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Knowledge and attitude of non-healthcare providers towards cardiopulmonary resuscitation in the eastern province of Saudi Arabia

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ABSTRACT

Early cardiopulmonary resuscitation (CPR) in sudden cardiac arrest by bystanders prior to the arrival of emergency medical services can profoundly improve victim's chances of survival if done correctly. Our study sought to evaluate the knowledge around cardiopulmonary resuscitation seen in non-healthcare providers in the Eastern Region, Saudi Arabia. This is a cross-sectional, online-questioner based study conducted between Aug and Sept 2021. The questions explored overall BLS knowledge and previous experiences with cardiac arrests. Our study included 487 participants, 51.3% of the participants had received BLS training, but only 43.1% had adequate BLS knowledge. Regarding the attitude, 11.9% of participants previously witnessed a sudden death, 15% of them performed CPR, and 39.7% told someone to get help. The most common concern preventing percipients from performing CPR was fear of making mistakes (74.7%). Our participants had a better overall BLS knowledge than people in other regions. Notably, 40.9% of our participants incorrectly thought that the compression-to-rescue breath ratio was 5:2, which underlines the need to implement mandatory BLS courses for the general population to maximize survival in out-of-hospital cardiac arrest.

Keywords: CPR, OHCA, BLS, Emergency medicine, public awareness, knowledge, and attitude

1. INTRODUCTION

Hundreds of thousands of people require resuscitation due to sudden cardiac arrest (SCA) annually (Püttgen et al., 2009). Sudden cardiac arrest can be defined as a condition in which the heart's mechanical activity stops (Virani et al., 2021). SCA is mainly caused by cardiac arrhythmias with the most commonly type found among out-of-hospital cardiac arrests (OHCA) being

ventricular fibrillation (VF) (Virani et al., 2021). Annually, there are 420,000 cases of OHCA reported within the United States alone. Additionally, approximately 275,000 cases are reported annually in Europe (Hasselqvist-Ax et al., 2015). The early application of cardio-pulmonary resuscitation (CPR) can have a profound effect on a victim's chances of survival. A study based on the Cardiac Arrest Registry in Sweden found the application of CPR prior to the arrival of emergency medical services (EMS) increased the odds of survival by more than two folds (from 4.0% to 10.5%) (Hasselqvist-Ax et al., 2015).

In most cases of OHCA, the first person to respond is a victim's relative, and 70% to 75% of cases are witnessed by non-healthcare providers (Qara et al., 2019). The United States' annual mortality rate from OHCA is estimated to be 90%, resulting in 356,000 deaths annually (Benjamin et al., 2017). Within central Saudi Arabia, 74% of cardiac arrests affect victims at their homes, which usually do not receive bystander CPR before EMS arrives (Bin Salleeh et al., 2015). Numerous studies have been conducted to assess CPR related knowledge and training among non-healthcare providers. A study done in the region of Jeddah concluded that 28.7% of respondents had received BLS training (Qara et al., 2019).

Furthermore, a study done in Riyadh found that 48.2% of participants expressed that they had undergone BLS training (Alhussein et al., 2021), in comparison to 25.6% in China, 40.3% in Turkey, and 56% in Australia (Chen et al., 2017; Aldhakhri and Can, 2020; Özbilgin et al., 2015; Cartledge et al., 2020). OHCA is also a significant problem in North America and in Europe (Gräsner et al., 2016). Having a good public awareness in the Middle East is needed to increase the knowledge of CPR and how to perform it by providing an accessible high quality CPR course and incorporating CPR material into the educational curriculum which can increase the OHCA survival rate.

