardize these trainings, create training models concerning this issue and conduct joint projects with the Ministry of National Education and Ministry of Health.

Conflicts of interest

The authors declare no conflicts of interest.

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Ozakar Akca study design, manuscript preparation and analysis. Guven, Goyhan, Kaya, Mercan data collection.

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