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A Study to Assess the Effectiveness of a Cardiopulmonary Resuscitation (CPR) Training Program on the Life-saving Knowledge and Skills of High School Students Regarding CPR in a Selected School of Haldwani, Uttarakhand

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Abstract

Background: *Cardiovascular diseases are the leading cause of death worldwide, accounting for 30% of all annual deaths, translating to an estimated 17.3 million deaths each year that might rise to 23.3 million by 2030. Every young individual without a medical background should undergo cardiopulmonary resuscitation awareness training to be equipped for life-saving situations in the absence of medical professionals. This study seeks to assess the impact of a cardiopulmonary resuscitation training initiative on the life-saving knowledge and skills of high school students.* ***Materials and methods:*** *The current research employed a quantitative research approach utilizing a pre-experimental design, specifically the one-group pre–post-test model. Total enumerative sampling was employed to select the samples. Data from 50 high school students were collected through a self-structured knowledge questionnaire and an observational checklist. The researcher utilized baseline data, a self-structured questionnaire, and an observational checklist to evaluate the knowledge and skills related to cardiopulmonary resuscitation.* ***Result:*** *The study finding shows that the pretest knowledge "mean" was 12.88 and the posttest knowledge "mean" was 20.76; here, the standard deviation of the pretest knowledge score was ±3.88 and the posttest standard deviation was ±5.40. Where t = 10.30 (>2) and p = 0.001 (<2). Whereas the pretest skill "mean" was 1.48 and the posttest skill "mean" was 21.34, here the standard deviation of the pretest skill score was ±1.51, and the posttest standard deviation was ±3.55. Where t = 35.47 (>2) and p = 0.001 (<2).* ***Conclusion:*** *The study concluded that the overall cardiopulmonary resuscitation knowledge among students was insufficient. The findings indicate a pressing requirement for enhancements in cardiopulmonary resuscitation education and training for students, aiming to mitigate the mortality rate associated with cardiac arrests within the community.*

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Keywords: Cardiovascular diseases (CVDs), medical professionals, cardiac arrests, CPR training, life-saving knowledge

INTRODUCTION

Cardiovascular disease (CVD) has become prevalent all over the world since the early 21st century as a result of the quick changes in the socioeconomic and political landscape. People's awareness of their health has grown as a result of the inclusion of biological and allied sciences in the classroom, which has expanded our understanding of human health and illness. CVDs encompass a range of conditions affecting the heart and blood vessels, including coronary heart disease,

cerebrovascular illness, peripheral arterial disease, rheumatic heart disease, congenital heart disease, deep vein thrombosis, and pulmonary embolism. In India, nearly 750,000 individuals succumb to sudden cardiac arrests annually. Critical brain damage becomes irreversible approximately 4 minutes after the onset of a cardiac arrest in the absence of cardiopulmonary resuscitation (CPR). The chances of survival decrease by 10% for every minute without CPR intervention. Bystander-administered CPR can substantially increase the likelihood of a cardiac arrest victim's survival, underscoring the importance of widespread education on chest compressions and CPR in schools, colleges, and workplaces, a practice embraced by several countries globally. Currently, approximately 9–10 individuals experiencing cardiac arrest outside a hospital setting do not survive; however, the implementation of effective and top-notch CPR has the potential to lower these mortality rates. The possibility of survival is double and triple if CPR is administered within a few minutes of cardiac arrest. In addition to healthcare professionals, students, particularly those in high school and intermediate education, should be aware of CPR because they will be citizens in the future. Also, they studied the anatomy and physiology of the heart and circulatory system in their syllabus so that it would be easier for them to understand the basic knowledge and skills of CPR. So, if they can be trained in CPR, they can become assets in such emergency situations [1–11].

MATERIALS AND METHODS

Research Approach and Design

In the present study, a quantitative research approach with a pre-experimental (one group pre-, posttest) research design was used.

Sample and Sampling Technique

A total of 50 high school students were selected for the study using a total enumerative sampling technique.

High school students who had basic knowledge of CPR were included, and students who did not have basic knowledge and skills of CPR were excluded from the study.

Research Tools

A self-structured knowledge questionnaire and observational checklist were used to collect data. Baseline data includes the social demographic information of the study participants. These were age, gender, and other information, such as previous exposure to life-saving training or events like CPR and experience dealing with a cardiac emergency. The structural knowledge questionnaire had a total of 36 objective-type questions. 1 mark was given for each correct answer and 0 for the wrong answer. The observational checklist had a total of 26 items.

