

Original Article

## Effect of First Aid of Choking Training Program on Knowledge and Skills of Primary School Children

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### Abstract

**Background:** Most child deaths in the world have been attributed to a lack of knowledge and practice in emergency and accident situations. Airway obstruction in children by a foreign body is a major health problem. The extent of injury can be reduced to a minimum if school children are provided with appropriate knowledge about first aid skills, injury prevention, and how to deal with them, which may increase the survival chances of the injured person. **Aim of the study:** This research aims to assess the effect of a training program on school children's knowledge and skills about first aid of choking cases. **Material and methods:** **Research design:** an experimental design /pretest-posttest with control group/ was followed in the present study. **Setting:** Data were collected from Gamal Abdel Nasser Abu Khosreen and Zur Reda Al-Sharqiya schools in the city of Hama/Syria. **Sampling:** The study was conducted on a random sample of 150 children aged between 8-10 years. The sample members were randomly divided into two groups (experimental group with 100 children and control group with 50 children). **Study Tools:** Three tools were developed by the researcher. Tool I is a demographic information questionnaire, Tool II is an information questionnaire for children about choking, and Tool III is a choking first aid checklist. **Results:** The current study showed that the children of the experimental group, before implementing the program, did not know what choking is by 71% and did not know what behaviors might lead to it by 82%. However, after applying the program, 100% of the children of the experimental group knew what choking is and what behaviors it is which may lead to it. The study also revealed that after applying the program there was a significant statistical difference ( $P = 0.000$ ) in the average information of children about signs indicating choking between the two study groups in favor of the experimental group. As for children's skills in first aid in cases of choking after applying the program to the experimental group, a statistically significant difference ( $P = 0.000$ ) was found in the average of children's skills between the two study groups in favor of the experimental group. **Conclusion:** From the previous results it was concluded that the training program was effective in increasing children's information and skills about first aid for choking.

**Keywords:** first aid, training school children, choking, training program

### Introduction:

Children experience significant changes in their physical and cognitive abilities, their level of dependence on others, and their dangerous activities and behaviors as they grow up in a world where they have little power and control. They are also known to be curious, as they rush with their small bodies to explore what is around them constantly and are characterized by an activity that urges them to move quickly without realizing the danger that may surround them, which makes them more vulnerable to accidents and injuries that may lead to death, such as falls, burns, drowning, airway obstruction with foreign objects, and poisoning. The type and severity of injury depend on children's age, level of development, and physical, anatomical, and physiological characteristics, such as narrow airways and a more sensitive layer of skin than adults. <sup>(1-7)</sup>

Children sustain injuries relating to physical activity in various physical and social environments, including during community-organized sporting events, at school, and while engaging in non-organized active leisure pursuits such as bicycle riding, swimming, and playing. <sup>(8)</sup>

Injury is defined as "the physical damage that results when a human body is suddenly subjected to energy in amounts that exceed the threshold of physiological tolerance - or else the result of a lack of one or more vital elements, such as oxygen". The energy in question can be mechanical, thermal, chemical, or radiated. Injuries are among the leading causes of death and disability in the world. <sup>(1,9)</sup>

The morbidity and mortality weekly report in the USA in 2001 showed that 160 children under the age of 14 died during the year 2000 due to airway obstruction in the respiratory tract associated with inhalation or ingestion of foreign objects. During 2001, about 17,537 children under the age of 14 were treated in emergency departments for choking-related seizures, an average of 29.9 per 100,000 population. According to (Vilke et al, 2004) in San Diego, USA, 50% of all patients with airway obstruction in the emergency department were children and under the age of 5 years. <sup>(10,11)</sup>

In addition, choking posed a major health problem for Londoners, especially in children and the elderly, as airway obstruction by a foreign body was considered a life-threatening emergency. A study by (Pavitt et al, 2017) entitled London ambulance source data on choking for 2016, showed that 811 cases of choking of children under 4 years of age were reported out of 1,916 cases of severe choking that required emergency assessment. <sup>(12)</sup>

