### **Original Research Article**

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# Public knowledge and attitude toward basic life support in Jeddah, Saudi Arabia

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#### **ABSTRACT**

**Background:** Basic life support (BLS) is an integral component of initial resuscitative care during critical situations like sudden cardiac arrest, stroke, and airway obstruction. Tragic consequences of such life-threatening emergencies can be prevented with adequate knowledge and training on BLS principles. This study sought to assess the current status of public knowledge and attitude towards BLS in Jeddah, Saudi Arabia.

**Methods:** Using a descriptive cross-sectional design, a study was conducted amongst residents of Jeddah, during July 2020. Participants were asked to fill a validated online questionnaire consisting of 9 demographic items, and 23 items determining attitude and general knowledge on BLS and cardiopulmonary resuscitation (CPR).

**Results:** A total of 740 participants completed the questionnaire, with the majority being between 18 to 39 years old. Overall, the study findings show inadequate levels of BLS knowledge, with a mean knowledge score of 5.3 (SD $\pm 2.8$ ) out of 15. The highest rates of correct responses were observed in the question concerning the recognition of the national emergency contact number (72.3%). Participants who had previously received BLS training had significantly higher knowledge scores (p<0.001), as well as those who took BLS courses within one year or less (p<0.001), and those who previously witnessed CPR (p<0.001).

**Conclusions:** In general, knowledge about BLS among the participants was very limited, yet a positive attitude towards BLS training was observed. Therefore, a nation-wide effort is advised to enhance the public exposure on BLS.

Keywords: Attitude, Basic life support, Jeddah, Knowledge, Saudi Arabia

#### **INTRODUCTION**

Sudden cardiac death (SCD) defines as an unexpected cardiac arrest that follows a sudden loss of heart function within the same hour of onset of acute symptoms.<sup>1</sup> According to the previous literature, more than 3 million patients around the world die annually. Hence, it

represents around (15%) of the global mortality in individuals with pre-existing cardiovascular diseases.<sup>2-4</sup>

Basic life support (BLS) is an essential part of emergency resuscitative care that saves people's lives from signs of sudden cardiac arrest, heart attack, stroke, and foreign body airway obstruction, which aims to retain sufficient

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ventilation and circulation.<sup>5,6</sup> The chance of survival will increase approximately two-folds if BLS is performed by the first person to intervene and use the automated external defibrillators (AED).<sup>7</sup> The lack of training and incapacity to address these emergencies may have tragic and legal consequences that can be prevented with simple maneuvers and skills.<sup>8</sup>

According to several studies conducted in different countries around the world, most of those who witnessed Out-of-Hospital Cardiac Arrest (OHCA) are non-healthcare providers who did not perform CPR in response to the situation due to the lack of sufficient theoretical understanding on acting in such critical cases. 9-12

Subki et al conducted a cross-sectional study in 2018 investigating public awareness toward BLS and found that the knowledge was below average in the Jeddah population. More public exposure to BLS education through awareness-raising and training programs is needed.8 Another cross-sectional study was done in Al-Qassim City, Saudi Arabia, among secondary school teachers, it revealed that almost half of them scored less than 50%.13 While another local study took place at King Saud University in Riyadh resulted in lacking BLS awareness among students, however, positive attitudes were preserved.<sup>5</sup> In the eastern area of the kingdom, a cross-sectional study took place in Al-Khobar city revealed that inadequate knowledge and awareness regarding CPR were highly noted among the young and educated population.<sup>14</sup> Locally, in the Kingdom of Saudi Arabia (KSA), current studies suggest that citizens have inadequate levels of BLS knowledge and attitude. 5,8,13,14

Up to our knowledge, the available data mostly focuses on health care providers knowledge towered BLS especially in the western area. There is a single study conducted in Jeddah and aimed to assess the BLS knowledge among Saudi population and identify the factors affected the level of BLS knowledge, however, the attitude was not assessed. Therefore, the following research question was raised.

