



# Assessment of Knowledge and Attitude of Basic Life Support (BLS) among Schoolteachers in the Jazan Region, Saudi Arabia

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## Authors' contributions

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

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## ABSTRACT

**Background:** Basic life support (BLS) is vital for out-of-hospital cardiac arrest survival. Previous studies suggested that Saudi schoolteachers' BLS knowledge and training are limited. This study aimed to evaluate the knowledge and attitude of BLS among schoolteachers in Jazan, Saudi Arabia.

**Methods:** Self-administered, online questionnaires were distributed to 24 randomly selected schools in Jazan, Saudi Arabia. Data were presented as frequency, percentage, mean (M), and standard deviation (SD). Statistical analysis was conducted using an independent sample t-test and analysis of variance (ANOVA).

**Results:** A total of 424 participants completed the study questionnaires, and 246 (58.0%) were male. Participants' age ranged from 20 to 62 years (M = 41.68, SD = 7.25). A total of 83 (19.6%) teachers had completed cardiopulmonary resuscitation (CPR) training. The overall level of BLS knowledge and skills was inadequate (M = 4.79, SD = 1.30). Knowledge scores were statistically different between males and females [t(1, 422) = 4.45, p=0.001]. Also, BLS knowledge scores differed significantly between teachers who had previous CPR training and teachers who did not [t

(1, 422) = 25.48,  $p = 0.000$ ]. In general, teachers had positive attitudes towards the importance of BLS and were willing to have future BLS training.

**Conclusion:** The study showed that schoolteachers had positive attitudes towards BLS but lacked BLS knowledge which would affect their skills.

*Keywords:* Basic life support (BLS); cardiopulmonary resuscitation (CPR); knowledge; attitude; schoolteachers; Saudi Arabia.

## 1. INTRODUCTION

Unintentional or accidental injury represents an international concern as it can lead to disabilities and death [1]. Many disabilities and deaths that occur due to accidental harm are preventable. The American Heart Association (AHA) describes basic life support (BLS) skills as recognition of a variety of life-threatening emergencies by first responders, providing Cardiopulmonary resuscitation (CPR) and choking aids and possessing skills to provide care to those who experience cardiac arrest, respiratory arrest, and airway obstruction [1]. Students in schools can be subjected to the risk of falls, choking, trauma, and many accidents during their school hours [1]. Teachers are considered caretakers of students as they are in the school and are responsible for children's wellbeing and safety at school [2]. Teachers' responsibilities regarding the pupil's health range from giving medications to handling emergencies [3]. The first minutes after an accident are crucial to reducing injury, so the awareness of first aid among teachers could reduce morbidity and mortality of children at school. Nowadays, it is attainable to learn CPR through various sources. However, several studies have shown that many factors, such as administering it incorrectly, making the situation worse, and fear of catching an infection, limit correct CPR practice [2,3]. Studies conducted worldwide reported inadequate BLS skills [1–15]. Some studies from Saudi Arabia that assessed knowledge and attitudes towards BLS were conducted in secondary schools a few years ago reported insufficient knowledge, lack of training and BLS skills [1,3,7]. Other studies conducted in Saudi Arabia were focused on community health workers, university lecturers and medical students and reported similar findings [11]. Even if there are several studies that assessed the Knowledge and Attitude of BLS among teachers, their findings might not accurately represent the current situation in the Jazan region, where there is still a lack of local data. Therefore, we conducted this study to evaluate the current knowledge and attitude regarding BLS among schoolteachers in the Jazan region.

## 2. MATERIALS AND METHODS

### 2.1 Study Design and Participants

A cross-sectional study that involved 424 teachers of the Jazan region public primary, intermediate, and secondary schools, Saudi Arabia, was carried out between 14<sup>th</sup> October and 26<sup>th</sup> December 2021. We excluded retired teachers, those working outside the Jazan region, and pre-school teachers. A minimum sample size ( $n=422$ ) was calculated with a confidence interval of 95%, margin error not exceeding 5%. A pilot study was conducted to test if the questionnaire's wording was clear and understandable.

### 2.2 Sampling Technique and Study Population

We used a multistage cluster random sampling technique to recruit teachers. The local education directorate is already divided into two districts, Jazan and Sabya. One educational office was selected from each education district using a simple random sampling technique during the first sampling stage. Schools in each education office were stratified into three strata according to the level of the school (primary, intermediate or secondary schools). In the second stage of sampling, two male and two female schools were selected using a systematic sampling technique, making 24 schools. Finally, all teachers from each school were invited to participate in the study.