Most of the child deaths in the world occur due to lack of knowledge and practice in emergency situations and accidents. So, providing basic information and understanding how to start helping is essential for every child so that they can provide care in the event of an accident, possibly saving lives and minimizing damage in school environments. <sup>(13,14)</sup>

The cornerstone of FBAO management is to eliminate the cause of the obstruction as soon as possible. Therefore, many researchers have noted the need to teach and train children in first aid skills for emergency situations that children may encounter. Because children may be the only people present in emergency situations or when an injury occurs. All children have the right to feel safe and healthy and to know that they will receive help when they need it. <sup>(14-17)</sup>

First aid training is defined as a training educational activity, with learning objectives defined in terms of skills and attitudes related to immediate assistance in the event of accidents, injuries or sudden illness. First aid education should be universal. Everyone can and should learn first aid. <sup>(18-20)</sup>

The results of a study conducted by (Tse E et al., 2022) on Greek kindergarten children aged between 4 and 5 years indicated that kindergarten children may benefit from first aid training, but more studies are needed to verify these observations. Aspects of first aid included (how to call an ambulance, trauma management, head injuries, bleeding, nosebleeds, and choking). <sup>(21)</sup>

The training program in the study conducted by (Gamze AKSU et al., 2023) prepared for students of a primary school from 8 to 11 years old in the eastern part of Turkey included the most common emergency cases that children may face daily, which are (definition of first and reporting emergency situations, epistaxis, sprains, burns, fractures, bee stings, cuts, and foreign bodies in the airway). After visual, interactive, and practical training on first aid, the children were able to acquire basic knowledge and skills for managing injuries. <sup>(22)</sup>

### **Significance of the study:**

There are proven ways to reduce the likelihood and severity of harm in each area of child injury, yet awareness of the problem and the possibility of its prevention remain unacceptably low. Knowledge of basic first aid is an important point to prevent accidents in early childhood, as knowledge of first aid can increase the chances of survival for the injured person. <sup>(1,23)</sup>

Schools are an ideal environment for teaching first aid skills and how to prevent injuries. Education in educational institutions is extremely important in the event of an accident or a health problem. The extent of the injury can also be reduced to a minimum if schoolchildren are provided with appropriate knowledge about first aid skills, injury prevention, and how to deal with it. <sup>(8,13,24,25)</sup>

### **Aim of the study:**

This current study aimed to evaluate the impact of a training program on the knowledge and skills of schoolchildren about first aid for choking.

### **Research question:**

What is the effect of training program on knowledge and skills of primary school children regarding first aid of choking?

### **Research hypotheses:**

Hypothesis 1: School children undergo a training program on first aid of choking exhibit more knowledge and higher average skills score than school children don't undergo a training program on first aid of choking.

Hypothesis 2: knowledge and average skills score of school children on choking first aid after applying the training program are higher than before applying the training program.

**Material and Methods:**

**Research Design:**

A pretest-posttest with control group randomized experimental design was followed in the current study.

**Setting:**

This study was conducted in the following primary schools (from second to fourth grade) in Hama Governorate:

- Gamal Abd Al-Nasser Abu Khasreen School in city /governmental/.
- Zur Arza Al-Sharqiya School in countryside /governmental/.

**Sampling:**

A sample of 150 children were selected from both schools in the following manner:

First, the proportional stratified sampling method was followed to determine the total number required in the sample from each school, and to distribute it into two groups, control and experimental, in a proportional manner as follows:

	Number and Percentage in the original community (n=513)		Percentage in sample size (n=150)		Number and Percentage in control group (n=50)		Number and Percentage in experimental group (n=100)	
	N	%	N	%	N	%	N	%
Zur Arza Al-Sharqiya School in countryside	63	12%	18	12%	6	12%	12	12%
Gamal Abd Al-Nasser Abu Khasreen School in city	450	88%	132	88%	44	88%	88	88%

Second, the sample was selected from both schools using a systematic random method. The distance between each sample member was determined by dividing the total number of the original study community (513) on the sample size (150):  $513/150=3$ .

The starting point in each school was randomly determined, then the number 3 was added to the starting point on a regular basis until the sample size (150 children: 18 from the countryside, and 132 from the city) was achieved.

Third, children participating in the study then were randomly assigned into the two study groups (control and experimental) using simple random method (lottery method).