2. METHOD AND MATERIAL

This has been a cross sectional study that sought to evaluate the knowledge of cardiopulmonary resuscitation posed by non-healthcare providers in the Eastern region, Saudi Arabia. Ethical approval has been granted from the IRB committee of King Fahad Hospital in Al Hofuf (KFHH RCA NO: 44-EP-2021). The study involved the distribution of questionnaires via digital means between the 1st of August 2021 and the 15th of September 2021 among the residents of the Eastern region of Saudi Arabia. The study's inclusion criteria were being 18 years or older, not being a healthcare provider, and living in the Eastern Province. Naturally, the exclusion criteria consisted of being under the age of 18 years old, are healthcare providers, or are living outside of the Eastern Province.

The questionnaire included a total of 22 questions, which included 4 questions regarding the demographic data of the participants (age, gender, level of education, and occupation), 2 questions about if participants' formal BLS training or lack thereof, 11 questions about general basic life support knowledge (e.g., recognizing the manifestations SCA, proper chest compressions, automated cardiac defibrillators), and 5 questions about the participants' previous experiences and attitude towards cardiopulmonary resuscitation (e.g. witnessing sudden death, concerns about chest compressions). The correct answers were based on the guidelines provided by the American Heart Association from 2020.

The analysis of data was done digitally. Two tailed tests were used for data analysis. P value was statistically significant if it was less than 0.05. Participants with scores more than 60% (≥ 11 points) of the maximum score were considered to have good BLS knowledge and participants with scores less than 60% (≤ 10 points) were considered to have poor BLS knowledge. Descriptive analysis based on frequency and percent distribution was done for all variables including participants' personal data, occupation, level of education, awareness regarding BLS in general, and awareness regarding CPR. Cross tabulation was used to assess the distribution of the knowledge level according to their personal data and practice, and the relations were tested using the Pearson chi-square test and exact probability test for small frequency distributions.

3. RESULTS

The total number of participants fulfilling the inclusion criteria that completed the study questionnaire was 487, of which, 316 (64.9%) respondents were females and 171 respondents were males (35.1%). The participants aged between 18 to 65 years with the mean age being 25.6 ± 11.4 years. Regarding the participants' educational level, 125 participants (25.7%) did not go to university, 162 participants (33.3%) were undergraduates, and 200 participants (41.1%) were university graduates. Considering job titles, 67 (13.8%) were unemployed, 236 (48.5%) were students, and 161 (33.1%) were employed. A total of 250 (51.3%) participants received formal basic life support training, of which, 97 participants (38.8%) were taught at university, 67 participants (26.8%) were taught in a course provided by the ministry of health, 57 participants (22.8%) were taught in schools, 50 participants (20%) were taught in their workplace, and 48 participants (19.2%) learned television, internet, and media (table 1).

Table 1 Biographical data of study participants

| Personal data | No | % |
|--|-----|-------|
| Age in years | | |
| < 25 | 260 | 53.4% |
| 26-35 | 72 | 14.8% |
| 36-45 | 80 | 16.4% |
| > 45 | 75 | 15.4% |
| Gender | | |
| <i>Male</i> | 171 | 35.1% |
| <i>Female</i> | 316 | 64.9% |
| Education | | |
| <i>Below university</i> | 125 | 25.7% |
| <i>Undergraduates</i> | 162 | 33.3% |
| <i>University graduates</i> | 200 | 41.1% |
| Occupation | | |
| <i>Unemployed</i> | 67 | 13.8% |
| <i>Student</i> | 236 | 48.5% |
| <i>Employed</i> | 161 | 33.1% |
| <i>Retired</i> | 23 | 4.7% |
| Have you received any basic life support training? | | |
| <i>Yes</i> | 250 | 51.3% |
| <i>No</i> | 237 | 48.7% |
| If yes, where did you receive the training? | | |
| <i>At school</i> | 57 | 22.8% |
| <i>At university</i> | 97 | 38.8% |
| <i>At a resuscitation society course</i> | 31 | 12.4% |
| <i>At a course given by the trainers of the ministry of health</i> | 67 | 26.8% |
| <i>At a course given in workplace</i> | 50 | 20.0% |
| <i>Television, internet, and media</i> | 48 | 19.2% |