Procedure

Approval was granted by the Principal of Pal College of Nursing and Medical Sciences, Haldwani, for ethical considerations, and written consent was acquired from the study participants.

Statistical Analysis

The analysis of data involved both descriptive and inferential statistics. Statistical software, specifically Statistical Package for the Social Sciences (SPSS) version 20, was employed for the analysis. The Z-test was utilized for statistical analysis.

RESULT

Section I: Distribution of Baseline Data of High School Students

The study findings showed that out of 50 high school students, the majority of students, 41 (82%), were in the age group of 16–17 and 9 (18%) were in the age group of 14–15. Mostly, 30 (60%) high schoolers were male and 20 (40%) high school students were female. A maximum of 44 (88%) high school students did not have previous exposure to life-saving training or events like CPR, and six (12%)

high school students had previous exposure to life-saving training or events like CPR. All 50 (100%) students had no experience in dealing with cardiac emergencies (Table 1).

Table 1. Baseline data of high school students (n = 50).

S.N.	Baseline data of high school students	(f)	(%)
1.	*Age (in years)*		
	14–15	9	18%
	16–17	41	82%
2.	*Gender*		
	Male	30	60%
	Female	20	40%
3.	*Previous exposure to life-saving training or events like CPR*		
	Yes	6	12%
	No	44	88%
4.	*Do you have any past experience dealing with cardiac emergencies?*		
	Yes	0	0%
	No	50	100%

Knowledge

Section II(A): Findings Related to Comparison of Pretest Posttest CPR Knowledge Score in the Area of Anatomy and Physiology of Heart and Circulatory System of High School Students (n = 50)

Figure 1 showed that, out of 50 high school students, in the pretest knowledge score, the majority (38, 76%) of the high school students were in the moderate score category. Nine (18%) high school students were in the low score category, and only three (6%) high school students were in the high score category. In the posttest, the majority of the (30, 60%) high school students were in the moderate score category, and 18 (36%) students were in the high score category.

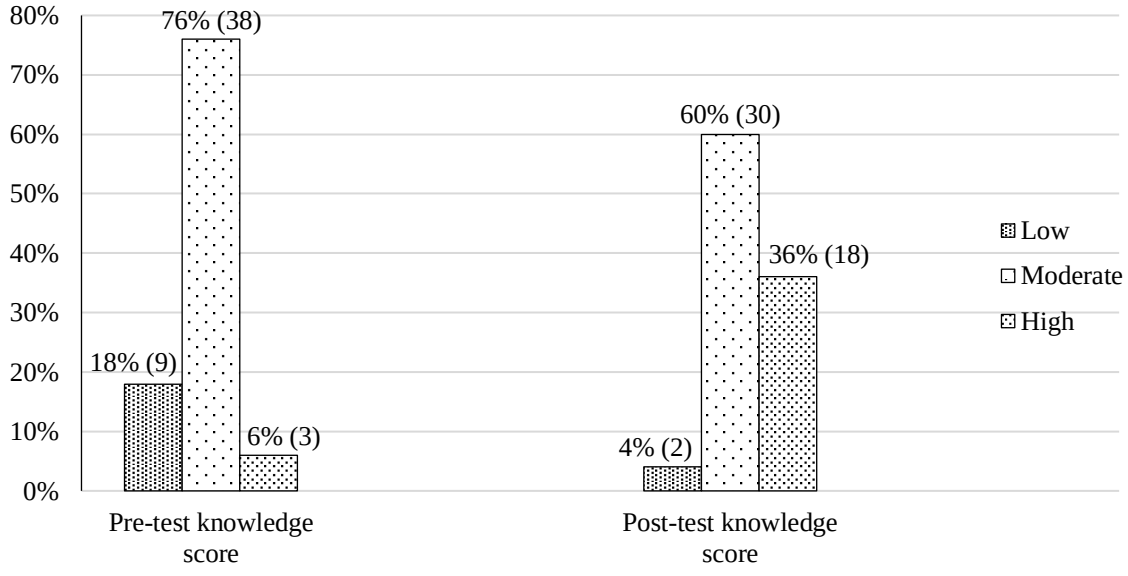

Figure 1. Comparison of pretest and posttest CPR knowledge score in the area of anatomy and physiology of heart and circulatory system of high school students.