**Study Tools:**

Three tools were developed by the researcher after reviewing the references and literature related to the research topic:

- Tool I: demographic data questionnaire, which includes the following information: (gender - age - place of residence).
- Tool II: a structured interview questionnaire, which includes the following information: (ambulance number, definition of choking, causes/behaviors leading to choking, symptoms and signs of choking, meaning of first aid for choking).
- Tool III: a choking first aid checklist, which includes the actions that the child must do when a case of choking occurs.

**Methods:**

1. Official approvals were obtained to conduct this research.
2. The research instruments were developed after reviewing previous literature.
3. The tools were tested for validity by a jury of 5 experts in the field of pediatric nursing (3), critical care nursing (1), and nursing and health education (1) and the necessary modifications were made.
4. A pilot study was carried out on 20 children, and they were not included in the sample. The necessary modifications were made.

5. The reliability test was conducted using the test-retest method, and the Pearson coefficient value of 0.515 indicated a strong, statistically significant correlation,  $P = 0.019$ .
6. The sample was divided into two groups by simple random method (experimental 100 children, control 50 children).
7. Each child in both groups was interviewed to collect demographic data using the first tool.
8. Each child in both groups was interviewed for the initial assessment of their knowledge about choking using the second tool.
9. The children's performance in both groups regarding first aid in case of choking was initially evaluated using the third tool.
10. A booklet was developed by the researcher that included age-appropriate information about first aid for situations that children in schools may encounter (choking), and the children in the experimental group were taught and trained through this booklet. The program included 4 educational training sessions of 20 minutes each.
11. The training program was applied to the experimental group only as follows:
  - Two (2) sessions to provide information about choking (definition, causes, symptoms and signs, meaning of first aid for choking).
  - Two (2) training sessions for choking aid (explanation of the method, application of the method by each child).

Each session included approximately 15-20 children.

Each child received 80 minutes of theoretical and practical training.

12. The secondary assessment of information using the second tool and the secondary assessment of performance using the third tool were conducted for both groups after applying the training program to the experimental group.
13. The data was analyzed and presented in tables.
14. **Statistical analysis:**
  - Frequency (N), percentage (%), arithmetic mean (M), and standard deviation (SD) were used.
  - The Chi-square test (Ch,2 Chi square) was used to compare the percentages between the control and experimental study groups.
  - The parametric T-test was used for two independent samples to compare the differences between the two study groups.
  - The parametric T-test was used for two linked samples to compare the differences between the two study groups.
  - Differences at the significance threshold ( $p \text{ value} \leq 0.05$ ) were considered statistically significant and denoted (\*), and at the significance threshold ( $p \text{ value} \leq 0.01$ ) they were considered statistically very significant and denoted (\*\*).

#### Ethical considerations:

- children and schools' administrations were clearly informed about the goal of the study.
- A written informed consent was obtained from the school's administrations to apply the program.
- Children and parents were told they have the right to refuse to participate in the study or withdraw at any time.
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#### Results:

##### First: Demographic and health data:

**Table No. 1** shows the distribution of the children in the two study groups according to their demographic data. About half of the sample (58% in the control group compared to 57% in the experimental group) were female. Regarding the age ratios between the two study groups, the highest percentage was 36% of them in the control group at the age of 10 years, while 39% of them were at the age of 8 years in the experimental group.

Regarding place of residence, the majority (88%) in the two study groups lived in the city, and the highest percentage of them (56% and 45% in the control and experimental groups, respectively) had three or more brothers. As for the children's rank in the family among their siblings, 34% of them ranked fourth or higher in the control group, while 32.2% of them ranked second in the experimental group.

We note that there is no statistically significant difference ( $P > 0.05$ ) in the demographic data of the children between the two study groups, which indicates the homogeneity of the demographic characteristics of the study sample.

