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# Effects of Education Programs on School Students' Knowledge, Attitude, and Practice Regarding First Aid for a Choking Person in Saudi Arabia

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**Abstract:** Choking and foreign body aspiration are significant causes of mortality and morbidity in young youngsters. This study aimed to investigate the effects of education programs on school students' knowledge, attitude, and practice towards a choking person. This quasi-experimental study with a pretest-posttest control group design included a total of 282 school students. The students were divided into an intervention group (n = 141) and a control group (n = 141). After both groups completed the pretest, the intervention group received an education program on first aid for a choking person. Then, both groups were subjected to a posttest at the end of the program. The descriptive and inferential statistics analyzed the data. There were no significant differences between the two groups within the study parameters at the pretest ( $P > 0.05$ ). However, at posttest, a significant difference was observed in the knowledge ( $p = 0.001$ ), attitude ( $p = 0.024$ ), and practice ( $p = 0.001$ ) of the intervention group compared to the control group. The intervention group showed significant improvement in the students' knowledge, attitudes, and practices regarding first aid for a choking person. We suggest a continuous training program to improve the competency of first aid for a choking person.

**Keywords:** Education program; school students; knowledge; attitude; practice; choking person

## 1. Introduction

Injuries are one of the causes of morbidity and mortality at all ages, but youngsters are more vulnerable worldwide [1]. Choking is a significant cause of mortality and morbidity in young students [2]. It is a severe medical condition characterized by a deficiency of oxygen to the brain. Choking leads to tissue damage and cell death within 4-6 minutes because of foreign object blockage of the throat or airway [3, 4]. The fifth most common cause of unintentional injury deaths in the USA is foreign body aspiration.

Eighty percent of FBAs occur in children younger than three years [5]. In Saudi Arabia, nontraffic unintentional paediatric injuries that occur under accidental circumstances such as falls, burns, ingestion of foreign bodies, and sports-related activities are common causes of morbidity, disability, and deaths. These injuries mainly occur because of children's lack of supervision from parents, an unsafe home environment, and a lack of safety measures at home [6].

First aid is the initial treatment given to an acute illness or injury to preserve life, alleviate suffering, prevent further illness or injury, and promote recovery [7]. The endorsed first aid for choking individuals is to provide quick abdominal thrusts combined with back blows [3]. Choking and foreign body aspiration are preventable, and with enough knowledge and training, anyone can save the life of a cardiac arrest victim [2]. Students trained in first aid can respond effectively and provide immediate care for emergency cases such as choking, respiratory and cardiac arrest, bone fracture, strain, bleeding, and cardiopulmonary resuscitation [8]. Any person in any setting can provide first aid procedures, including individual self-care, to help people in life-threatening conditions maintain vital functions, which avoids worsening their health condition [7, 9]. Although any person near the victim can provide first aid until professional help is available to save lives, performing first aid requires some knowledge [10]. Additionally, a lack of first aid knowledge in early childhood can lead to many school problems, such as failure to provide help and improper handling of victims, resulting in a deterioration of the situation [9]. Therefore, this study aimed to assess the effects of health education programs on students' knowledge, attitudes, and practices towards a choking person in Saudi Arabia.

## **2. Materials and Methods**

### *2.1. Study design, setting, subjects*

This quasi-experimental study with a pretest-posttest control group design included a total of 282 school students aged 15-18 years enrolled at the Intermediate School of the Imam-SHATBY in Shagra city, Saudi Arabia, on Oct 22, 2018. Researchers randomly divided participants into an intervention group (n = 141) and a control group (n = 141).

### *2.2. Sampling technique:*

The researchers selected samples using the convenience sampling technique.

### *2.3. Inclusion and exclusion criteria.*

The study included students who agreed to participate in and were available during the study. The study excluded students who disagreed with participating in the study and were not present during data collection.

### *2.4. Health education program development:*

The researchers developed the health education program contents of first aid for a choking person based on relevant literature reviews and had five experts validate them. The aim of this program was to improve the knowledge, attitudes, and practices regarding the delivery of first aid for a choking individual. The program covered the introduction, causes of airway obstruction, signs, and symptoms of foreign body aspiration, primary assessment, and first aid procedures for airway obstruction. The program was applied during two class sessions; the time for each session was two 4-hour-sessions for both theory and four practical hours. The education program was presented using different teaching methods, such as lectures, group discussions, demonstrations and audio-visual materials, leaflets, and posters.

### *2.5. Questionnaire of the study*

The researchers developed a self-administered questionnaire in the English language based on the literature review to assess the school students' knowledge, attitude, and

practice regarding first aid for choking before and after health education intervention. Then, researchers translated the original questionnaire items into the Arabic language because Arabic is the country's primary language. Five experts checked the validity of the questionnaire content. For the pretest, 30 school students engaged in the pilot study to check feasibility and estimate the required time to complete the questionnaire for each respondent. The reliability test was performed from the pilot study. Based on the pretest findings, the researchers corrected for feasibility and excluded the pilot test participants from the main study.