Section II(B): Findings Related to Comparison CPR Knowledge Score in the Area of "Step of CPR and Assessment of Outcome of CPR Steps" of High School Students (n = 50)

Figure 2 showed that, out of 50 high school students, in the pretest knowledge score, the majority of the (38, 76%) high school students were in the low score category. At the same time, 12 (24%) high

school students were in the moderate score category. In the posttest knowledge score, the majority of the (26, 52%) high school students were in the moderate score category, and 13 (26%) students were in the high score category.

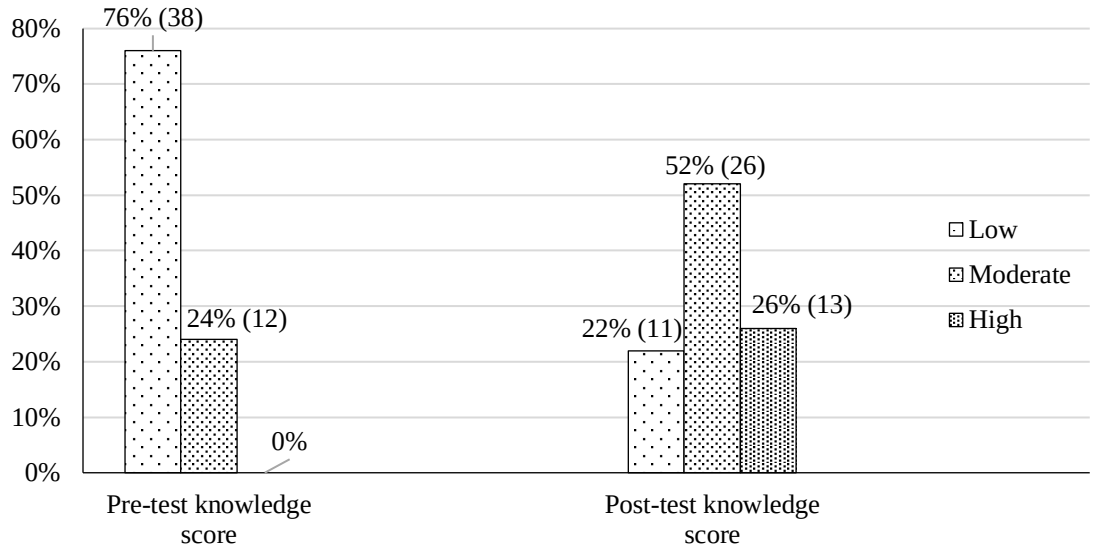

Figure 2. Comparison of CPR knowledge score in the area of "step of CPR and assessment of outcome of CPR steps" of high school students.

Section II(C): Findings Related to Comparison CPR Knowledge Score in the Area of "Application of Knowledge to CPR Skill Performance" of High School Students (n = 50)

Figure 3 showed that, out of 50 high school students, in the pretest knowledge score, the majority of the 30 (60%) high school students were in the low score category. Meanwhile, 20 (40%) high school students were in the moderate score category.