**Table 1:** Distribution of the children into the two study groups according to their demographic data.

Demographic data		Control group n=50		Experimental group n=100		X <sup>2</sup> P	
		N	%	N	%		
Sex	Male	21	42	43	43	0.014 0.907	
	Female	29	58	57	57		
Child's Age	8 years	17	34	39	39	1.983 0.371	
	9 years	15	30	36	36		
	10 years	18	36	25	25		
Place of residence	City	44	88	88	88	0 1	
	the countryside	6	12	12	12		
Number of brothers	Nothing	3	6	13	13	2.622 0.454	
	one brother	5	10	13	13		
	2 brothers	14	28	29	29		
	≥ 3 brother	28	56	45	45		
If there are siblings, determine the child's order in the family?	the first	8	17.0	22	25.3	3.499 0.478	
	the second	14	29.8	28	32.2		
Control	Experimental	the third	9	19.1	13		14.9
N=47	N=87	Fourth and above	16	34.0	24		27.6

X<sup>2</sup>: Refers to the Chi-Square test (Ch,2 Chi square). P: Significance level.

**Second: children's information about choking:**

**Table No. 2-1** shows the distribution of the children in the two study groups according to their answers about the number they should call in emergency situations before and after applying the training program. Before applying the program, It was found that the vast majority of children (96% and 98% in the control and experimental groups, respectively) do not know the number. A very small percentage (4% versus 2% in the control and experimental groups, respectively) knew the correct emergency number, with no statistically significant difference (P>0.05) between them.

After applying the training program to the experimental group, the table shows that the vast majority of children (99%) in the experimental group became aware of the correct emergency number. with a statistically significant differences between the two groups (P=0.000).

**Table 2-1:** Distribution of the children in the two study groups according to their answers about the emergency number to call before and after implementing the program

The question		Before applying the program to the experimental group					
		Control group n=50		Experimental group n=100		X <sup>2</sup>	P
		N	%	N	%		
1. Do you know what number to call in an emergency?	Yes	2	4	2	2	0.514	0.474
	No	48	96	98	98		
If the answer to the previous question is yes, what is the number to call in emergency situations?	110	2	4	2	2	0.514	0.474
	wrong number	0	0	0	0		
The question		After applying the program to the experimental group					
		Control group n=50		Experimental group n=100		X <sup>2</sup>	P
		N	%	N	%		
1. Do you know what number to call in an emergency?	Yes	1	2	99	99	141.14	0.000 **
	No	49	98	1	1		
If the answer to the previous question is yes, what is the number to call in emergency situations?	110	1	2	99	99	141.14	0.000 **
	wrong number	0	0	0	0		

X<sup>2</sup>: Refers to the Chi-Square test (Ch,2 Chi square). P ≤ 0.05: \*, P ≤ 0.01: \*\*

**Table No. 2-2** presents the distribution of the children in the two study groups according to their answers regarding the definition of choking and the behaviors that lead to its occurrence before and after applying the training program. It was found that the highest percentage of children (64% and 71% in the control and experimental group, respectively) do not know what choking is, and (70% in the control group compared to 82% in the experimental group) do not know what behaviors and actions may lead to choking in children. The differences were not statistically significant ( $P > 0.05$ ).

After applying the training program to the experimental group, the table shows that 100% of the children in the experimental group became aware of what choking is and what behaviors lead to its occurrence in children. Most of them mentioned these behaviors, with very important statistical differences between the two groups ( $P = 0.000$ ).

**Table 2-2: Distribution of the children in the two study groups according to their information regarding choking before and after implementing the program.**

