Proceedings Series on Health & Medical Sciences, Volume 6
Proceedings of the 5th International Nursing and Health Sciences
ISSN: 2808-1021

Knowledge, Attitude, Practice, and Barriers toward Performing Cardiopulmonary Resuscitation (CPR) and Automated External Defibrillation (AED) among School Teachers

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ARTICLE INFO

Article history:

DOI:
10.30595/pshms.v6i.1426

Submitted:
Sept 25, 2024

Accepted:
Dec 25, 2024

Published:
Jan 17, 2025

Keywords:

AED; CPR; School Teachers

ABSTRACT

Cardiac arrest is a sudden emergency that can occur anywhere including schools. The American Heart Association recommends incorporating CPR training and AED education in schools to improve emergency response. Teachers, as caregivers, are encouraged to enhance their knowledge of CPR and AED to increase the survival rate of cardiac arrest victims. This study aimed to identify knowledge, attitude, practice, and barriers toward performing cardiopulmonary resuscitation (CPR) and automated external defibrillation (AED) among school teachers. A quantitative cross-sectional study was conducted among 91 school teachers using a questionnaire covering five sections: sociodemographics, CPR and AED knowledge, attitudes, practices, and barriers. Data were analyzed using SPSS version 20.0, with descriptive statistics, ANOVA, and t-tests applied. Gender was significantly associated with attitude and practice, but no sociodemographic variables were associated with knowledge ($p > 0.05$). Educational training on CPR and AED can greatly improve school teachers' knowledge and skills.

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1. INTRODUCTION

Cardiac arrest (CA) is a medical emergency with a high mortality risk, especially in out-of-hospital cardiac arrest (OHCA), where approximately 70% of cases result in death [1]. Cardiac arrest is often triggered by severe cardiac arrhythmias and requires prompt defibrillation to restore heart rhythm [2]. Studies emphasize the critical role of bystanders in performing effective chest compressions and early defibrillation to increase

survival rates during OHCA [3]. In Malaysia, however, bystander-initiated CPR remains low. Research from Hospital Universiti Sains Malaysia (HUSM) reports only 8.7% of OHCA patients received bystander CPR, compared to 33.3% globally [4]. Despite this, bystander CPR significantly improves survival and neurological outcomes [4]. According to American Heart Association 2015 guidelines, CPR and defibrillator in less than 4 minutes and the early stages of paramedic aid in less than 8 minutes of collapse raise the likelihood of surviving cardiac arrest in the hospital to 43% and additional measures are needed to increase public awareness about the importance of implementing early CPR and to ensure that any link in the survival chain works successfully.

The guidelines also reinforce the effectiveness of mouth-to-mouth ventilation in chest compression. [5]. A high-profile example of inadequate CPR response in Malaysia is the death of TV host Hani Mohsin, who suffered a sudden cardiac arrest at an airport terminal where CPR and AED access could have been critical (Chew et al., 2008). This case underlines the need for increased CPR education and AED accessibility in public spaces. Schools, in particular, have been identified as critical settings for training individuals in life-saving skills, including CPR and AED use, as recommended by the American Heart Association [2]. Several studies have explored the level of knowledge about CPR and AED use among educators. A study also emphasized that early defibrillation is essential for cardiac arrest survival and highlighted the American Heart Association's recommendations for integrating AED and CPR training into schools [2]. However, educators often report insufficient training in these life-saving skills.

A previous study found that while primary school children showed improved knowledge post-intervention, baseline knowledge of CPR and AED among educators remains low, particularly in countries like Malaysia, where structured training programs are scarce [6]. This gap highlights the need for continuous professional development for teachers on CPR and AED skills to improve bystander response in schools. There are several barriers to CPR and AED implementation among school staff, including fear of causing harm, lack of confidence, and limited access to equipment. A study identified fear of legal repercussions, concerns about performing CPR incorrectly, and lack of training as the most common barriers among both adults and school-aged children [7]. Additionally, many teachers express discomfort with the possibility of performing mouth-to-mouth ventilation due to concerns about disease transmission [5].