The assessment of the knowledge of cardiac arrest manifestations is presented in table 2. Following those results, it was revealed that 62.6% of participants were aware of the loss of consciousness, 53.8% of participants were aware of the cessation of breathing, and 44.1% of participants were aware of pulselessness. Regarding the methods to detect the consciousness state, 72.5% of the study respondents were aware of the absence of response when called, 55.2% were aware of the absence of response when touched, and 52.8% were aware of the absence of all movement. Regarding the methods of breathing assessment, 70.8% of participants were aware of the absence of respiratory movement, 68.6% of participants were aware of the absence of air movement from the victim’s mouth, and 58.3% of participants were aware of the absence of respiratory sounds. Regarding the methods to detect the absence of circulation, 78.6% of the participants were knowledgeable about the absence of pulse in the vessels of the neck, and 54.8% of the respondents answered incorrectly. Regarding the definition of chest compressions, 76.6% of participants answered with “Applying strong compression to the chest at certain intervals”, 15.4% of participants answered incorrectly, and only 8% of participants answered with “I do not know”.

Table 2 Knowledge of non-healthcare providers regarding BLS in Eastern province, Saudi Arabia

| Knowledge items | No | % |
|--|-----|-------|
| Signs of SCA | | |
| <i>Loss of consciousness</i> | 305 | 62.6% |
| <i>Loss of breathing</i> | 262 | 53.8% |
| <i>Pulselessness</i> | 215 | 44.1% |
| <i>Cyanosis</i> | 175 | 35.9% |
| <i>Nausea</i> | 56 | 11.5% |
| <i>Difficulty in breathing</i> | 254 | 52.2% |
| <i>Chest pain</i> | 304 | 62.4% |
| <i>Faintness of the skin</i> | 183 | 37.6% |
| <i>The individual is not moving</i> | 183 | 37.6% |
| Methods to detect the consciousness state of the individual | | |
| <i>No response when called</i> | 353 | 72.5% |
| <i>No response when touched</i> | 269 | 55.2% |
| <i>Not moving at all</i> | 257 | 52.8% |
| <i>I do not know</i> | 37 | 7.6% |
| Methods to detect the absence of respiration of the individual | | |
| <i>Absence of respiratory movement</i> | 345 | 70.8% |
| <i>Absence of respiratory sound</i> | 284 | 58.3% |
| <i>Absence of air out of the mouth of individual</i> | 334 | 68.6% |
| <i>No steaming up a mirror placed on the mouth of the individual</i> | 150 | 30.8% |
| <i>I do not know</i> | 31 | 6.4% |
| Methods to detect the absence of circulation of the individual | | |
| <i>Not feeling a pulse in the vessels of the neck</i> | 383 | 78.6% |
| <i>Not feeling a pulse in the vessels of the arm</i> | 267 | 54.8% |
| <i>I do not know</i> | 40 | 8.2% |
| What do you think a "chest compression" means? | | |
| <i>To apply strong compression to the chest at certain intervals</i> | 373 | 76.6% |
| <i>To scrub the chest at certain intervals</i> | 21 | 4.3% |
| <i>To scrub the heart directly opening the chest wall</i> | 42 | 8.6% |
| <i>To apply compression directly to the heart opening the chest wall</i> | 12 | 2.5% |
| <i>I do not know</i> | 39 | 8.0% |

The results of the participants' BLS knowledge are presented in Table 3. Regarding knowledge about the compression-to-rescue breath ratio, only 34.9% of the participants answered correctly (30:2), the remaining 64.3% answered incorrectly. Regarding the best

site for chest compressions, 54.4% of the participants answered correctly (middle part of chest), the remaining 45.5% answered incorrectly. Regarding the correct rate of chest compressions, only 31.2% of participants answered correctly (at least 100 compressions/minute), 34.9% of participants answered incorrectly, and 33.9% of participants answered with “I don’t know”. Regarding the force of the compressions, 47.6% of participants answered correctly (moderate force, such that the rib cage moves down 5 cm to 6 cm) and 52.4% of participants answered incorrectly. With regards to knowledge about defibrillators, 80.5% of participants correctly identified them as devices used to restart a heart that stopped working.