In this study, we aimed to assess the public knowledge and attitude toward basic life support (BLS) in Jeddah, Saudi Arabia, and correlate the theoretical understanding to prior BLS training and real-life exposure.

#### **METHODS**

An analytic cross-sectional study took place in Jeddah City, Saudi Arabia, from July to August 2020 and targeted the general population and their correlation with knowledge and attitude toward BLS representing in bar and pie charts. The study was approved by Dr. Soliman Fakeeh Hospital Scientific Research Review Committee (DSFH IRB). Participants who lived outside Jeddah, less than 18 years old and non-Arabic speakers were excluded. The estimated sample size is 384 participants,

calculated by using Raosoft.<sup>15</sup> A total of 740 questionnaires were returned out of 874 distributed to the general population. A validated online, multiple-choice questionnaire composed of 32 questions was used from a study conducted in Palestine in 2017.<sup>16</sup> The questionnaire is composed of 3 major sections, the first nine questions included demographic data: age, gender, education level, living in Jeddah, source of information and previous BLS training. The second section contained 8 questions related to determine BLS attitude and the last section contained 15 questions regarding BLS knowledge, and every correct answer has one point and the total marks out of fifteen were computed automatically. The result and the correct answers will appear immediately after submission. The survey was translated into Arabic and subjected to a process of forward and backward translation. At the beginning of the survey, a consent statement was added to inform the respondents. It also assured that the information obtained will be treated confidentially and anonymously.

Data entry was performed by Microsoft Excel 2010. Statistical Package for the Social Sciences (SPSS) software, version 25, was used for analysis. A p value of < 0.05 was considered statistically significant, and 95% confidence interval. Demographic and attitude-based data were analyzed by frequencies and chi-square. Independent t-test and one-way ANOVA were used to assess correlation between socio-demographic data and the participant's knowledge of BLS. In addition, they were used to determine whether participants with either previous resuscitation experiences or previous CPR had higher scores than those without experience or training, Also, the level of knowledge between medical and nonmedical population who take BLS courses during a certain period of time.

#### **RESULTS**

In this study, we aimed to assess the knowledge and attitude among the public towards BLS in Jeddah, Saudi Arabia.

The response rate was not possible to be determined due to the online nature of the questionnaire, where those who did not want to participate could simply discard the link. A total of 740 questionnaires were returned out of 874 distributed to the general population. The majority of the sample were female representing (83.8%) of the total responses. Our participants' BLS online exam scores ranged from 0 to 15, with a mean of 5.3 (SD±2.8). More than two-thirds of participants (67.6%) of the sample were between 18 to 39 years of age. Regarding the educational levels, college or high education represents (79.5%). Data suggested that the key sources of information on BLS was the internet and social media marked by more than half of the percent (52.2%). Only (32.8%) of the participants take BLS training as shown in (Table 1).

#### Attitude toward BLS

Data showed that (32.4%) of participants reported not knowing where to take BLS training, and it was the main factor affecting the practice of CPR and the main factor that led to insufficient knowledge of BLS was being busy in job/study (37%).

The main reason for reluctance was the fear of causing further harm to the patient (47.2%). CPR training must be mandatory, whether in all workplaces or at schools according to the majority of participants (92%). The current study reports that around (43.8%) of respondents were hesitant to perform mouth to mouth ventilation as shown in (Table 2).

Table 1: The general population socio-demographic characteristics in Jeddah, Saudi Arabia.

Characteristic	(N) %
Age group	
Less than 18 years old	(52) 7
Between 18 to 39 years old	(500) 67.6
Between 40 to 59 years old	(169) 22.8
60 years old and above	(19) 2.6
Gender	
Male	(120) 16.2
Female	(620) 83.8
Level of education	
High school or less	(152) 20.5
Collage or high education	(588) 79.5
Sources of information about CPR	
School/ University/ workplace	(212) 28.6
TV	(98) 13.2
Internet and social media	(386) 52.2
Brochures	(44) 5.9
Previous BLS training	
Yes	(243) 32.8
No	(497) 67.2
Last BLS training / 268	
1 year and less	(118) 44
2 years	(66) 24.6
3 years and more	(84) 31.3
Medical field	
Yes	(164) 22.2
No	(576) 77.8

Table 2: Training status among general population in Jeddah, Saudi Arabia.