Before applying the program to the experimental group		Control group n=50		Experimental group n=100		X <sup>2</sup>	P
The question		N	%	N	%		
1. Do you know what choking is?	Yes	19	38	29	29	1.24	0.265
	No	31	64	71	71		
2. Do you know what behaviors and actions may lead to choking in children?	Yes	15	30	18	18	2.797	0.094
	no	35	70	82	82		
If the answer to the previous question is yes, mention the behaviors (actions) that you know of that lead to choking							
		Control group = 15		Experimental group = 18			
Laughing while eating.		0	0	0	0	-	-
Talking while eating.		0	0	2	11.1	1.014	0.314
Performing some type of physical activity, such as jogging, while eating.		0	0	0	0	-	-
Eat large pieces of food.		8	53.3	7	38.9	3.000	0.083
Eat quickly.		2	13.3	3	16.7	0.103	0.748
Swallowing small toy pieces.		5	33.3	7	38.9	0.408	0.523
After applying the program to the experimental group		Control group n=50		Experimental group n=100		X <sup>2</sup>	P
The question		N	%	N	%		
1. Do you know what choking is?	Yes	19	38	100	100	78.15	0.000**
	no	31	64	0	0		
2. Do you know what behaviors and actions may lead to choking in children?	Yes	14	28	100	100	94.74	0.000**
	no	36	72	0	0		
If the answer to the previous question is yes, mention the behaviors (actions) that you know of that lead to choking							
		Control group = 14		Experimental group = 100			
Laughing while eating.		0	0	91	91	115.68	0.000**
Talking while eating.		0	0	81	81	88.04	0.000**
Performing some type of physical activity, such as jogging, while eating.		0	0	87	87	103.57	0.000**
Eat large pieces of food.		8	57.4	96	96	100.33	0.000**
Eat quickly.		3	21.4	95	95	116.58	0.000**
Swallowing small toy pieces.		3	21.4	96	96	120.32	0.000**

X<sup>2</sup>: Refers to the Chi-Square test (Ch,2 Chi square).  $P \leq 0.05$ : \*,  $P \leq 0.01$ : \*\*

**Table No. 2-3** shows a comparison of the children's information about the signs that indicate choking between the two study groups and in each group before and after applying the program. It was noted that there is no significant statistical difference ( $P = 0.931$ ) in the average information of children between the two study groups before implementing the training program. As for after applying the program, the table indicates that there is a statistically



significant significance ( $P = 0.000$ ) in the average information of children between the two study groups in favor of the experimental group.

On the other hand, the table shows an increase in the average information of the children in the experimental group about the signs that indicate choking from 1.21 before implementing the program to 6.70 after implementing it, and this difference is considered very statistically significant ( $P = 0.000$ ).

**Table 2-3: Comparison of the children’ average information about signs that indicate choking between the two study groups and within each group before and after applying the program**

The time	The group				<i>t</i> P value
	Control group n=17		Experimental group n=19		
Before applying the program	M	SD	M	SD	0.215 0.931
		1.18	0.528	1.21	
After applying the program	Control group n=15		Experimental group n=100		<i>T</i> P value
	M	SD	M	SD	
	1.20	0.561	6.70	0.541	36.536 0.000**
t pair /p	0.435 0.670		31.642 0.000**		

**n** indicates the number of sample members who answered “yes” to their knowledge of the seven signs of choking (knowledge of the signs of choking) in each group before and after implementing the program. **t**: refers to the t-test for independent samples. **t pair**: refers to the T-test for paired samples. **P** ≤ 0.05: \*,  $P \leq 0.01$ : \*\*

**Third: Children’s skills regarding first aid for choking:**

**Table No. 3** shows a comparison of the children’s skills on first aid for choking between the two study groups and in each group before and after applying the program to the experimental group. It shows that there is no statistically significant difference ( $P = 0.637$ ) in the average skills of children between the two study groups before applying the training program. After applying the program, the difference was statistically significant ( $P = 0.000$ ) between the two study groups in favor of the experimental group.

On the other hand, the table shows an increase in the skills of the children in the experimental group regarding first aid for choking from 0.04 before implementing the program to 8.7 after the application. This difference is considered very statistically significant ( $P = 0.000$ ), while there was no change in the skills of the children in the control group.

**Table 3: Comparison of the children’ skills on first aid for choking between the two study groups and in each group before and after applying the program**

The time	The group				<i>t</i> P value
	Control group n=50		Experimental group n=100		
Before applying the program	M	SD	M	SD	0.473 0.637
		0.02	0.141	0.04	
After applying the program	M	SD	M	SD	146.067 0.000**
		0.02	0.141	8.7	
t pair /p	0		142.740 0.000**		

**t**: refers to the t-test for independent samples. **t pair**: refers to the T-test for paired samples.  $P \leq 0.05$ : \*,  $P \leq 0.01$ : \*\*