### 2.3 Study Tools

Data was collected using an online self-administered Arabic questionnaire previously validated and used in another published study [16]. This questionnaire consisted of four sections; the first section collected data on sociodemographic data and previous training status. The second section included ten questions about knowledge and BLS skills. The third section had eight questions to assess attitudes toward learning and practicing CPR.

Finally, the fourth section included questions about the barriers to performing CPR and previous resuscitation experience.

## 2.4 Statistical Analysis

The data were coded, tabulated, and statistically analyzed using IBM SPSS Statistics for Windows, version 23.0. (Armonk, NY: IBM Corp.). Both descriptive and inferential statistics were used. For the descriptive analysis, results were expressed as numbers and percentages for categorical data and means ( $\pm$  SD and 95% CI) for continuous data. For the knowledge and skills section, the accurate response was given one and the wrong response was given zero. The ten questions were added together to obtain a total knowledge score. A normality test was

conducted to determine if the data were normally distributed. Accordingly, a distributed t-test and Analysis of variance (ANOVA) test were used to compare the mean knowledge scale across variables. The accepted level of significance was below 0.05 ( $P < 0.05$ ).

## 3. RESULTS

A total of 424 participants completed the study questionnaires. The majority, 246 (58.0%), were male, and the mean age was 41.68 (SD=7.25) years. Most, 350 (82.5%), were married, 190 (44.8%) had more than three children, and 355 participants had at least a bachelor's degree (83.7%). Of all participants, 233 (55.0%) reported a monthly income between 10,000 and 14,999 Saudi Riyals (Table 1).

**Table 1. Baseline characteristics of the sample**

Characteristics	n	%
Age in years, <i>M</i> ( <i>SD</i> )	41.68 (7.25)	
Sex		
Male	246	58.0
Female	178	42.0
Marital status		
Single	55	13.0
Married	350	82.5
Divorced/Widow	19	4.4
Number of children		
None	85	20.0
1-3	149	35.1
More than 3	190	44.8
Education		
High school or diploma	43	10.1
Bachelor	355	83.7
Higher studies	26	6.1
Monthly income (in Saudi Riyals)		
0–4,999	22	5.2
5,000–9,999	40	9.4
10,000–14,999	233	55.0
15,000 OR MORE	129	30.4
Residency		
Rural	222	52.4
Urban	202	47.6
Level of teaching		
Primary school students	156	36.8
Middle school students	115	27.1
Secondary school students	153	36.1
Role in school		
Teaching	313	73.8
Administrative	107	25.2
Both	4	0.9
Years of experience, <i>M</i> ( <i>SD</i> )	17.18 (8.73)	

*M*, mean; *SD*, standard deviation.

As shown in Table 2, only 83 (19.6%) participants had completed CPR training, and 60 (72.3%) had completed their CPR training more than two years prior to our study. Of those trained, 37 (44.6%) were trained by Saudi Red Crescent.

Our study participants had an overall low knowledge score ( $M = 4.79$ ,  $SD=1.30$ ). Although the majority (90.3%) of teachers acknowledged the need for the recovery position in unconscious people, most (80.7%) knew the correct emergency telephone number. About 59% knew the first step of CPR, and only 23.6% knew the chest compressions and mouth ventilation combinations. The majority (81.8%) must know the proper hand placement on the patient's torso, and 73.8% knew that the rescuer should kneel next to the patient's torso. However, only a few of the teachers knew the correct depth and pace of chest compressions (9.4%) and the exact

frequency of chest compressions (19.3%). More than half (59.2%) were not aware that only trained people could use an automated external defibrillator (AED) (Table 3).

Table 4 shows teachers' attitudes towards BLS training. The most common reason for not having previous CPR training was a lack of knowledge of where to attend the course (41.5%). Most (71.2%) teachers thought that a lack of proper knowledge and skills was the main reason for fear to give the BLS to a victim and the majority (80.0%) wanted more training in BLS. These results indicate that our respondents need further CPR training, as 90.6% were willing to take a free BLS course. While 85.6% of teachers thought that CPR must be part of the educational curriculum, 72.6% thought every school should have an Automated External Defibrillator (AED), and 71.9% disagreed that CPR training should be a requirement to be certified (Table 4).