#### 2.5.1. Components of the questionnaire

The questionnaire comprises three sections. Section one includes demographic variables of the school students, such as the age of students, education level, parents' income, and previous training in first aid. Section two consisted of 4 items related to knowledge about first aid for a choking person. Section three comprised four questions to evaluate attitude towards first aid for a choking person associated with the five-point Likert scale ranging from strongly agree (5 points), agree (4 points), neutral (3 points), disagree (2 points), and strongly disagree (1 point). Section four consisted of 4 items related to assessing school students' practice of first aid for a choking person. Respondents chose from two options: never do (0 points) and always (1 point). We gave each correct response 1 point and gave each incorrect answer 0 points. The total mean scores of knowledge, attitude, and practice were calculated before and after the health education program to evaluate the differences and effects of the program.

#### 2.6. Data collection procedure:

Data collection occurred in two periods: After both groups completed the pretest using the self-administered questionnaire, the intervention group received an education program on first aid for a choking person. Then, both groups were subjected to a posttest at the end of the one-day workshop program by the same pretest questionnaire to evaluate the effects of the health education intervention on the school students' knowledge, attitude, and practice regarding first aid for choking. Every participant was coded in the pretest and posttest of two groups to match the questionnaires.

#### 2.7. Ethical clearance

Before implementing the program, the authors obtained ethical permission to conduct this study from the College of Applied Medical Sciences of Shaqra University to the Director of the Education Department in Saudi Arabia's Shaqra Governorate before implementing the program (Ref. 6/10/2019). Furthermore, researchers explained the purpose of the survey to the school students and received consent from each participant before starting the study. All school students in this study agreed to voluntarily participate before proceeding to the questionnaire in the pretest and posttest. All responses were kept strictly confidential for research purposes only, and the results did not personally identify the respondents.

#### 2.8. Data analysis

The Statistical Package for Social Sciences (SPSS) version 25 was adopted for the data entry and analysis. Data analysis was run in four phases: homogeneity, exploratory, descriptive, and inferential data analysis. The chi-square test ( $\chi^2$ ) was operated to examine the homogeneity of the nominal variables in the sociodemographic information of the intervention and control groups. In the exploratory data analysis phase, the Kolmogorov-Smirnov test was used (K-S) to check the normality of the data distribution, which denoted the data as having a nonnormal distribution in both samples of the intervention and control groups. Descriptive statistics were used to display data frequency, percentage,

mean, and standard deviation. Since the data were nonnormally distributed, nonparametric tests were adopted in the inferential analysis, including the Mann–Whitney (M–W) test, to check the differences between the intervention and control groups in the pretest and posttest. Moreover, for the paired samples, the Wilcoxon signed-rank test was performed on the two groups to examine any differences between the pretest and posttest scores on the school students' knowledge, attitudes, and practices to evaluate the effects of a health education intervention regarding first aids for choking. The significance level was fixed at a p-value of  $< 0.05$  in all results.

The Wilcoxon matched-pairs signed-ranks test and the Mann–Whitney U-test are nonparametric statistical hypothesis tests, and they work when the data does not follow a normal distribution. The Wilcoxon matched-pairs signed-ranks test can be used as an alternative to the paired Student's t-test to compare two related samples or matched samples to assess differences in the mean ranks of the sample population. However, the Mann–Whitney U-test for comparing differences between two independent groups is a nonparametric alternative to the independent t-test [11].

### 3. Results

#### 3.1. Sociodemographic information.

This study included a total of 282 school students involved in the education program. The intervention group included 141 participants, and the control group had 141 students. The chi test ( $\chi^2$ ) showed significant differences between only the students who previously trained on first aid and those who did not prepare. However, there were no significant differences noted between the rest of the sociodemographic groups, such as age, parents' education, and parents' income, in the two groups of the study ( $P > 0.05$ ) (Table 1).