Items	(N) %
If you had no previous CPR training, what was the reason?	·
Lack of time	(150) 20.3
Limited interest	(81) 10.9
Do not know where to follow training	(240) 32.4
Costs	(53) 7.2
Not applicable	(216) 29.2
Reasons for reluctance?	
Fear of causing further harm to patient	(349) 47.2
Fear of acquiring infection	(33) 4.5
Fear of taking responsibilities	(256) 34.6
Not confident	(102) 13.8
The reason for lack of knowledge about BLS?	
Busy in job/ studying	(274) 37
Lack of interest	(80) 10.8
No professional training available	(198) 26.8

Continued.

Items	(N) %
Medical emergencies are not commonly happened	(83) 11.2
I have enough knowledge	(105) 14.2
Who should be trained in BLS?	
ER Health personnel	(17) 2.3
All health personnel	(70) 9.5
General people	(653) 88.2
Do you think CPR training should be mandatory?	
Yes, at school, collages and all workplaces	(681) 92
No, CPR training should be optional	(59) 8
Have you ever attended a workshop on BLS?	
Yes	(271) 36.6
No	(469) 63.4
Would you perform mouth to mouth ventilation for persons even if who is male or female?	
Yes	(200) 27
No	(216) 29.2
Hesitant	(324) 43.8
Emergency training should be required in all work preparation programs	
Agree	(690) 93.2
Natural	(23) 3.1
Disagree	(27) 3.6

Table 3: Knowledge and skills assessment regarding BLS and CPR among the general population in Jeddah, Saudi Arabia.

General idea of items	Correct answers (N) %	Incorrect answers (N) %	Don't know answers (N) %
Recognized cardiac arrest	(103) 13.9	(571) 77.2	(66) 8.9
Someone collapsed what next	(246) 33.2	(379) 51.2	(115) 15.5
Ratio of chest compression and ventilation	(201) 27.2	(237) 32	(302) 40.8
Chain survival of BLS	(347) 46.9	(176) 23.8	(217) 29.3
Checking for responsive what next	(442) 59.7	(225) 30.4	(73) 9.9
Location for checking pulse	(427) 57.7	(197) 26.6	(116) 15.7
Location of hands for CPR	(440) 59.5	(137) 18.5	(163) 22
Giving breathing in infant	(135) 18.2	(290) 39.2	(315) 42.6
Depth of chest compression in adult	(145) 19.6	(180) 24.3	(415) 56.1
Depth of chest compression in children	(59) 8	(243) 32.8	(438) 59.2
Depth of chest compression in infant	(55) 7.4	(223) 30.2	(462) 62.4
Rate of chest compression	(149) 20.1	(216) 29.2	(375) 50.7
Number of emergency service	(535) 72.3	(115) 15.5	(90) 12.2
Choking in pregnant lady	(315) 44.1	(241) 30.1	(184) 25.8
Location for abdominal thrust during choking	(327) 44.2	(178) 24	(235) 31.8

#### BLS knowledge

In general, performance on the BLS knowledge and skills assessment was low in our population, with a mean score of 5.31 (SD±2.84) out of 15.

Question with the highest percentage of correct responses was the emergency phone number (72.3%). On the other hand, the question with the highest percentage of incorrect responses was the clinical features of a cardiac arrest victim (77.2%). The most question that people had no idea about it answered "I don't know" where the depth

of chest compression in infants (62.4%) as shown in (Table 3).

