

Awareness of Hands-only Cardiopulmonary Resuscitation in High School Students in Riyadh

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Abstract: High school students have less awareness about CPR in general and hands-only CPR in particular. 88% of sudden cardiac arrest takes place at home, so the delivery of bystander Cardiac Pulmonary Resuscitation (CPR) is a crucial element in the chain of survival of Out of Hospital Cardiac Arrest (OHCA). The primary objective is to assess the level of awareness of hands-only CPR in high school students in the capital city of Riyadh, Saudi Arabia. **Methods:** Cross-sectional design study was conducted in 10 high schools in April 2018. **Results:** Total 538 male high school students were enrolled during this study period. The major findings were 90% of the participants were Saudis, from private schools (92%), with High School (HS) grade I (46%). Mean age was 17 years. With (56%) no prior knowledge of CPR and (87%) wanting CPR to be mandatory in schools. **Conclusion:** This research study highlighted the lack of knowledge and awareness of compression-only CPR in male high school students. It is recommended that CPR course should be incorporated in the curriculum and regular refresher courses should be designed to provide hands-on experience and to improve survival rates of out of hospital cardiac arrest.

Keywords: Awareness, Compression-only CPR, Cardiac Pulmonary Resuscitation, Out of Hospital Cardiac Arrest, High School Students

1. Introduction

Cardio-Pulmonary Resuscitation (CPR) is a life-saving technique which is essential in cases of suffocation, near-drowning, electrocution injuries, heart attacks, or any other situation in which a person's breathing or heartbeat has stopped. CPR involves a combination of rescue breathing and chest compression to keep oxygenated blood flowing to the brain and other vital organs until more definitive care can restore the normal heart rhythm. When the heart stops, the absence of oxygenated blood can cause irreparable brain damage and death. This study focuses on the awareness and knowledge of effective; early hands-only CPR among male high school students in Riyadh in the Kingdom of Saudi Arabia (KSA).

Objectives

The primary objective of this research study was to assess the level of awareness and knowledge of hands-only CPR among high school students in Riyadh. The secondary objectives were to improve the hands-only awareness among this demographic, to identify the most effective way to increase their awareness of hands-only CPR, to ascertain their interest in hands-only CPR training courses, and to identify the importance of hands-only CPR training courses among high school students in Riyadh.

2. Literature Survey

A systematic review of the literature was conducted for this research study. Our research team was inspired by many previous studies, including "Early cardiopulmonary

resuscitation in out-of-hospital cardiac arrest" in which the authors indicated that the survival rate among patients who had experienced out-of-hospital cardiac arrest (OHCA) and had undergone CPR before the arrival of emergency medical services in Sweden had increased [1]. A nationwide study also demonstrated that chest-compression-only CPR is as effective as conventional CPR for OHCA [2]. In another study, the presence of family members during CPR was associated with a positive result in terms of psychological variables and did not interfere with medical efforts, increase stress on the health care team, or result in medico-legal conflicts [3]. Furthermore, Drager [4] found that the bystander CPR rate increased when using compression-only CPR compared to standard CPR. A Chinese study showed that there is a positive attitude toward CPR training among high school students, [5] while a 2014 study in Al Khobar in the KSA determined that public awareness and knowledge of CPR was inadequate, particularly among the younger and educated population of Al Khobar, even though the level of motivation and willingness to acquire knowledge of CPR was encouraging [6]. Many studies have been conducted internationally to explore public knowledge and attitudes toward basic life support (BLS) among different groups. The increasing prevalence of the risk factors for cardiac disease among both youth and adults in the KSA makes learning BLS essential for both the general public and healthcare professionals. The incidence of chronic diseases, such as diabetes mellitus, hypertension, obesity, and hyperlipidemia, has increased in KSA by 8%-9% in adults, and such conditions have resulted in the urgent need to educate the population about BLS and CPR [7, 8]. A cross-sectional study of school teachers enrolled 118 female staff from

different schools in both the governmental and private sectors in Jeddah, KSA, and examined the readiness of primary school staff and students to respond to emergency situations such as cardiac arrest. It was found that the participants had insufficient knowledge about CPR. However, the participants' attitudes toward first aid training were positive, and they were in favor of receiving such training [9]. Since only a few published studies are available on this topic in the KSA, our study focused on male students in government and private high schools in the capital city of Riyadh, KSA, to explore their awareness and knowledge of CPR.