The overall Knowledge of participants about cardiopulmonary resuscitation is presented in Figure 1. 210 (43.1%) participants had good knowledge regarding basic life support and CPR technique while 277 (56.9%) had poor knowledge.

Table 3 Knowledge of non-healthcare providers towards cardiopulmonary resuscitation in Eastern province, Saudi Arabia

| Knowledge items, continued | No | % |
|--|-----|-------|
| What is the proper rate of chest compression /rescue breath ratio during compression? | | |
| 30:2 | 170 | 34.9% |
| 5:1 | 1 | .2% |
| 15:2 | 69 | 14.2% |
| 5:2 | 199 | 40.9% |
| Others | 48 | 9.9% |
| Best site for chest compression | | |
| <i>Middle part of chest</i> | 265 | 54.4% |
| <i>Upper part of chest</i> | 67 | 13.8% |
| <i>Lower part of chest</i> | 79 | 16.2% |
| <i>Left part of chest</i> | 71 | 14.6% |
| <i>I do not know</i> | 5 | 1.0% |
| What must be the rate of the chest compression? | | |
| <i>At least 100 times per minute</i> | 152 | 31.2% |
| <i>At least 150 times per minute</i> | 62 | 12.7% |
| <i>At least 50 time per minute</i> | 108 | 22.2% |
| <i>I do not know</i> | 165 | 33.9% |
| How much force must be applied during heart compression? | | |
| <i>Moderate force, such that the rib cage moves down 5 to 6 cm</i> | 232 | 47.6% |
| <i>Enough that the rib cage moves down 1 to 2 cm</i> | 190 | 39.0% |
| <i>High force, such that the rib cage moves down 6 to 10 cm</i> | 12 | 2.5% |
| <i>As much force as possible</i> | 53 | 10.9% |
| What do you know about the defibrillator that us used during chest compression when necessary? | | |
| <i>A device to restart a heart the stopped working</i> | 392 | 80.5% |
| <i>It is a device supporting respiration</i> | 14 | 2.9% |
| <i>I have heard of it before but never seen it</i> | 48 | 9.9% |
| <i>I have never heard of it</i> | 33 | 6.8% |



Figure 1 Overall Knowledge of participants towards cardiopulmonary resuscitation as assessed by the knowledge part of the survey.

Attitude towards cardiopulmonary resuscitation of participants are presented in Table 4. Most participants of this study (88.1%) did not witness any sudden cardiac deaths and only 11.9% have witnessed such events. Regarding the most reported actions among those who have witnessed such events were the following: telling somebody to call for help (39.7%), calling an ambulance (37.9%), began to give chest compressions (25.9%), called for help by telephone (22.4%), and starting CPR was reported by 15.5% of the participants. As for actions that should be done in case of facing someone who had fainted, 51.3% reported they would begin to give chest compression, and 29.2% would call an ambulance. Regarding concerns that prevented participants from giving chest compressions, the most reported concerns were fear of making mistakes (74.7%), fear of causing bone fractures (30.4%), fear of causing harm to organs (24%), and fear of legal punishment (17.7%). When asking for actions that can be applied when confronting a person who sustained a sudden cardiac arrest, 39.6% reported they can both ventilate and give chest compressions, 18.3% reported that they can give chest compression only, 10.9% can open the airway, and 7.4% can give rescue breaths. A considerable percentage of participants (23.4%) did not know what actions should be taken in cases of SCA.