**Table 2. Basic life support training**

Variables	n	%
Previous CPR training		
No	341	80.4
Yes	83	19.6
Source of CPR training		
School	16	19.3
Red crescent	37	44.6
Other	30	36.1
Date of CPR training		
Less than a year	8	9.6
1-2 years	15	18.1
More than 2 years	60	72.3

*CPR, cardiopulmonary resuscitation*

**Table 3. Correct answers on the knowledge and skills in the BLS questionnaire**

Questions	n	%
Knowledge about the correct emergency telephone number (997)	342	80.7
You are alone and come across an apparently lifeless adult person. What do you do?	252	59.4
It turns out the patient is breathing but shows no response to verbal stimuli. What do you do?	383	90.3
You decide to perform BLS. Which of the following combinations of chest compressions and mouth ventilation would you choose?	100	23.6
Depth and pace of chest compressions	40	9.4
Who is allowed to use an AED?	173	40.8
Does the respondent kneel next to the torso?	313	73.8
Proper hand placement on the torso	347	81.8
Frequency of chest compressions	82	19.3
Total knowledge score, M (SD)	4.79	1.30

*AED, automated external defibrillator; M, mean; SD, standard deviation*

**Table 4. Attitudes towards BLS training**

Questions	n	%
<b>Reasons for no previous CPR training</b>		
Little time	41	9.7
Not sure where to attend the course	176	41.5
no reason	123	42.7
Little interest	16	3.8
Costs	10	2.4
<b>Reasons people are afraid to apply BLS to a victim</b>		
Causing potential harm to the person in need	56	13.2
Lack of proper knowledge and skills	302	71.2
Emotional factors	8	1.9
Afraid of legal consequences	45	10.6
Afraid of contagious diseases through mouth-to-mouth breath	13	3.1
<b>Do you want more training?</b>		
No	45	10.6
Yes	339	80.0
Already have it	40	9.4
<b>Reason for more CPR training</b>		
Wish of avoiding unnecessary death	265	62.5
Heart disease within the family	40	9.4
I do not want more training	59	13.9
Others	60	14.2
<b>Willing to take a free CPR course</b>		
No	40	9.4
Yes	384	90.6
<b>Do you think CPR training should be mandatory?</b>		
No, CPR training should be optional	101	23.8
Yes, at school	162	38.2
Yes, training should be mandatory in every job	140	33.0
Yes, to obtain the driving license	21	5.0
<b>Do you think CPR must be part of the educational curriculum?</b>		
No	61	14.4
Yes	363	85.6
<b>CPR training should be a requirement to receive teacher certification</b>		
No	305	71.9
Yes	119	28.1
<b>Do you think every school should have AED?</b>		
No	116	27.4
Yes	308	72.6

AED, automated external defibrillator; M, mean; SD, standard deviation

An independent sample t-test indicated that BLS knowledge scores differed significantly between males ( $M = 4.98$ ,  $SD = 1.23$ ) and females [ $(M = 4.54$ ,  $SD = 1.36)$ ,  $t(1, 422) = 4.45$ ,  $p = 0.001$ ] and between teachers who had previous CPR training ( $M = 5.42$ ,  $SD = 1.19$ ) and teachers who did not [ $(M = 4.64$ ,  $SD = 1.28)$ ,  $t(1, 422) = 25.48$ ,  $p = 0.000$ ]. However, our study showed that BLS knowledge scores did not significantly differ in terms of teachers' education, source of CPR training, date of CPR training, whether they observed someone performing CPR, or actively participated in it (all  $P > 0.05$ ) (Table 5).

#### 4. DISCUSSION

CPR is one of the most significant factors for reducing death rates due to out-of-hospital cardiac arrest [17]. Therefore, knowledge and skills in CPR are essential for the survival of cardiac arrest victims and should be regarded as a primary educational strategy according to the international resuscitation council [18]. Some countries like Norway adopted BLS as a part of the school curriculum, and CPR training for schoolteachers has been compulsory since 1961 [19]. In Saudi Arabia, however, BLS training

**Table 5. Factors associated with BLS knowledge and skills**

Variables	M	SD	t or F	p-value	95%CI
<b>Sex</b>					
Male	4.98	1.23	4.45	0.001*	0.19 0.69
Female	4.54	1.36			
<b>Education</b>					
High school or diploma	4.35	1.23	3.01	0.050*	3.97 4.73
Bachelor	4.83	1.31			4.69 4.97
Higher studies	5.00	1.13			4.54 5.46
<b>Previous CPR training</b>					
No	4.64	1.28	25.48	0.000*	4.50 4.78
Yes	5.42	1.19			
<b>Source of CPR training</b>					
School	5.25	1.18	0.30	0.744	4.62 5.88
Red crescent	5.41	1.32			4.96 5.85
Other	5.53	1.04			5.14 5.92
<b>When undertook the CPR training</b>					
Less than a year	5.88	1.13	0.69	0.503	4.93 6.82
1-2 years	5.47	1.13			4.84 6.09
More than 2 years	5.35	1.22			5.04 5.66
<b>CPR skills simulation</b>					
No	4.68	1.36	-1.85	0.064	-0.48 0.01
Yes	4.91	1.23			
<b>Participate in CPR</b>					
No	4.77	1.30	-1.31	0.192	-0.86 0.17
Yes	5.12	1.28			