3. Methods

Research Design

A cross-sectional study design was adopted for this research study. We used a questionnaire and stepwise process as follows: (1) Registration to acquire demographic data; (2) Pre-tests to assess the level of awareness among the participants; (3) Trained the participants to improve their skills and knowledge of hands-only CPR; (4) Post-tests to measure the improvements in the participants' skills and knowledge; (5) Distributed questionnaires to the participants to determine the importance of the hands-only CPR training course; (6) Collected and sorted the data; (7) Analyzed the data; (8) Formulated the research report.

Setting: This research study took place at 10 high schools comprising male students in Riyadh, KSA.

Research Population and Sampling

We selected males-only high schools randomly from all parts of Riyadh (north, south, east, and west). The high school student population of male students in the KSA in 2017 was 640,997 for both public and private schools [10]. Before starting the survey, the questions were discussed and oral consent obtained from all the participants. Our sample was 538 male high school students who responded to our survey questions in April 2018. Each participant was assigned a special identifier so that we could compare their performance before and after the training (pre- and post-test).

Data Collection

This research study began with the registration process and pre-tests to assess the level of the participants' awareness of hands-only CPR before training commenced. Following the training, we conducted post-tests to determine the participants' levels of awareness after training and to obtain their feedback. All the researchers participated equally in the data collection and data capture phases.

Statistical Data Analysis

After completing the data collection, the data was reviewed, organized, and analyzed using the Statistical Package for the Social Sciences (SPSS) software program. Following the data analysis, general conclusions were drawn, and the discussion was developed.

4. Results

A total of 538 male high school students were enrolled in this research study. The research focused on the participants'

demographics, prior CPR knowledge, post-training survey results, and feedback.

Demographics: The demographic distribution included the type of school, education level, and age (in years) of the male high school students. The majority of the participants were Saudi (90%), while non-Saudis comprised (10%) of the study population. Students from private schools were strongly represented (92%), with a very low percentage (8%), from government schools. The education level distribution was (46%) for High School (HS) 1, 33% for HS2, and 21% for HS3. The range of the participants' age (in years) was 16 (38%), followed by 17 (32%), 18 (20%), 15 (7%), 19 (1%), and 14 (1%), with only 2 (0%) participants aged 20 years. One percent of the data regarding age was not found or not available. Participants mean age was 17 years, as shown in (Table 1).

Table 1: Demographics of the male high school students

Survey variable	Number (N=538)	N (%)
Distribution of students' nationalities		
Saudi	485	90%
Non-Saudi	53	10%
Distribution of students' school types		
Government	45	8%
Private	493	92%
Distribution of students' education levels		
High school 1 (HS1)	248	46%
High school 2 (HS2)	175	33%
High school 3 (HS3)	115	21%
Distribution of students' age in years		
14	3	1%
15	37	7%
16	202	38%
17	173	32%
18	105	20%
19	10	2%
20	2	0%
Not available	6	1%

Prior Knowledge of CPR

Prior knowledge of CPR was defined as where the participant had previously learned or heard about CPR. The majority of the participants had obtained their CPR knowledge from their family, friends, and/or teachers (26%). This was followed by a CPR course (24.3%), the Internet (20.9%), electronic or print media (18.3%), and other sources (10.6%). According to these results, (89%) of the participants had not encountered a medical emergency where CPR was performed by either the participant or someone else, although (11%) had the experience of performing CPR. The majority (56%) of the participants did not have any information about CPR, with the balance (44%) having knowledge of CPR. A significant (87%) of the participants thought CPR courses should be mandatory in the school curriculum, while (13%) did not think they should be included. The level of CPR knowledge as reported by the participants and their perceptions of the sufficiency of their knowledge are presented in (Table 2).