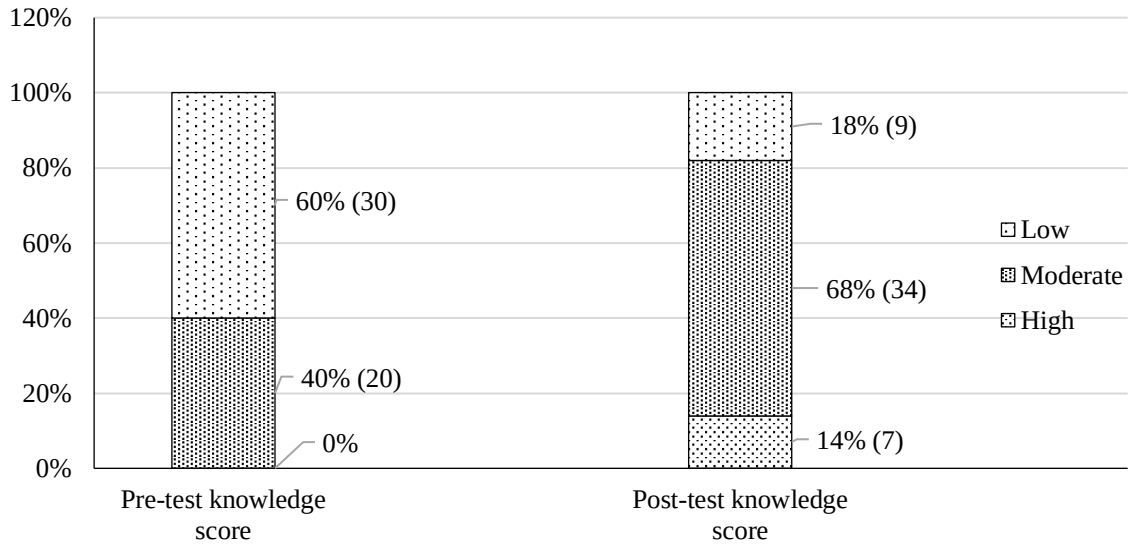

Figure 3. Comparison of CPR knowledge score in the area of "application of knowledge to CPR skill performance" of high school students.

Section III: Findings Related to Comparison of Pretest and Posttest Overall CPR Knowledge of High School Students (n = 50)

Figure 4 showed that, out of 50 high school students, in the pretest knowledge score, the majority of the 42 (84%) high school students were in the low score category. At the same time, eight (16%) high

school students were in the moderate score category. In posttest knowledge regarding CPR, the majority of the 29 (58%) high school students were in the moderate score category, and nine (18%) high school students were in the high score category.

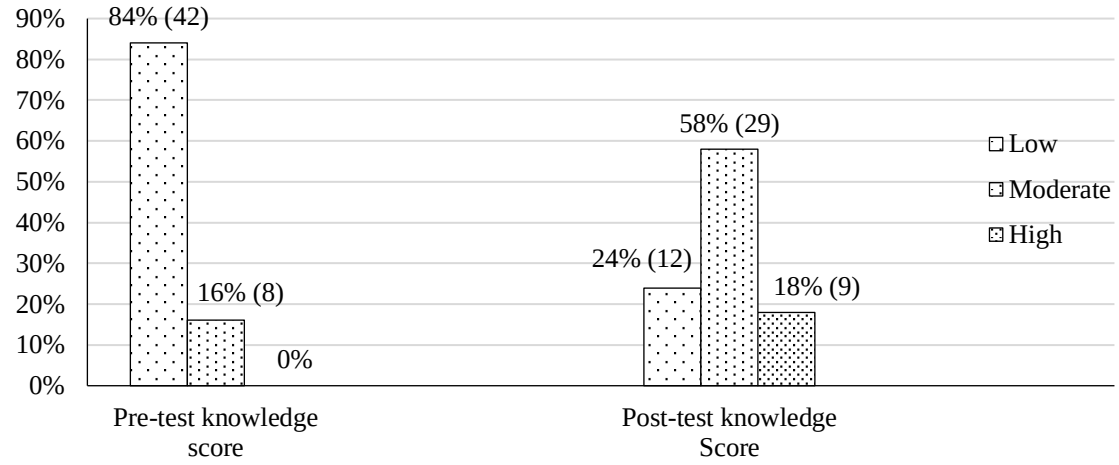

Figure 4. Comparison of pretest and posttest overall CPR knowledge of high school students.

Skill

Section IV(A): Findings Related to Comparison of Pretest and Posttest CPR Skill Score in the Area of "Assessment of Victim" (n = 50)

Figure 5 showed that out of 50 high school students, in the pretest skill score, the majority of the (49, 98%) high school students were in the low score category, and only one (2%) high school student was in the moderate score category.

In posttest skill score, the majority of the (39, 78%) high school students were in the high score category, whereas 11 (22%) students were in the moderate score category, and no one was in the low score category.