**Table 1.** Sociodemographic information of the participants in two groups.

Variables	Groups		Total	$\chi^2$	df	P
	Intervention	Control				
Age	<15 years	57	49	106	3.001 <sup>a</sup>	3
	15-16 years	72	72	144		
	17-18 years	8	11	19		
	> 18 years	4	9	13		
	Total	141	141	282		
Parents' education	Uneducated	14	14	28	5.641 <sup>a</sup>	4
	Primary	20	20	40		
	Intermediate	20	22	42		
	Secondary	4	13	17		
	College	83	72	155		
Parents' income	Total	141	141	282	.608 <sup>a</sup>	2
	low	23	28	51		
	moderate	86	83	169		
	high	32	30	62		
	Total	141	141	282		
First aid training on choking?	Yes	35	52	87	4.804 <sup>a</sup>	1
	No	106	89	195		
	Total	141	141	282		

Note:  $\chi^2$ = Chi-Square Tests, \* statically significant at P value  $< 0.05$

#### 3.2. To compare differences between two groups in the pretest and posttest

The normality of the data was tested in the two groups by the one-sample K-S test, which showed that the data of both the intervention and control groups at pretest and posttest did not follow a normal distribution. Therefore, A Mann–Whitney U-test (mean ranks and p values) was used to compare the mean differences in the school students' knowledge, attitudes, and practices regarding first aid for a choking person at pretest and posttest between the intervention group ( $n=141$ ) and the control group ( $n=141$ ). The results revealed that there were no significant differences between the intervention and control groups in the school students' knowledge, attitudes, and practices at the pretest ( $P = 0.174$

$> 0.05$ ) ( $P = 0.170 > 0.05$ ) ( $P = 0.292 > 0.05$ ), which indicated that the two groups were homogeneous at the pretest stage (before the education program). However, after the education program at the posttest, the mean rank scores of the intervention group increased significantly compared to the control group on the school students' knowledge ( $P = 0.015 < 0.05$ ), attitudes ( $P = 0.001 < 0.05$ ), and practices ( $P = 0.001 < 0.05$ ). Therefore,  $H_0$  was rejected (Table 2).

**Table 2.** Comparing differences between the two groups in the pretest and posttest.

Variable	Pretest in two groups						Posttest in two groups					
	Group	N	Mean Rank	U	Z	P	Group	N	Mean Rank	U	Z	P
Knowledge	IG	141	135.13				IG	141	152.94			
	CG	141	147.87	9042.0	-1.359	.174	CG	141	130.06	8327.5	-2.430	.015
	Total	282					Total	282				
Attitude	IG	141	148.09				IG	141	158.95			
	CG	141	134.91	9011.0	-1.371	.170	CG	141	124.05	7480.5	-3.634	.000
	Total	282					Total	282				
Practice	IG	141	146.48				IG	141	159.10			
	CG	141	136.52	9239.0	-1.053	.292	CG	141	123.90	7458.5	-3.822	.000
	Total	282					Total	282				

Note. IG= Intervention group; CG = Control group, U = Mann–Whitney U test, P = statically significant at P value  $< 0.05$

### 3.3. Comparison of the mean scores of paired samples between pretest and posttest in the two groups

The results of the S and K tests for the pretest and posttest data on school students' knowledge, attitudes, and practices of the control group were not distributed normally (p values were 0.001, 0.001, and 0.001). Thus, researchers used the Wilcoxon matched-pairs signed-ranks test (z-scores and p values) to compare the mean scores of the school students' knowledge, attitudes, and practices regarding a choking person at pretest and posttest within the intervention group ( $n=141$ ) and control group ( $n=141$ ). The results of the Wilcoxon signed-rank test showed that there was no significant difference between the scores of the pretest and posttest of knowledge, attitudes and practices of the control group ( $P = 0.174 > 0.05$ ), ( $P = 0.170 > 0.05$ ), ( $P = 0.292 > 0.05$ ), respectively. However, in the intervention group, there was a significant difference between the pretest and posttest mean scores of knowledge, attitudes, and practices ( $Z = -3.415$ ;  $p = 0.001$ ), ( $Z = -2.262$ ;  $p = 0.024$ ) and ( $Z = -7.124$ ;  $p = 0.001$ ), respectively (Table 3).

**Table 3.** Comparing mean scores of paired samples between Pretest and Posttest in two groups.

Posttest –pretest		Control group					Intervention group				
		N	Mean Rank	Sum of Ranks	Z	P	N	Mean Rank	Sum of Ranks	Z	P
K-Post – K-PRE	Negative Ranks	43	38.84	1670.00			39	44.73	1744.50		
	Positive Ranks	37	42.43	1570.00			66	57.89	3820.50		
	Ties	61			-.247	.805	36			-3.415	.001*
	Total	141					141				
A-POST – A-PRE	Negative Ranks	44	55.85	2457.50			54	57.89	3126.00		
	Positive Ranks	65	54.42	3537.50			73	68.52	5002.00		
	Ties	32			-1.657	.098	14			-2.262	.024*
	Total	141					141				
P_Post – P_PRE	Negative Ranks	36	35.56	1280.00			22	32.14	707.00		
	Positive Ranks	41	42.02	1723.00			88	61.34	5398.00		
	Ties	64			-1.166	.244	31			-7.124	.001*
	Total	141					141				