Table 2: Students’ responses to the questionnaire about CPR (N=538)

Variable response	N (%)
Have you encountered a medical emergency where you or someone else had to perform CPR?	
Yes	11%
No	89%
Distribution of students with prior knowledge of CPR	
Yes	44%
No	56%
Percentage of students wanting CPR to be mandatory in schools	
Yes	87%
No	13%
Would you be able to perform CPR with the skills that you learned during an unprecedented medical emergency situation?	
Yes	56%
No	5%
Maybe	39%

Table 3: Students’ responses regarding the effectiveness of the CPR training (N=538)

Variable response	N(%)
Length of course conducted	
Adequate	84%
Inadequate	14%
No response	2%
Instructor rating	
Excellent	90%
Good	7%
Average	2%
Poor	1%
Overall course rating	
Excellent	87%
Good	10%
Average	2%
Poor	1%

Post-training Survey

Before commencing training, the enrolled participants were asked to take a pre-test to determine their prior knowledge of CPR. Although the pre-test percentages were low, the post-test results showed an improvement in the CPR knowledge among the participants. The highest score in the pre-test was 2, and only 24% of the participants obtained this mark. After training, the highest post-test score was 5, which was obtained by 52% of the participants (Figure 1).

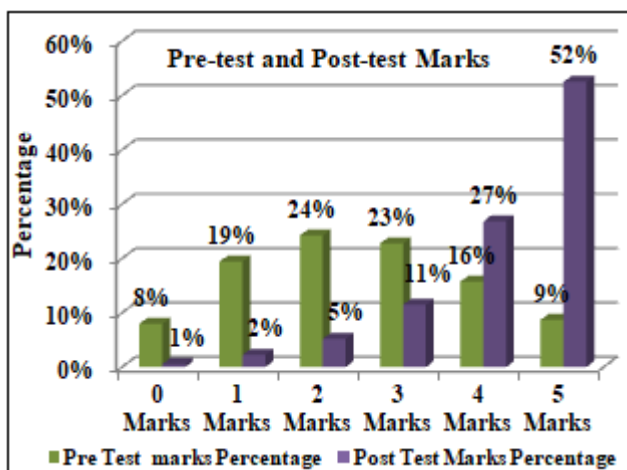


Figure 1: Distribution of the pre-test and post-test marks

Feedback

The participants completed a questionnaire after the completion of the training course. The results showed that (84%) of the participants found the length of course to be adequate, (14%) found it inadequate, and (2%) provided no response. The instructor rating was given as excellent by (90%) of the participants, good by (7%), average by (2%), and poor by (2%). The overall course was rated excellent by (87%) of the participants, while (10%) thought it was good, (2%) average, and (1%) poor as shown in (Table 3).

5. Discussion

The findings of the survey variables, which are represented in this study as tables and graphs, not only provide an understanding of the complexity of the awareness of CPR among male high school students in Riyadh, but also represent the main elements necessary to build an effective system to improve the knowledge and awareness of hands-only CPR in this population. In our study, we found a self-reported lack of awareness of CPR prior to training, with 56% of the participants indicating that they did not have any information about CPR. This is similar to the study by Alanazi et al [11]. In which only 58.1% of the female students and 58% of the male students had proper information about CPR. The finding regarding CPR knowledge prior to training in our study can be attributed to a lack of structured educational and training courses on first aid in schools in the KSA. The school curriculum contains simple instructions on first aid measures, like safety measures at home, but there are no structured courses for CPR for either teachers or students. Every member of a community should have CPR knowledge and practical training, and the best strategy to achieve this goal begins with educating the community's future leaders, in other words, its school students. Once decision-makers agree to adopt this approach, it is expected that students will be positively oriented toward CPR and will have the opportunity to be trained on CPR in well-organized and free short courses during protected times at school. Evidence-based educational pathways with educational goals concerning the study of first aid for each age group are available [12], [13] and may be used to include first aid training in school curricula. Our study showed that students can gain more knowledge and skills and be more confident in performing CPR if they attend CPR courses, even if they are trained by school teachers and not healthcare professionals. In our study, the majority of the students had obtained their prior CPR knowledge from family, friends, and/or teachers, followed by CPR courses, the Internet, electronic or print media, and other sources. However, another local study [14] found that the main sources of information on first aid were TV for 56.4% of the participants, followed by parents (43.4%), books (39.2%), and teachers (33.6%). When compared with the results of our study, this difference may be due to the different settings and populations in the studies.