Table 4 Attitude towards CPR in the Eastern province, Saudi Arabia

| Practice & attitude items | No | % |
|--|-----|-------|
| Have you ever witnessed a sudden death? | | |
| <i>No</i> | 429 | 88.1% |
| <i>Somebody from my family</i> | 29 | 6.0% |
| <i>Somebody from my friends or relatives</i> | 6 | 1.2% |
| <i>A stranger</i> | 23 | 4.7% |
| If you have witnessed such an event, what did you do in the situation? | | |
| <i>I told somebody to call for help</i> | 23 | 39.7% |
| <i>I called an ambulance</i> | 22 | 37.9% |
| <i>I began to give chest compressions</i> | 15 | 25.9% |
| <i>I called for help by telephone</i> | 13 | 22.4% |
| <i>I gave CPR</i> | 9 | 15.5% |

| | | |
|--|-----|-------|
| <i>I just watched and left</i> | 9 | 15.5% |
| <i>I gave rescue breathes</i> | 8 | 13.8% |
| If somebody fainted (sudden death) what would you do? | | |
| <i>I would begin to give chest compression</i> | 250 | 51.3% |
| <i>I would call an ambulance</i> | 142 | 29.2% |
| <i>I would call somebody or call for help</i> | 86 | 17.7% |
| <i>I would just watch and leave</i> | 9 | 1.8% |
| What concerns may prevent you from giving chest compression? | | |
| <i>Making a mistake</i> | 364 | 74.7% |
| <i>Causing bone fractures</i> | 148 | 30.4% |
| <i>Causing harm to organs</i> | 117 | 24.0% |
| <i>Punishment due to legal reasons</i> | 86 | 17.7% |
| <i>Stopping a working heart</i> | 79 | 16.2% |
| <i>Others</i> | 69 | 14.2% |
| <i>Contracting a contagious disease</i> | 60 | 12.3% |
| <i>Contamination by blood or vomiting</i> | 30 | 6.2% |
| If you are confronted with a person who collapsed with is without a pulse, which of the basic life support applications can you apply? | | |
| <i>I can both ventilate and give chest compression</i> | 193 | 39.6% |
| <i>I can give chest compression</i> | 89 | 18.3% |
| <i>I can open the airway</i> | 53 | 10.9% |
| <i>I can ventilate/conduct mouth to mouth ventilation</i> | 36 | 7.4% |
| <i>I can control respiration</i> | 2 | .4% |
| <i>I do not know</i> | 114 | 23.4% |

Distribution of awareness regarding basic life support based on personal data can be seen in Table 5. Good awareness level was significantly higher among young participants (< 25 years) compared to old age participants (>45) (56.5% vs. 22.7%; respectively). Also, we found that male participants had a higher knowledge level compared to female participants (56.1% vs 36.1% respectively) with recorded statistical significance (P=.001). Regarding the educational level, 53.7% of university students had good knowledge regarding BLS compared to 35.2% of low education participants (P=.003). Good awareness was seen among 62% of participants who received basic life support training compared to 23.2% of the participants who did not (P=.001).

Table 5 Distribution of awareness regarding basic life support based on personal data

| Factors | Knowledge level | | | | p-value |
|--------------|-----------------|-------|------|-------|---------|
| | Poor | | Good | | |
| | No | % | No | % | |
| Age in years | | | | | |
| < 25 | 113 | 43.5% | 147 | 56.5% | .001* |
| 26-35 | 46 | 63.9% | 26 | 36.1% | |

