Journal of
Babol University of Medical Sciences
JBUMS
e-ISSN: 2251-7170 p-ISSN: 1561-4107

Comparison of Practical and Video-Based Cardiopulmonary Resuscitation Training on the Knowledge, Attitude, and Skills of Kindergarten Teachers in Babol

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Article Type

Research Paper

Received:
Sep 2nd 2023
Revised:
Nov 22nd 2023
Accepted:
Feb 6th 2024

ABSTRACT

Background and Objective: Incidents are the leading cause of cardiac arrest in children. Teaching (cardiopulmonary resuscitation) CPR to kindergarten teachers saves children. Since teachers do not have knowledge of CPR, the aim of this study is to compare CPR training according to practical and video-based methods on the knowledge, attitude, and skills of kindergarten teachers in Babol, northern Iran.

Methods: This quasi-experimental intervention was conducted on 212 kindergarten teachers in two groups of 106. One group was trained based on theories and the other by showing a film. First, a pre-test was taken and then a post-test was taken one week and one month after the training. Demographic information as well as data related to knowledge assessment (minimum score 0 and maximum 21), attitude (minimum score 10 and maximum 50) and performance (minimum score 16 and maximum 32) were collected in a questionnaire and compared in the two groups.

Findings: The mean score of knowledge, attitude and skill of the teachers before CPR training were (2.29±0.45), (3.30±0.68) and (1.48±0.14), respectively, and after training were (2.40±0.39), (3.63±0.35) and (1.69±0.12), respectively, indicating a statistically significant difference ($p<0.001$). Covariance analysis for comparing the two methods of practical and video-based training showed that there was no significant difference between the groups in terms of mean knowledge score (2.40±0.39 and 2.46±0.34) with $p=0.2$ and mean skill score (1.69±0.12 and 1.74±0.10) with $p=0.94$, but the level of attitude in video-based training method was higher than the practical method (3.63±0.35 and 3.74±0.39) with $p=0.03$.

Conclusion: The results of the study showed that both methods increase individuals' knowledge, attitude, and skills, but video-based training is recommended due to its increased attitude and ease of use.

Keywords: *Training, Cardiopulmonary Resuscitation, Knowledge, Attitude, Skills.*

Cite this article: Nabavian M, Rahmani N, Kiapour A, Afshari A. Comparison of Practical and Video-Based Cardiopulmonary Resuscitation Training on the Knowledge, Attitude, and Skills of Kindergarten Teachers in Babol. *Journal of Babol University of Medical Sciences*. 2025; 27: e10.

[DOI: 10.22088/jbums.27.1.10]

Introduction

Incidents are the leading cause of death and cardiopulmonary arrest in Iran, with trauma and choking due to foreign bodies being the leading causes of death (1, 2). Studies have shown that 84.7% of cardiopulmonary arrests occur at home, and the rest occur in public places (3). CPR increases the chance of survival after cardiac arrest (4). The main challenge in out-of-hospital resuscitation is who should initiate resuscitation quickly (5). Evidence suggests that only 15-30% of people who experience out-of-hospital cardiac arrest receive bystander CPR before emergency medical personnel arrive (6). The American Heart Association has suggested that if at least 20% of people are trained, mortality from heart attacks will be significantly reduced (7). Experiences from many countries indicate that cardiopulmonary resuscitation (CPR) training among different population groups can provide useful interventions at the scene of an accident (1, 8).

One such group is kindergarten teachers who, due to their contact with children, need to learn resuscitation skills (9). Since children spend a lot of time in kindergarten, the risk of developing emergencies requiring resuscitation, such as injuries, is high. In the United States, the most common injuries that lead to cardiac arrest in children include falls, bruises, abrasions, and choking, with 0.7 to 5 cases reported per child (10). According to research from Slovenia, injuries and poisoning are the leading cause of cardiac arrest in children over one year of age, resulting in 6 deaths and more than 1400 hospitalizations annually (9). In China, cardiac arrest due to injuries is reported to be the cause of death in one-third of children aged 1 to 4 years and also the cause of death in more than half of children aged 5 to 9 years (11).

Most injuries that occur in kindergarten require only first aid. Studies have shown that proper first aid in kindergartens is effective in improving the prognosis of injuries (12). To achieve this goal, educators should learn first aid and basic cardiopulmonary resuscitation, which can play a significant role in keeping children alive in critical moments (13). Studies have shown that success in CPR is related to the level of training (14, 15). One method of resuscitation training is practical training, which provides maximum opportunity for participants to learn (16). Another method is video-based training, in which learners are trained in places other than the educational environment without the presence of an instructor through a video (17). Research in other countries has shown that preschool teachers do not have sufficient skills for resuscitation. Also, due to the lack of a study in this field in Iran, we decided to conduct a study to compare two basic CPR training methods (practical method and video-based training) on the knowledge, attitude, and skills of kindergarten teachers in Babol, northern Iran.