*BLS, basic life support; M, mean; SD, standard deviation; CI, confidence interval; CPR, cardiopulmonary resuscitation; \*Significant*

among schoolteachers is still optional. Our study revealed limited knowledge and BLS skills among schoolteachers in the Jazan region, similar to Onyeaso AO study [25] and the findings of other studies conducted in Saudi Arabia [3,12,20]. The limited BLS knowledge in this study was reflected in the frequency of incorrect answers, particularly in BLS sequence and technique. Our findings agree with other studies that found the level of BLS knowledge among Saudi schoolteachers to be 43% in Riyadh and 30% in Al-Madinah [12,20]. This might be due to the lack of BLS training for most participants because we found that only 19.6% of schoolteachers in the Jazan region had been previously trained in BLS.

Moreover, the majority (72.3%) of teachers were trained more than 2 years prior and were not enrolled in any additional courses to improve and update their knowledge and skills. Similar results of poor knowledge and challenges were reported in a study conducted in the United Kingdom (UK) [21]. Most (59.2%) teachers in our study were not aware of the need for training to use AED (59.2%), unlike the study from Denmark by Line

Zinckernagel et al., who found that teachers considered AED training to be too complicated to be included in the curriculum and preferred separate training by a professional. However, they reported that teachers lacked skills in using them and were not aware of AED available at their schools [22].

Most teachers enrolled in this study had poor knowledge of chest compression technique. Only 9.4% correctly responded to the question regarding the depth and pace of chest compressions. Previous BLS training was significantly associated with higher knowledge scores ( $p=0.0001$ ). This aligns with experimental study findings from Iran that indicated higher knowledge after basic BLS training [23]. Though the association of gender with BLS knowledge and skills was not well studied among schoolteachers, we found that the male gender was significantly associated with higher knowledge than the female gender (95% C.I.: 0.19-0.69,  $p<0.001$ ). The difference might be due to cultural variabilities such as less training for female teachers rather than intrinsic gender differences. Our study also showed that more

males (33.7%) than females (13.4%) received BLS training in our sample ( $P = 0.001$ ). Our findings agree with a study carried out in the United Kingdom that found female participants less likely to get trained in resuscitation and CPR techniques than their male counterparts [24]. The main reason for the lack of BLS training among schoolteachers was not knowing where to take CPR training courses. This is the same reason reported in previous studies in Saudi Arabia [3,20] and Palestine [7]. Therefore, establishing BLS training at schools close to teachers would improve knowledge of BLS among schoolteachers.

Moreover, our study indicated that schoolteachers generally had positive attitudes regarding BLS, as shown by their willingness to undertake more training and their support for making BLS training mandatory for schoolteachers. Similar attitudes were observed in other studies conducted on Saudi teachers [12,20]. In contrast, most teachers in this study opposed making CPR training a requirement to get certified as qualified teachers. The reason might be their perceptions of CPR training as more complicated, too technical and challenging. A similar reason was reported in another study from Denmark [22]. This negative view may be improved by education programs to raise schoolteachers' awareness of the vital role of CPR in saving lives.

Despite being one of the few studies in Saudi Arabia and the first study in Jazan to evaluate the current schoolteachers' knowledge and attitudes toward BLS, the generalization of our findings is limited by the cross-sectional approach and the use of an online questionnaire. Given the practical nature of cross-sectional studies and the time of data collection, which coincided with the COVID-19 pandemic, a longitudinal, interview-based study followed by an interventional study was not possible.

## 5. CONCLUSION

The study found that most schoolteachers in the Jazan region had limited knowledge and skills in BLS despite their positive attitudes towards BLS training. Different factors, such as gender, influence these findings, aligning with some previous reports in the country. Previous BLS training was strongly associated with better BLS knowledge and skills. Thus, we recommend that education authorities in Saudi Arabia establish obligatory BLS training and periodic refreshing

courses for all schoolteachers. Extensive, longitudinal, interview-based studies are also recommended to further investigate BLS knowledge and skills among schoolteachers to confirm the current findings, raise awareness regarding schoolteachers' knowledge and attitudes toward BLS, and help establish corrective measures.

## DISCLAIMER

The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

## CONSENT

Teachers who decided to participate in the study consented by signing online consent forms. All of the teachers were informed of their right not to participate or withdraw from the study at any time. The data's privacy and confidentiality were preserved by ensuring anonymity during data collection, and there was no disclosure of the information data to anyone outside the study.

## ETHICAL APPROVAL

The study was approved by the Research Ethics Committee of Jazan University, Saudi Arabia (REC-43/03/035).

## DATA AVAILABILITY STATEMENT

The data presented in this study are available on request from the corresponding author.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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