6. Conclusion

Our study results shown that male high school students in KSA have low awareness and knowledge of CPR, therefore there is an urgent need to address the emerging challenge of OHCA. Most people are unaware of the right way to carry out CPR during an emergency.

7. Future Scope

To mitigate this, hands-only CPR training should be included in the curriculum of schools and colleges with refresher courses on CPR at regular intervals to provide hands-on experience. CPR awareness campaigns and hands-only CPR training should be increased, even at community level. The best strategy to achieve this goal would be to begin educating the community's school students, who are its future leaders, so that students, bystanders, and family members can give immediate medical assistance when emergency CPR is required. Early hands-only CPR provided by trained individuals could play a critical role in saving lives. As this is a small study in a single city, such research studies should be conducted with wider sample size included from other cities.

8. Study Limitation

In the KSA, there is segregation by gender in the school system. This led to the exclusion of female students, which is the only limitation of this research study.

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References

- [1] Hasselqvist-Ax I, Riva G, Herlitz J, et al. Early cardiopulmonary resuscitation in out-of-hospital cardiac arrest. *N Engl J Med* 2015; 372: 2307-2315.
- [2] Kitamura, Tetsuhisa et al. Time-dependent effectiveness of chest compression-only and conventional cardiopulmonary resuscitation for out-of-hospital cardiac arrest of cardiac origin. *Resuscitation*, Volume 82, Issue 1, 3 - 9
- [3] Jabre P, Belpomme V, Azoulay E, et al. Family presence during cardiopulmonary resuscitation. *N Engl J Med* 2013; 368: 1008-1018.
- [4] Drager, KK. Improving patient outcomes with compression-only CPR: will bystander CPR rates improve? *J Emerg Nurs* 2011; 38: 234-238.

- [5] Chen Z, Zhao Y, Lu Z, et al. Awareness and attitudes of Chinese students towards cardiopulmonary resuscitation. *Emerg Med J* 2010; 27: 907-910.
- [6] Al-Turkistani, H. Awareness and knowledge of pediatric cardiopulmonary resuscitation in the community of Al-Khobar city. *J Family Community Med* 2014; 21: 125-129.
- [7] Ng SW, Zaghoul S, Ali HI, Harrison G, Popkin BM. The prevalence and trends of overweight, obesity and nutrition-related non-communicable diseases in the Arabian Gulf states. *Obes Rev* 2011; 12:1-3.
- [8] Alfred N, Ahmed F. Prevalence of cardiovascular disease and associated risk factors among the adult population in the Gulf region: a systematic review. *Advances Public Health* 2015:1-23.
- [9] Bashir SM, Bakarman MA. Are our children in safe hands? Evaluating the preparedness of primary school staff in Jeddah, Saudi Arabia in responding to health-related emergencies. *Life Sci J* 2014; 11:986-989.
- [10] General Authority for Statistics. General Authority for Statistics Website. <https://www.stats.gov.sa/ar/903>
- [11] Alanazi A, Bin-Hotan AM, Alhalyabah H, Alanazi A, Al-oraihi S. Community awareness about cardiopulmonary resuscitation among secondary school students in Riyadh. *World J Med Sci* 2013; 8:186e-189e.
- [12] Cave DM, Aufderheide TP, Beeson J, et al. Importance and implementation of training in cardiopulmonary resuscitation and automated external defibrillation in schools: a science advisory from the American Heart Association. *Circulation* 2011; 123:691-706.
- [13] De Buck E, Van Remoortel H, Dieltjens T, et al. Evidence-based educational pathway for the integration of first aid training in school curricula. *Resuscitation* 2015; 94:8-22.
- [14] Onyiaso AO, Imogie AO. Attitude towards cardiopulmonary resuscitation among some secondary school students in Rivers State, Nigeria. *Br J Educ* 2014; 2:37-43.

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