Methods

This quasi-experimental interventional study was conducted after approval by the Ethics Committee of the Islamic Azad University of Babol with the code IR.IAU.BABOL.REC.1401.089 with a pretest–posttest design and permission from the Welfare Department of Babol in kindergartens of this city in 2023. The participants in this study were teachers who had at least 6 months of work experience and were willing to participate in the study and provided their experiences to the researcher. If they did not want to, they could withdraw from the study at any stage of the study. Multistage sampling was adopted. The total number of teachers in Babol was 310 and the total number of samples considering sample dropout was 212, which were divided into two groups, and according to the Pocock's formula with a confidence level of 0.95 and a test power of 0.9, 106 people were considered in each group.

[DOI: 10.22088/jbums.27.1.10]

Data collection was based on self-report. The data collection tools included a demographic questionnaire, a knowledge assessment questionnaire with a minimum score of 0 and a maximum of 21, an attitude questionnaire with a minimum score of 10 and a maximum of 50, and a performance assessment checklist with a minimum score of 16 and a maximum of 32. In order to collect data, in the first stage, a written and practical pre-test was taken from the subjects after obtaining consent. In the second stage, the subjects were randomly divided into two groups. In one group, a training workshop was used, and in the other group, a training film was used. A two-day workshop (8 hours) was considered which included explanations of basic resuscitation topics and practical training on mannequins. At the same time, a film on the topic of teaching the correct treatment of a casualty in cardiopulmonary arrest, prepared by the American Heart Association, was provided to the video-based training group. In the third stage, the teachers were evaluated theoretically and practically under the same pre-test conditions one week and one month after completing the training course. Then, the data were analyzed using SPSS version 26 based on descriptive and inferential statistics, including paired t-test and analysis of covariance; $p<0.05$ was considered significant.

Results

The mean age of the trainers was 37.34±8.93 years and the two groups were homogeneous in terms of demographic characteristics (Table 1). In the practical group, the mean knowledge score before training changed from 2.29±0.45 to 2.40±0.39 after training (p=0.03), the mean skill score before training changed from 1.48±0.14 to 1.69±0.12 after training (p=0.000), and the mean attitude score before training changed from 3.30±0.68 to 3.63±0.35 after training (p=0.000). Therefore, there is a significant difference between pretest and posttest in the practical group. In the video-based training group, the mean knowledge score before training changed from 2.25±0.39 to 2.46±0.34 after training, the mean skill score before training changed from 1.48±0.14 to 1.74±0.10 after training, and the mean attitude score before training changed from 3.10±0.66 to 3.74±0.39 after training (p=0.000). Therefore, there is a significant difference between pretest and posttest in the practical group. Thus, the two training methods were effective in increasing the knowledge, skills, and attitudes of the trainers (Table 2).

Table 1. Demographic findings

Variable	Mean±SD or frequency percentage
Age	37.34±8.93
Education	
Diploma	33
Associate degree	28.8
Bachelor’s degree	32.1
Master’s degree	6.1
Marital status	
Single	25.9
Married	59
Widow	15.1
Work experience	9.37±6.09
Kindergarten area	
Uptown	94.8
Downtown	5.2

[DOI: 10.22088/jbums.27.1.10]

Course status	
Yes	14.6
No	85.4
CPR status	
Yes	14.2
No	85.8
CPR witness status	
Yes	14.6
No	85.4
The latest cardiopulmonary resuscitation training course	
Six months ago	0.5
One year ago	3.8
Two years ago	4.2
More than two years	4.7
They didn't answer.	86.8
Interested in participating in training courses	
Yes	70.3
No	29.7

Table 2. Comparison of knowledge, attitude, and skill scores in the two groups before and after training

Variable	Group	Stages	Mean±SD	Value of the t-test statistic	Degree of freedom	p-value
Knowledge	Practical	Pretest	2.29±0.45	-2.10	105	0.03
		Posttest	2.40±0.39			
	Video	Pretest	2.25±0.39	-4.22	105	0.000
		Posttest	2.46±0.34			
Skill	Practical	Pretest	1.48±0.14	12.08	105	0.000
		Posttest	1.69±0.12			
	Video	Pretest	1.48±0.14	14.68	105	0.000
		Posttest	1.74±0.10			
Attitude	Practical	Pretest	3.30±0.68	-4.54	105	0.000
		Posttest	3.63±0.35			
	Video	Pretest	3.10±0.66	-8.60	105	0.000
		Posttest	3.74±0.39			

To compare the two training methods, practical and video-based, the analysis of covariance test was used before and after the training. The significance value of the analysis of covariance test for knowledge was 0.2 and skill was 0.94, which is higher than the significance level of 0.05. Therefore, there is no significant difference between the mean knowledge and skill of the trainers in the practical and video-based training groups. However, the significance value of the analysis of covariance test for attitude was 0.03, which was

[DOI: 10.22088/jbums.27.1.10]

lower than the significance level of 0.05. Therefore, there is a significant difference between the mean attitude of the teachers in the practical and video-based training groups. According to Table 3, the attitude level in the video-based training method was higher than in the practical method.