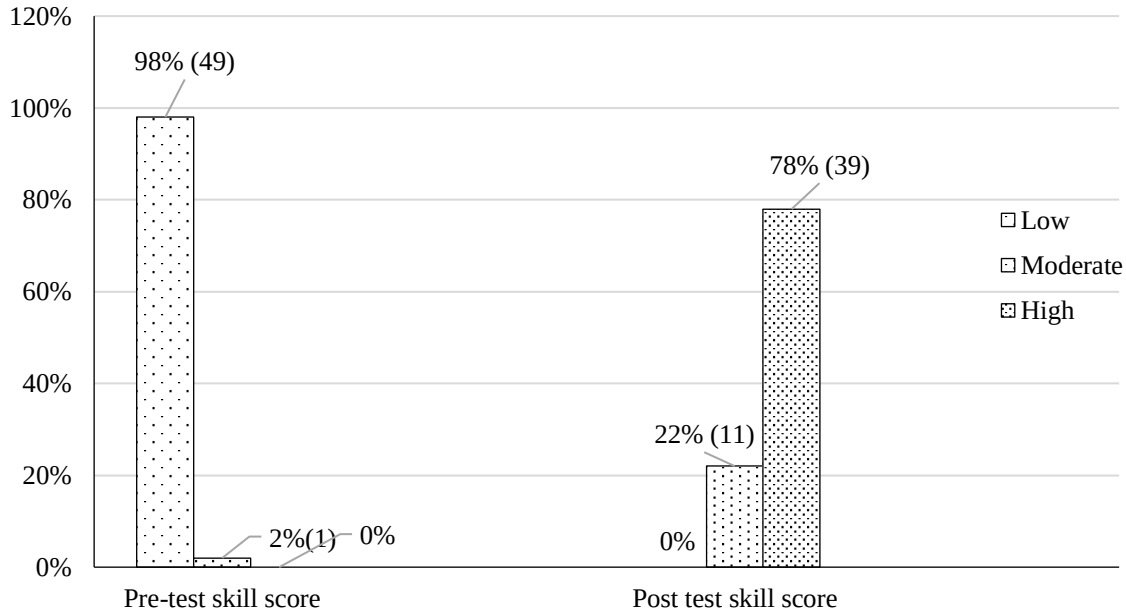

Figure 5. Comparison of pretest and posttest CPR skill score in the area of "assessment of victim".

Section IV(B): Findings Related to Comparison of Pretest and Posttest CPR Skill Score in the Area of "Steps of CPR" (n = 50)

Figure 6 showed that, out of 50 high school students in the pretest skill score, all (50, 100%) were in the low score category. Meanwhile, in the posttest skill score, most of them (36, 72%) were in the high score category, and 14 (28%) were in the moderate score category.

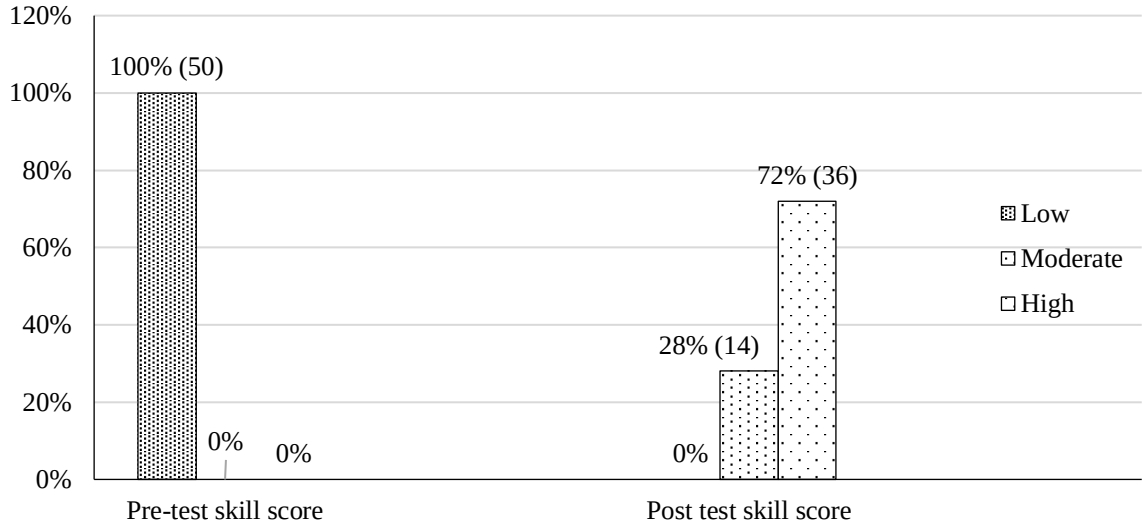

Figure 6. Comparison of pretest and posttest CPR skill score in the area of "steps of CPR".

Section V: Finding Related to Comparison of Pretest and Posttest Overall CPR Skill Score of High School Students (n = 50)

Figure 7 shows that, out of 50 high school students, all (50, 100%) students were in the low score category in the pretest skill regarding CPR and in the posttest score, 42 (84%) students were in high score category and 8 (16%) in moderate category regarding CPR skill.