Addressing these barriers through regular hands-on training and clear guidelines can significantly increase the willingness and competence of teachers to perform CPR and AED. Introducing CPR and AED training in schools can foster a culture of preparedness among teachers and students. A study showed that practical, hands-on training was more effective than theoretical lessons alone in enhancing CPR performance [8]. However, the study also found that many teachers lacked the skills to confidently perform CPR in emergencies. A study supported this by noting that teachers who receive annual refresher training are more likely to perform CPR effectively in emergencies. Moreover, structured CPR training programs in schools have been shown to improve both the knowledge and the attitudes of educators toward taking action in life-threatening situations [2]. In countries like the United States, the United Kingdom, and Australia, national resuscitation councils have integrated CPR and AED training into school curricula.

These councils emphasize the importance of early intervention in cardiac emergencies, with AEDs being made accessible in public spaces, including schools [3]. However, in Malaysia, no such unifying body exists, and the availability of AEDs in schools remains limited. This underscores the need for national-level initiatives to standardize CPR and AED training for educators, making life-saving skills a priority for school staff [9]. These studies collectively suggest that while knowledge and attitude improvements are possible with structured training, significant barriers remain. Addressing these barriers through policy changes, practical training, and resource allocation can enhance teachers' capacity to respond to cardiac emergencies effectively. Therefore, the primary objective of this study is to examine the knowledge, attitudes, practices, and barriers related to performing Cardiopulmonary Resuscitation (CPR) and using Automated External Defibrillators (AED) among school teachers. Additionally, the study aims to identify the association between sociodemographic factors (such as age, gender, and teaching experience) and the teachers' knowledge, attitude, and practice toward CPR and AED.

2. RESEARCH METHOD

A quantitative cross-sectional survey was conducted by using a self-administered questionnaire among 93 school teachers at Sekolah Menengah Kebangsaan (SMK) Sultan Abu Bakar, Kuantan, Pahang, Malaysia. The inclusion criteria: (a) secondary school teachers at SMK Sultan Abu Bakar who are willing to participate in this study. (b) able to read or understand Malay and/or English. The exclusion criteria were: (a) teachers who were unwilling to participate. (b) teachers who are not in the field during data collection. The study was ethically approved by the IIUM Research Ethics Committee (IREC) (IIUM/504/14/11/2/ IREC 2020).

Research Instrument

The survey was designed to gather data from participants and consisted of five sections focused on Cardiopulmonary Resuscitation (CPR) and Automated External Defibrillation (AED). It provided a short explanation of the study's purpose and objectives, and participants were asked to complete the questionnaire in English, which was appropriate for the target audience. The instrument assessed knowledge, attitude, practice (KAP), and barriers concerning CPR and AED. The knowledge section questions were adapted from a validated questionnaire used in a study on school-based CPR and AED programs among secondary school students in Kuantan, Pahang [10]. The attitude section was based on a study assessing the knowledge and attitudes of Basic Life Support (BLS) among school teachers in Hebron, Palestine [1]. The practice section was adapted from research evaluating laypersons' awareness of Basic Life Support at a university in Izmir, Turkey [11]. Finally, the barrier questions were developed based on domains from a study that identified barriers to bystander CPR in high-risk regions through a qualitative review of emergency calls [12]. The approval to use all the questionnaires was taken from the original authors prior to the study.

Data analysis

SPSS version 20 (Statistical Package for Scientific Studies) was used to analyse the data collection. Descriptive statistics (e.g. frequencies, percentage, mean and standard deviation) were used to analyze the demographic, practice and barriers. Inferential statistics were used to give a mean score of knowledge and attitude and also tested the hypothesis using independent t-test and one-way ANOVA to determine if there is a significant difference between knowledge, attitude and socio-demographic variables. Each correct answer was given 1 and 0 for incorrect answers. The p-values <0.05 were considered statistically significant.

3. RESULTS AND DISCUSSIONS

Demographic data of respondents

A total of 91 respondents were included in the final analysis **Table 1**. The study sample showed the highest number of participants was Malay (84.6%) with the majority of the respondents being female (83.5%). Moreover, the majority of the teacher's ages ranged from 20 -39 (42.9%). Meanwhile, teaching experience for teachers was mostly from 11 to 20 years of experience (48.4%). The subject of teaching among teachers was mostly literature-based (39.6%). In addition, academic qualification was majority from the bachelor level (82.4%). Apart from than, question regarding cardiopulmonary resuscitation (CPR) and automated external defibrillation (AED), the majority of teachers have heard about CPR and AED with (89.0%). Therefore, only four teachers stated that they had seen an AED before (1.1%), school, hospital and supplier. Most of the teachers have no experience of witnessing any cardiac victim with (73.6%).