Table 3. Comparison of two methods of practical and video-based training

Variable	Sum of squares	Degree of freedom	Mean squares	The value of the F test statistic	p-value
Knowledge	0.22	1	0.22	1.65	0.20
Skill	0.000006	1	0.000006	0.005	0.94
Attitude	0.61	1	0.61	4.34	0.03

Discussion

The results of this study indicated that CPR training using both practical and video-based methods had a positive and equal effect on the level of knowledge and skills of the teachers, and the educational effect of the video-based method on their attitude was greater than that of the practical method. The results of the present study also showed that the majority of participants had no history of participating in CPR training courses. These findings are not consistent with the findings of the study by Isbye et al., who found that the majority of trainers had participated in CPR training courses (18). This discrepancy can be attributed to the different cultures of the regions, different research environments and the importance of people participating in training courses.

The results of various studies showed that there was a statistically significant difference between the knowledge and skill levels of kindergarten teachers regarding cardiopulmonary resuscitation of children before and after training in the form of educational videos and training with mannequins; no difference was observed between the two groups before training. After training, the knowledge score of the participants in both groups increased to the same extent in the study, which was statistically significant compared to pretest (19, 20). Various other studies also showed that the level of knowledge of the participants about cardiopulmonary resuscitation increased to the same extent after training in both methods, and this increase in the level of knowledge was maintained one to two months after training and practice (21-23). These results are consistent with the results of the present study.

In a study titled "Investigating the Effect of Optimal Training on Acquiring and Maintaining High-Quality CPR Skills," the results showed that CPR training on a mannequin, although short-term, can provide effective visual feedback in real time to improve CPR performance, while traditional training on a mannequin had less effect on increasing CPR awareness and performance (24). This finding is in contrast to the findings of the present study, which found no significant difference between the two training methods, practical training and video presentation. The reason for this discrepancy can be attributed to the fact that despite the same methodology, the training was provided and evaluated in separate periods at intervals of one, three, six, and twelve months in different research environments with different facilities and equipment. In a study that was consistent with the methodology of the present study, two methods of CPR training with video and mannequin were examined on the knowledge and performance of nursing students. In this study, the majority of nursing students achieved the highest level of knowledge in both methods, and no difference was observed between the two training methods (25). These findings are consistent with the findings of the present study.

[DOI: 10.22088/jbums.27.1.10]

The results of the study by Pivač et al. showed that after training, participants showed a significant increase in attitudes to help others and self-confidence to help others (26). Consistent with the findings of the present study, previous studies showed that CPR training increases learners' self-confidence. With excellent CPR knowledge, they have a higher willingness to help others (27). Generalization of the findings showed that the virtual training method increased kindergarten teachers' self-efficacy to perform CPR and a positive attitude towards resuscitation more than other methods (28). In this regard, the findings of the present study also showed that virtual training using video had a greater effect on the teachers' attitudes compared to practical training, and they showed a greater willingness to perform CPR and help others. The results of a study in this regard show that participants who were trained with video have a better attitude towards the early stages of resuscitation and performed better than instructor-based training (29). Researchers believe that the appropriate response in the shortest possible time in video-based training can be due to the video's clear instructions for practice, images, and reality context that remove learning barriers. Existing studies show that individuals' ability to learn is enhanced by combining multimedia such as images, audio, and video because it uses different methods that stimulate the senses and make the audience more receptive to the data (30). In a study conducted by Mir et al., it was reported that video demonstrations can be more effective than live demonstrations in transferring clinical knowledge and skills to medical students (31).

According to the results of this study, CPR training for teachers can increase their knowledge, skills, and attitudes. Therefore, it is recommended that teachers complete these courses before entering the workplace. This can be a preventive factor against unwanted complications caused by cardiopulmonary arrest and improve the health of children in the country.

Acknowledgment

We hereby acknowledge the Vice Chancellor for Research and Technology, Islamic Azad University, Babol Branch, for supporting the research.

[DOI: 10.22088/jbums.27.1.10]

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[DOI: 10.22088/jbums.27.1.10]