## Analysis of knowledge by socio-demographic characteristics of respondents

To examine the impact of taking prior BLS training, the mean knowledge scores were compared between those who received previous training and those who did not. Results revealed a significant association between the two groups (p<0.001), as those who received previous training showed a higher rate of knowing the correct answers. Moreover, a significant difference was detected in the

mean score based on since when the participant took the course (p<0.004).

Table 4: Effect of training and experience on knowledge and skills assessment among the general population in Jeddah, Saudi Arabia.

Variable	Group (n) %	Mean (SD)	P value
Previous	Yes (243) 32.8	7.0 (2.8)	
training in CPR	No (497) 67.2	4.5 (2.5)	0.001
Observed	Yes (335) 45.3	5.8 (2.9)	
CPR performance	No (405) 54.7	4.9 (2.8)	0.001
Medical field	Yes (164) 22.2	7.4 (2.8)	
Wieurcai field	No (576) 77.8	4.7 (2.5)	0.001
Last BLS	1 year and less (41) 35	6.3 (2.9)	
training and	2 years (21) 17.9	5.5 (2.3)	
non-medical Total: 117	3 years and more (55) 47	5.8 (2.3)	
Last BLS	1 year and less (61) 50.4	9.1 (2.6)	0.004
training and medical	2 years (37) 30.6	7.6 (2.5)	
Total: 121	3 years and more (23)	6.8 (1.7)	
C	School/ university/ workplace (212) 28.6	6.9 (2.8)	
Source of information	TV (98) 13.2%	4.6 (3.1)	
about CPR	Internet and social media (386) 52.2	4.6 (2.3)	0.001
	Brochures (44) 5.9	5.7 (3.3)	
Level of education	High school or less (152)	4.9 (3.2)	0.049
	Collage or high education (588)	5.4 (2.7)	0.049

Also, there were a significant difference in the mean score between those who had observed CPR and those who did not (p<0.001). Participants in medical and non-medical fields who took BLS courses within 1 year or less scored higher than those who took the courses within 2 or 3 years with mean score of  $9.1\pm2.5$  and  $6.32\pm2.8$ , respectively which resulted in a (p<0.001). The relation between the source of information and level of education with the knowledge were also significant with a (p<0.001) and (p<0.049), respectively as shown in (Table 4).

Table 5: Effect of mouth-to-mouth ventilation and gender among the general population in Jeddah, Saudi Arabia.

Gender	Yes N (%)	No N (%)	Hesitant
Male	49 (24.5)	26 (12)	45 (37.5)
Female	151 (75.5)	190 (88)	279 (86.1)

The results revealed a significant difference between males and females regarding the likelihood of giving rescue breaths to someone of the opposite gender (p<0.001). Overall, females were less likely to give mouth to mouth ventilations by (88%) to someone of an opposite gender compared to males as shown in (Table 5). Another significant relation was seen between age group and the reason for the absence of CPR training (p<0.004) as (64.2%) aged between 18-39 years old did not know where to find professional training as shown in (Table 6). While Table 7 shows an association between the reason for lack of BLS knowledge and age group with (p<0.001) as (73%) of participant aged 18-39 were busy in jobs or study.

Table 6: Effect of the reason of no BLS training and age group among the general population in Jeddah, Saudi Arabia.

Age group	Lack of time N (%)	Limited interest N (%)	Do not know about training centers N (%)	Costs N (%)	Not applicable N (%)
<18 years	8 (5.3)	8 (9.9)	22 (9.2)	4 (7.5)	10 (4.6)
18-39 years	92 (61.3)	44 (54.3)	154 (64.2)	40 (75.5)	170 (78.7)
40 -59 years	44 (29.3)	27 (33.3)	58 (24.2)	8 (15.1)	32 (14.8)
60 years and more	6 (4)	2 (2.5)	6 (2.5)	1 (1.9)	4 (1.9)

Table 7: Effect of the reason of decreased BLS knowledge and age group among the general population in Jeddah, Saudi Arabia.