| | | | | | |
|---|-----|-------|-----|-------|--------|
| 36-45 | 60 | 75.0% | 20 | 25.0% | |
| > 45 | 58 | 77.3% | 17 | 22.7% | |
| <hr/> | | | | | |
| Gender | | | | | |
| Male | 75 | 43.9% | 96 | 56.1% | .001* |
| Female | 202 | 63.9% | 114 | 36.1% | |
| <hr/> | | | | | |
| Education | | | | | |
| Below university | 81 | 64.8% | 44 | 35.2% | .003* |
| University student | 75 | 46.3% | 87 | 53.7% | |
| University graduated | 121 | 60.5% | 79 | 39.5% | |
| <hr/> | | | | | |
| Job title | | | | | |
| Not working | 51 | 76.1% | 16 | 23.9% | .001* |
| Non-health care student | 112 | 47.5% | 124 | 52.5% | |
| Non-health care provider | 94 | 58.4% | 67 | 41.6% | |
| Retired | 20 | 87.0% | 3 | 13.0% | |
| <hr/> | | | | | |
| Have you received any basic life support training? | | | | | |
| Yes | 95 | 38.0% | 155 | 62.0% | .001* |
| No | 182 | 76.8% | 55 | 23.2% | |
| <hr/> | | | | | |
| Have you previously witnessed a case of sudden death? | | | | | |
| None | 247 | 57.6% | 182 | 42.4% | .093** |
| Somebody from my family | 17 | 58.6% | 12 | 41.4% | |
| Somebody from my friends or relatives | 5 | 83.3% | 1 | 16.7% | |
| A stranger | 8 | 34.8% | 15 | 65.2% | |

P: Pearson X² test * P < 0.05 (significant) **: Exact probability test

4. DISCUSSION

The early application of cardiopulmonary resuscitation can have a profound effect on a victim’s chances of survival. Because the first bystander to arrive at an OCHA scene is usually a non-healthcare provider, we believe it is imperative to assess the level of BLS knowledge among the general community to understand how public education should be approached. This study included a total of 487 participants with a female predominance (64.9%) and most participants were under the age of 25 years (53.4%). Our study showed that 51.3% of all participants have received BLS training, which is at the upper end of the spectrum when compared to various studies conducted in Riyadh by Alhussein et al., (2021), in Jeddah by Qara et al., (2019), in Jazan by Ahmad et al., (2020), in Oman by Aldhakhri et al., (2020), in Turkey by Özbilgin et al., (2015), in Australia by Cartledge et al., (2020), and in China by Chen et al., (2017), in which the percentage of the study’s participants who underwent formal BLS training were 48.2%, 28%, 20%, 29.1%, 40.3%, 56%, and 25.6% respectively. Unfortunately, formal BLS training is only mandatory for health care providers in Saudi Arabia, while in certain countries like turkey, BLS training is mandatory for employment in some jobs or before obtaining a driver’s license. This study excluded healthcare providers, which is also the case in the previously mentioned study by Alhussein et al., (2021) conducted in Riyadh. On the contrary, the other studies included all participants without exclusion of health care providers. Most participants with formal BLS training (38.8%) have received their training at universities and only 19.2% of participants with formal BLS training have received their training from television, the internet, and media.

The participants showed some basic awareness of the signs of SCA, as the five most chosen signs were loss of consciousness (62.6%), chest pain (62.4%), loss of breathing (53.8%), difficulty breathing (52.2%), and pulselessness (44.1%). Those findings were similar to the findings of studies conducted in Riyadh and Turkey, in which they found the most chosen signs to be pulselessness (51.8% and 60.7% respectively), absence of breathing (48.1% and 49.3% respectively), and loss of consciousness (44.9% and 40.7%

respectively) (Alhussein et al., 2021; Özbilgin et al., 2015). Overall, participants in our study showed adequate knowledge in the assessment of the level of consciousness, breathing, and pulselessness, which was similar to a study conducted in Jeddah which showed that participants who had undergone CPR training can properly assess the consciousness level, breathing, and circulation (Qara et al., 2019). Most participants in our study have correctly identified the meaning of chest compressions (76.6%), which was higher than what was found in a study conducted in Jeddah (58.2%) (Qara et al., 2019).

In our study, 18.3% of all participants know how to give chest compressions alone and 39.6% know how to give both chest compressions along with rescue breathes. This was more than a study by Qara et al., (2019) in Jeddah, in which, 11.7% of participants stated they knew how to give chest compression alone, and 29.5% of participants could give both chest compression and rescue breathes, which was similar to the Turkish study and the Slovenian study, in which the percentages of participants who claimed to know how to give both chest compressions along with rescue breaths were 28.7% and 38% respectively (Özbilgin et al., 2015; Rajapakse et al., 2010).