Note: K-Post – K-PRE = knowledge posttest –knowledge pretest, A-POST – A-PRE= Attitude posttest – Attitude pretest, P-Post – PPRE= Practice posttest –Practice pretest, based on Wilcoxon Signed Ranks Test, Z= Test Statistics, P= statically significant at P value  $< 0.05$



#### 4. Discussion

Choking and foreign body aspiration are preventable, and with enough knowledge and training, anyone can save the life of a cardiac arrest victim [2]. This study aims to evaluate the effects of a health education intervention on school students' knowledge, attitudes, and practices regarding first aid for a choking person. The results of the current study revealed no significant differences between the intervention and control groups in the school students' knowledge, attitudes, and practices at the pretest. However, after the education program at the posttest, the mean scores of the intervention group increased significantly compared to the control group on the school students' knowledge, attitudes, and practices. Our current result is consistent with a previous study that showed that middle and high school students had inadequate knowledge about foreign body aspiration [12]. However, in the posttest, the mean score of the school students' knowledge increased significantly regarding first aid for choking [13]. These findings agree with studies conducted in different countries comparing the effect of training on school students' knowledge, and they found that the level of students' knowledge about foreign body aspiration increased after training [14, 15].

In the present study, there were no significant differences in the mean score of the school students' attitude regarding first aid for choking in the two groups at the pretest. However, at the posttest after administration of the health education intervention, the mean attitude score improved significantly in the intervention group compared to the control group. This improvement in attitude level might be attributed to health education interventions. Moreover, there were no significant differences observed in the mean score of the practice before the program between the intervention and control groups. However, in the posttest, the mean score of the students' training on providing first aid for a choking person increased significantly in the intervention group compared to the control group. Our results disagreed with a study conducted in Nigeria about the poor practice of first-aid among secondary school students. The study revealed that most of the respondents in the survey had fair knowledge, a positive attitude towards, and poor practice of first aid [16].

Similarly, a study conducted in Malaysia showed a significant association between knowledge and attitude, and students who scored higher on first aid answers displayed a more positive attitude towards first aid. Similarly, there were statistically significant relations between race and experience learning first aid [17]. These significant improvements in the school students' knowledge, attitudes, and practices at posttests in the intervention group compared to the control group may be attributed to the health education program, which indicated that the program was effective and may help school students provide first aid for a choking person in the future.

##### 4.1. Strengths and Limitations

Even though our study denoted a significant improvement in knowledge, attitudes, and practices among intermediate school students after applying to the education program in the intervention group, the study has some limitations. First, this program was conducted in a specific school; therefore, future studies should focus on different schools to maximize the benefits of such programs. Second, convenience sampling was adopted in data collection. Third, the program finished on the same day due to time constraints. Thus, this study's results might not represent all students of intermediate schools in Saudi Arabia. Therefore, we suggest further study in different schools of the kingdom to generalize the findings.

#### 5. Conclusions

The current study revealed that the intervention group showed significant improvement in mean scores of school students' knowledge, attitudes, and practices regarding first aid for a choking person. These remarkable changes in the mean scores indicate the efficacy of the health education program that may help teenagers disseminate knowledge,

positive attitudes, and skills to their families, which might increase public awareness in the future by providing first aid for a choking person more effectively. Furthermore, the efficacy of the health education program may guide policy-makers to introduce a first aid training program as part of the school curricula.

## **6. Recommendations**

The authors of this study recommend that school authorities conduct a continuous training program to upgrade school students' competency in first aid for a choking person.

## **Authorship contributions**

Conceptualization, Abdalrahman Saeed; Data curation, Mohammed Abdelmalik and Almoez Mohammed; Formal analysis, Mohammed Abdelmalik; Methodology, Mohammed Mohammed; Software, Binyameen Sambu; Supervision, Adel Abdalla; Writing – original draft, Mohamed Beraima; Writing – review & editing, Ibrahim Abbakr. All researchers have reviewed and approved the final draft before submission and are responsible for the content of the manuscript.

## **Conflicts of Interest**

In this study, all authors have no conflicts of financial or personal interest to declare.

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## **Institutional Review Board Statement:**

Before implementing the program, the authors obtained ethical permission to conduct this study from the College at the University to the Director of the Education Department in Saudi Arabia's Shaqra Governorate before implementing the program (Ref. 6/10/2019). Furthermore, researchers explained the purpose of the survey to the school students and received consent from each participant before starting the study.

## **Informed Consent Statement:**

The researchers explained the purpose of the survey to the school students and received consent from each participant before starting the study. All school students in this study agreed to voluntarily participate before proceeding to the questionnaire in the pre-test and posttest. All responses were kept strictly confidential for research purposes only, and the results did not personally identify the respondents.

## **Data Availability Statement:**

All the data generated during and/or analyzed during this study are available with the corresponding author upon request.

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## **Conflicts of Interest:**

In this study, all authors have no conflicts of financial or personal interest to declare.

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