**Discussion:**

First aid, as the name implies, is the first care given to a victim of an accident, injury, or sudden illness, before the provision of advanced medical care. First aid should be aimed to preserve life, promote recovery, and prevent worsening of the victim’s condition. Delay in accessing appropriate medical care and/or lack of knowledge

regarding treatment results in the death of the injured. Therefore, the earlier the intervention, the lower the morbidity and mortality rates. <sup>(4,26)</sup>

The results of the current study show that the highest percentage of children in the two study groups in the initial assessment did not know the emergency situations for which they could call an ambulance, and they did not know that the ambulance number in Syria is (110), and they did not know what choking is or what behaviors and actions might lead to it occurring. In children, these results are considered normal since these children do not receive any information or training on first aid for choking and the teaching program in the Syrian schools does not involve any first aid courses.

On the other hand, the results of the study showed that children in the experimental group who received first aid training had significantly improved knowledge in all areas of first aid assessed. This indicates the effectiveness of the training program in improving children's first aid knowledge. There are several possible reasons for the effectiveness of the training program: such as the researcher's use of interactive educational methods that can help children learn and remember information better. Providing clear and simple information about first aid, and having practical training that allowed children to practice first aid skills and apply them in realistic scenarios, and enhanced children's confidence in their ability to provide first aid, making them more prepared to act in emergency situations. In contrast, the children in the control group did not receive any first aid training and therefore did not have the opportunity to improve their knowledge. This explains why their knowledge remains low and little changed.

This result is consistent with a study (Tse et al., 2023) in Greece, which showed that the training provided by primary school teachers to children between 6 and 8 years of age on first aid led to improved children's knowledge in the field of first aid and trauma management, compared to children who did not receive Training. <sup>(27)</sup>

It is consistent with another study in Greece by (Tse et al., 2022), which showed that kindergarten children between the ages of 4 and 5 years were able to know first aid, which includes how to call an ambulance, and manage bleeding and bruises. <sup>(21)</sup>

It is also consistent with the study (Gamze et al., 2023) in Turkey, which demonstrated the effectiveness of the training program on first aid for daily injuries for primary school children in providing these children with appropriate knowledge about identifying and reporting emergency situations, and detecting a foreign body in the airway. <sup>(22)</sup>

Improving children's knowledge of choking and first aid for choking is of great importance. By knowing the signs of choking, children can recognize emergency situations that require immediate intervention. By knowing first aid for choking, children can provide life-saving assistance to people suffering from choking. In this regard, the results of the current study showed the effectiveness of the training program in improving the knowledge of the children in the experimental group about the signs that indicate choking and about the meaning of first aid for choking compared to what it was before implementing the program. This result can be attributed to the quality of the training program design in providing information to children in an age-appropriate manner that helps them remember and learn it.

This result is consistent with a study (Gamze et al., 2023) in Turkey, which showed that training primary school children in visual, interactive, and practical first aid gave them appropriate knowledge about first aid for choking and signs of the presence of a foreign body in the airway. <sup>(22)</sup>

Similar results were reported in a study by (Tse et al., 2022) in Greece, which showed that kindergarten children between the ages of 4 and 5 years were able to know first aid for choking. <sup>(21)</sup> It is also in line with a study (Martínez-Isasi et al., 2023) in Spain, which showed that 75% of school children were able to recognize the signs of choking and how to provide relief after conducting brief training for them on rescuing airway obstruction with a foreign body using the steps of the FBAO protocol. <sup>(15)</sup>

## **Conclusions and Recommendations:**

### **Conclusions:**

From the previous results, the present study concluded that:

- Training program for children about first aid is an effective way to increase their knowledge and skills regarding the first aid of choking.
- The program was significantly effective in increasing the children's awareness about the emergency cases and the number they should call in such cases.
- Children's knowledge and information about causes and signs and symptoms of choking were significantly increased after applying the training programs.
- The average skills of children regarding the first aid of choking were significantly increased after applying the training program.



**Recommendations:**

- Implement first aid courses for choking in the primary school curriculum.
- Using videos, role play, and short stories in teaching and training children on different types of first aid.
- Develop programs and manuals on other areas of first aid.
- Activating the educational role of nursing by selecting specialized staff responsible for conducting educational and training courses.

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