The percentages of our study's participants who successfully identified the correct compression to rescue breath ratio, location, rate, and force of compressions were 34.9%, 54.4%, 31.2%, and 47.6% respectively. On the contrary, the study done in Jeddah showed that a smaller percentage of participants were aware of the correct compression to rescue breath ratio, location, rate, and force of compressions, which were 11.5%, 55.5%, 11.8%, and 44.5% respectively. This was also the case in two studies done in Turkey (Özbilgin et al., 2015) and Slovenia (Rajapakse et al., 2010). While it may seem that participants of our study had a better overall BLS knowledge than other regions, it is worth mentioning that most participants of our study (40.9%) incorrectly answered that the compression to rescue breath ratio was 5:2, which underlines the urgent need to implement mandatory BLS courses to the general populous to maximize survival in out of hospital sudden cardiac arrests.

Our study showed that 11.9% of our participants previously witnessed a sudden cardiac arrest, and most of them witnessed the sudden death of a family member. Unfortunately, only 15.5% of participants who encountered those cardiac arrests applied CPR, 25.9% gave chest compressions alone, and most of those participants (39.7%) decided to call for help only. The findings of our study are not dissimilar from the two studies done in Jeddah and Turkey, where 15.8% and 18.6% of participants encountered a sudden death, respectively (Qara et al., 2019; Özbilgin et al., 2015). Likewise, only 22.1% and 22% of participants in those studies applied CPR, respectively. However, a disparity exists in the literature regarding how many participants were willing to apply CPR to a person with a sudden cardiac arrest. A study done in Japan found that while 19% of participants encountered a sudden death, only 4% applied CPR (Taniguchi et al., 2012).

Regarding the reasons and fears that prevented participants from applying CPR, the most reported reason by our participants (74.7%) was "fear of making mistakes", which is matching to what was reported in the Jeddah study (62%) (Qara et al., 2019). In contrast, the most reported reason in the Japanese study was fear of disease transmission (63%) (Taniguchi et al., 2012).

A limitation of our study is that participants were answering survey questions regarding what they would do in the scene of an out-of-hospital cardiac arrest, which may differ from what they would actually do in those cases because the majority of them have not encountered one before. Another limitation of the study is that data only collected from participants in the Eastern Province in Saudi Arabia, thus may not be used to assume the knowledge level in the remainder of the provinces.

5. CONCLUSION

The level of BLS knowledge demonstrated by the participants is slightly better than what is found in other regions in Saudi Arabia, in addition to being on the higher end when compared to other countries. However, more than half of this study's participants possessed poor knowledge about BLS and CPR, which suggests that if OHCA happens with only one observer, the observer is likely to apply CPR incorrectly which may severely affect the victim's chances of survival. We recommend that more efforts are put into launching campaigns regarding public BLS awareness and making it mandatory to complete an official BLS training program to be eligible for certain governmental services, such as obtaining a driver's license.

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Authors' contributions

Conceptualization: Omar Aldamigh, Zainab Alarab, Fahad Al-Mulhim, Hussain Al Hassan.

Methodology: Ali Alkhalifah, Hussain Al Hassan, Omar Aldamigh, Ali Al Nasser.

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Data analysis: Fahad Al-Mulhim, Ali Al Nasser, Omar Aldamigh, Hussain Al Hassan.

Manuscript and review: Fahad Al-Mulhim, Ali Al Nasser

Supervision: Nasser Almulhim

Ethical approval

Ethical approval was obtained from the IRB committee in King Fahad Hospital in Al Hofuf (KFHH RCA NO: 44-EP-2021).

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Conflicts of interest

The authors declare that there are no conflicts of interests.

Data and materials availability

All data associated with this study are present in the paper.

REFERENCES AND NOTES

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