Age group	Busy in job N (%)	Lack of interest N (%)	No professional training centers N (%)	Medical emergencies are not commonly happened N (%)	I have enough knowledge N (%)
<18 years	21 (7.7)	11 (13.8)	13 (6.6)	5 (6)	2 (1.9)
18-39 years	200 (73)	45 (56.3)	120 (60.6)	50 (60.2)	85 (81)
40 -59 years	51 (16.6)	18 (22.5)	60 (30.3)	24 (28.9)	16 (15.2)
60 years and more	2 (0.7)	6 (7.5)	5 (2.5)	4 (4.8)	2 (1.9)

Table 8: Effect the reason of decreased BLS knowledge and level of education among the general population in Jeddah, Saudi Arabia.

Age group	Busy in job N (%)		No professional training centers N (%)	Medical emergencies are not commonly happened N (%)	I have enough knowledge N (%)
High school or less	56 (20.4)	28 (35)	46 (23.2)	15 (18.1)	7 (6.7)
Collage or high education	218 (79.6)	80 (65)	152 (76.8)	68 (81.9)	98 (93.3)

The relation between level of education and the reason for lack of BLS knowledge with (p<0.001). Busy in work/study was the most reason (79.6%) for collage or high education as shown in (Table 8).

#### **DISCUSSION**

This study aimed to assess the knowledge and attitude among the public towards BLS in Jeddah, Saudi Arabia. Our findings reveal a considerable number of inadequate levels of knowledge in regard to basic BLS principles and skills amongst our population. Similar observations were reported elsewhere, emphasizing the poor knowledge levels amongst participants. 8,9,11,12,14,17-19

More than half of population reported the internet and social media as key sources of BLS information, which is a great chance to raise awareness through realistic techniques (e.g., video-assisted instruction) via CPR training organizations

On the other hand, more than a quarter of teachers in Hebron, Palestine, considered television the fundamental source as the majority of them aged from 30-39. <sup>16</sup> Unlike our study, (67.6%) aged from 18-39 which explained by more time consumption in social media and internet is high among younger population. Although, the data showed that the main reasons affecting the practice of CPR were "do not know where to follow training" which is similar to a study in India stated that the participants reported a lack of comprehension about how and where to obtain such training, among the reasons they did not take up BLS training. <sup>20</sup> The other reason was "lack of time" and that attributed it to being busy either in work or studying which was consistent with a similar studies in Riyadh and Al-Qassim, Saudi Arabia. <sup>5,13</sup>

It is noteworthy that only (20.1%) of the participants knew the correct rate of chest compressions, and even fewer of them were able to identify the recommended chest compression depth for adults (19.6%), children (8%) and infants (7.4%). These findings are particularly alarming, considering the simple steps yet crucial value of chest compression skills in determining the outcome of a cardiac arrest victim.<sup>21</sup> The significant lack of knowledge in the basics of dealing with cardiac arrest could be attributed to a lack of educational content about BLS skills and principles in school and university curricula in Saudi Arabia, contrarily to other countries like Japan and

Norway.<sup>22,23</sup> These significantly contrasting findings can be attributed to the fact that, unlike in Saudi Arabia, BLS courses are a compulsory requirement before getting a driver's license and before enrolment in certain jobs in some countries.<sup>10,12,24</sup> In general, BLS courses are not mandatory unless for hospitals and health related studies or jobs. This study results suggest that more focus is needed on providing education and training programs for the community in Saudi Arabia.