Table 1. The teachers' demographic characteristics (n=91)

Variables	Characteristics	Frequency (n)	Percentages (%)
Race	Malay	77	84.6
	Indian	2	2.2
	Chinese	12	13.2
Gender	Male	15	16.5
	Female	76	83.5
Age	20-39	39	42.9
	40-49	27	29.7
	50-59	25	27.5
Teaching experience	1-10 years	15	6.5
	11-20 years	44	48.4
	21-30 years	27	29.7
	31-40 years	5	5.5
Area of teaching (subject)	Science based	22	24.2
	Language based	17	18.7
	Mathematics based	16	17.6
	Literature based	36	39.6
Academic qualification	Bachelor	75	82.4
	Master	10	11
	Others	6	6.6
Have you heard the word of CPR and AED?	No	10	11.0
	Yes	81	89.0

Variables	Characteristics	Frequency (n)	Percentages (%)
Have you ever seen an AED before?	Google	1	1.1
	Hospital	1	1.1
	School	1	1.1
	Supplier	1	1.1
Do you have witness any cardia arrest victim?	No	67	73.6
	Not sure	9	9.9
	Yes	15	16.5

Knowledge of school teachers toward CPR and AED

The total score of knowledge related to CPR and AED is 10. The highest score obtained by respondents is 9 and the lowest score is 0. The score of the 25th percentile is 3.00, the 50th percentile is 4.00 and the 75th percentile is 6.00. Therefore, the respondent's knowledge is average. The mean score is 4.22 (± 1.73) which was at the 50th percentile. Generally, a small proportion of the teachers responded correctly to questions about what should be done to check responsiveness (59.3%), what information should be given when calling 999 (65.9%) and what conditions are required to use an AED (82.4%). However, large proportions responded incorrectly to questions which the best indicator of a person's cardiac arrest (79.2%), what should be done to an unresponsiveness person (82.5%), what the correct pattern of CPR in adults (57.2%)**,** how to ensure the adequacy of each breath rescue (56.1%), what is the priority when using an AED (60.5%), why should everybody stand clear when press AED button (83.6%) and after no shock advised what should do next (66%). **Table 2**.

Table 2. ***Knowledge regarding CPR and AED among school teachers (n=91)***

Items	Respond; n (%)	
	Correct	**Incorrect**
Which of the following is the best indicator that a person is experiencing cardiac arrest?	19 (20.9%)	72 (79.2%)
Severe chest pain		32 (35.2%)
Difficulty in breathing		33 (36.3%)
Choking		7 (7.7%)
Absence of breath	19 (20.9%)	
What should you do to check responsiveness?	54 (59.3%)	37 (40.7%)
Call 999		23 (25.3%)
Shake his/her shoulder and ask loudly: ''Are you okay?''	54 (59.3%)	
Get an Automated External Defibrillation (AED)		6 (6.6%)
Perform two rounds of CPR and see if the person responds.		8 (8.8%)
What is the first thing you should do when a person is unresponsive?	16 (17.6%)	75 (82.5%)
Do nothing until someone brings an automated external defibrillation (AED)		2 (2.2%)
Check the person's breathing and start CPR if he/she is not breathing		37 (40.7%)
Call 999		36 (39.6%)
Shout for help	16 (17.6%)	
When you call 999, what information should you be prepared to give them?	60 (65.9%)	31 (34.1%)
Your name		3 (3.3%)
The type of emergency		19 (20.9%)
Your location		9 (9.9%)