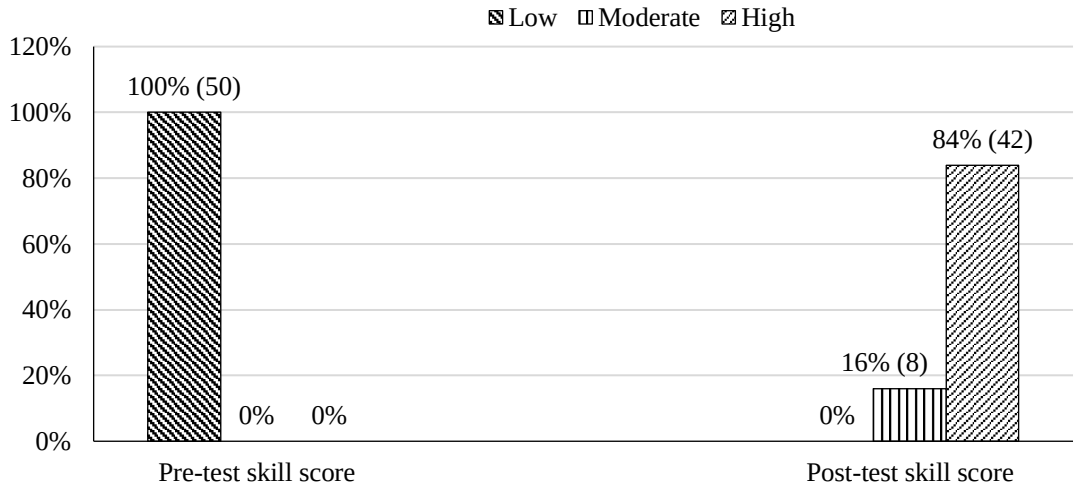

Figure 7. Comparison of pretest and posttest overall CPR skill score of high school students.

Effectiveness of the Training Program

Section VI(A): Effectiveness of Training Program on CPR Knowledge of High School Students (n = 50)

Table 2 shows the pretest knowledge and posttest knowledge score. The pretest knowledge "mean" was 12.88, and the posttest knowledge "mean" was 20.76. Here, the standard deviation (SD) of the

pretest knowledge score was ±3.88, and the posttest SD was ±5.40 whereas, t = 10.30 (>2) and p = 0.001 (<2).

Table 2. CPR knowledge of high school students.

Knowledge score	Mean ± SD	Df	Mean difference	't' value	'p' value	Inference
Pretest knowledge score	12.88 ± 3.88	49	7.88	10.30	0.001	Highly significant
Posttest knowledge score	20.76 ± 5.40					

Section VI (B): Effectiveness of Training Program on CPR Skill of High School Students (n = 50)

Table 3 shows the pretest skill and posttest skill scores. The pretest skill "mean" was 1.48, and the posttest skill "mean" was 21.34. Here, the SD of the pretest skill score was ±1.51, and the posttest SD was ±3.55. Whereas t = 35.47 (>2) and p = 0.001 (<2).

Table 3. CPR skills of high school students.

Skill score	Mean ± SD	Df	Mean difference	't' value	'p' value	Inference
Pretest skill score	1.48 ± 1.51	49	19.86	35.47	0.001	Significant
Posttest skill score	21.34 ± 3.55					

DISCUSSION

Prior to the CPR training, the general public was unaware of life-saving techniques. The majority of them possessed prosaic behavior—the desire to assist others in times of need, but they were unaware of the cognitive and psychomotor aspects of saving lives. All aspects of life-saving skills, including knowledge, psychomotor abilities, prosaically behavior, and readiness for medical emergencies, were significantly enhanced by CPR training. Training in CPR should be a continued process so that the public, as well as health personnel in the community, are well-prepared with basic life support skills. Schoolchildren and youngsters should be taught about basic life-saving skills.

It was made possible for the researcher to finish the study with the support and encouragement provided by the participants and authorities. The study showed satisfactory results since every participant improved their knowledge and abilities, which remained for a period of 3 weeks [12–28].

CONCLUSION

The findings of the study revealed that there was a significant gain in CPR knowledge and skill scores of high school students after the training program. So, the study revealed that the CPR training program had significant potential for creating awareness among high school students regarding CPR.

The overall consensus among the students was in favor of the necessity of this study. They realized (self-stated) that as the non-professional common public, they could also learn CPR and save lives. That had made them think of their social responsibility in this matter. They had become aware of their own inadequacy in knowledge and skill of performing CPR, so they wanted to learn further.

In that way, the usefulness of the study design as "pre-experimental" was proved.

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