Only 117 (15.81%) of non-medical participants took previous training courses in CPR. However, previous studies suggest higher rates of CPR training amongst the public populations of Hong Kong (21%), New Zealand (27%), and Ireland (28%). Rates were much higher in Poland (75%), the US (79%), Slovenia (69.4%), Japan (65%), and Australia (64%). 10,18,19,24-28 The most common reason for reluctance to performing CPR was reported to be the fear of causing further harm/injury to the cardiac arrest patient (47.2%). Comparable results were observed in another study conducted in Jeddah, Jordan, and Turkey. 9,11,12 On the other hand, two studies based in Japan found that the lack of sufficient knowledge, fear of inadequate performance (70%), and scare of the transmission of disease (63%) were the most common causes.<sup>22,29</sup> Responding to a patient of a different gender by giving mouth-to-mouth ventilations held significantly different response rates between males and females of our population. Results showed that males were more willing than females to perform rescue breaths to someone of the opposite gender. Comparable findings were observed in a study in Palestine, which may be attributed to the similar cultural and religious backgrounds of these countries.<sup>16</sup> Previous studies indicated that rescue ventilations were not a necessity during the first 5 minutes of adult CPR. Therefore, these observations suggest that those who are unwilling to provide mouth-to-mouth breathing should be encouraged to perform chest compressions.<sup>30,31</sup> Although a previous study was done locally in Al-Khobar, more than half of the participants reported unawareness of the local EMS number.<sup>32</sup> Our study showed that only (15.5%) are unaware of the national emergency contact number. A study was done in Slovenia also showed a significantly higher percentage of those who were not aware of the EMS number (40%), whereas other studies around the world report lower (2-11%) percentages. 24,33,34

Regarding the scores, in this study, those who had previous training had higher scores than those without

training when comparing it to a study that was done in Al-Qassim, Saudi Arabia, it showed that those with training did not have higher scores than those without training. The reason for that is almost half of the sample had their training within two years or more, unlike our study, the majority of people who had previous training was within one year or less.13 Our study medical field or healthcare providers' findings are in line with similar studies showing that the scores deteriorate after 3-6 months post-BLS course.35,36 However, the scores of our study it is not better than that, students in the medical field or healthcare providers who took BLS courses within one year or less had a higher score with a mean of 9.1±2.5, and then after that, it started to deteriorate. The mean score after two years was 7.6±2.5 and 6.8±1.7 after three years, and more, which is almost similar to a study was done in Seoul, Korea showed that the mean score was (9.7) at the end of the BLS course, then after six months the mean was (9.5), and after 12 months the mean score reached (8.7).37 One of the methods used to improve skills retention should be to test those skills after training and test those skills three months upon training, which will be more beneficial than either testing directly at the end of the course or not testing anyway.<sup>38</sup> Participants with a higher educational level seem to score higher than those with low education.<sup>5,16</sup> In contrast with a cross-sectional study conducted in Jeddah found that there was no significant correlation between the total score and the education level.8

Since the data is gathered only from the Saudi citizens, our results might be affected by differences in cultural and ethical backgrounds and other social circumstances that might differ in comparison with those of other countries. This considered as a strength point in our study in addition to the large sample size. Although, the limitations of this study include; first, females were more than male participants; hence, there was a disproportion in the female to male ratio. There was no assessment of the practical skills of BLS in this study due to the pandemic. However, questions asked in the questionnaire only involved the basics of any CPR training course, even if it was self-learned through the media. Furthermore, whether the training courses were accredited or not; was not evaluated in this study.

#### **CONCLUSION**

This study highlights the importance of citizens training in Saudi Arabia for BLS, CPR knowledge and skills to increase survival rates from OHCA. Respondents showed poor knowledge with positive attitude. Hence, public exposure can also be enhanced by raising awareness campaigns, teaching CPR in public settings and workplaces, and incorporating life-supporting first aid skills into school and university curricula. With easy accessibility to the internet platforms, the public will have an opportunity to expose as much as possible to resuscitation techniques.

#### Recommendations

The American Heart Association suggested that at least (20%) of adults need to be properly prepared to perform CPR for substantially reduced morbidity and mortality from out-of-hospital arrest. Moreover, two studies revealed that even nine-year-old children could perform CPR if properly trained.<sup>39,40</sup> The individuals who received CPR from trained citizens were four times more likely to survive for a month in contrast with those who did not receive CPR.<sup>41</sup> Further research should include more comprehensive studies, include several cities or the entire region of Saudi Arabia, and evaluate peoples' BLS skills in practice.

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