All of the above	60 (65.9%)	
What is the correct pattern used while performing CPR on an adult?	39 (42.9%)	52 (57.2%)
Thirty chest compressions, 2 rescue breaths, repeat.	39 (42.9%)	
Five chest compressions, 1 rescue breath, repeat		23 (25.3%)
Fifteen chest compressions, 5 breaths, repeat		11 (12.1%)
Ten chest compressions, 2 breaths, repeat		18 (19.8%)
How can you ensure the adequacy of each rescue breath?	40 (44.0%)	51 (56.1%)
Easy air passage.		10 (11.0%)
Breathing sounds are heard.		40 (44.0%)
The person's chest rises as you deliver each breath	40 (44.0%)	
The person turns blue.		1 (1.1%)
For which of the following conditions will you use an automated external defibrillation (AED)?	75 (82.4%)	16 (17.6%)
Heart attack	75 (82.4%)	
Heart burn		1 (1.1%)
Choking		13 (14.3%)
Seizure		2 (2.2%)
What is your first priority when using an automated external defibrillation (AED)?	36 (39.6%)	55 (60.5%)
Plug the AED in an electrical socket		13 (14.3%)
Turn on the AED		21 (23.1%)
Put the AED pads on the person's chest.	36 (39.6%)	
Take deep breaths to calm yourself.		21 (23.1%)
Why should everybody stand clear when pressing the AED SHOCK button?	15 (16.5%)	76 (83.6%)
So that the AED does an accurate reading.		21 (23.1%)
So that the AED gives the shock.		13 (14.3%)
So that no one else is shocked by mistake.	15 (16.5%)	
All of the above		42 (46.2%)
After 2 shocks you receive a ''no shock advised'' message from the AED. The victim has signs of circulation, is breathing normally, and there are no signs of injury. What should you do next?	32 (35.2%)	59 (66%)
Give thirty chest compressions, 2 rescue breaths, repeat		21 (23,1%)
Turn off the AED and remove the AED pads	32 (35,2%)	
Check the AED pads and press the AED ON button	18 (19,8%)	
Leave the AED attached and roll the victim to the side position	20 (22,0%)	

The attitude of school teachers toward CPR and AED

The total score of attitude related to CPR and AED is 7. The highest score obtained by respondents is 5 and the lowest score is 0. The score of the 25th percentile is 1.00, the 50th percentile is 2.00 and the 75th percentile is 3.00. Overall, the attitude toward CPR and AED was positive. The mean score is 1.89 (± 1.34) which is between the 25th to 50th percentile. In addition, the majority of the respondents did not know where to follow the training (49.5%) and most of them were not confident (53.8%) regarding CPR and AED. In addition, most respondents stated that the reason for lack of knowledge is due to no professional training available (44.0%). Moreover, the majority of respondents agreed that everyone should be trained in Basic Life Support (BLS) school teachers (57.1%). Meanwhile, the respondents stated that CPR training should be mandatory in every job (60.4%). Meanwhile, the majority of the respondents said that they would perform mouth-to-mouth

ventilation for an unconscious person if it the same gender as me. (56.0%). Furthermore, the respondents agreed that CPR and AED training should be required in teacher programs at the Higher Learning Institute (69.2%). **Table 3**.

Practice of school teachers toward CPR and AED

Table 4 shows larger proportions of school teachers responded does not know regarding questions on how to determine whether a person needs BLS (67.0%), When person's heart and respiration stopped, what should do first (63.7%), where chest compression applied (57.1%), what the ideal number of chest compression in adult in a minute (71.4%), how long should compression depth in adult (75.8%), what rate of chest compression in adult (83.5%), how long BLS certificate valid (90.1%), an AED is a device that can give a shock to a patient with cardiopulmonary arrest when necessary and instructs on BLS (63.7%) and who can use an AED (57.1%). Meanwhile, only one question responds answer regarding which number of urgent EMS requests (83.5%).

Table 3. Attitude regarding CPR and AED among school teachers (n=91)

Items	Frequency (n)	Percentage (%)
If you had no previous CPR training, what was the reason?		
Lack of time	33	36.3
Limited interest	11	12.1
Do not know where to follow training	45	49.5
Costs	2	2.2
What is the reason for reluctance?		
Fear of causing further harm to patient.	26	28.6
Fear of acquiring infection	8	8.8
Fear of taking responsibilities	8	8.8
Not confident	49.0	53.8
The reason for lack of knowledge about Basic Life Support (BLS)?		
Busy in job	28	30.8
Lack of interest	10	11.0
No professional training available	40	44.0
Medical emergencies are not commonly happen	13	14.3
Who should be trained in Basic Life Support (BLS) to school teachers?		
Emergency response team member	18	19.8
All healthcare personnel	20	22.0
Everyone	52	57.1
Child age above 9 or 10 years old	1	1.1
Do you think CPR training should be mandatory?		
Yes, at school	17	18.7
Yes, training should be in every job	55	60.4
No, CPR training should be optional	8	8.8
Yes, should be mandatory in all the healthy nation	11	12.1
Would you perform mouth to mouth ventilation for an unconscious person?		
Yes for the same gender as me	51	56.0
Yes for the other gender only	2	2.2
Yes for both genders	22	24.2
No for both genders	16	17.6

CPR AED training should be required in teacher programs at Higher Learning Institute.		
Disagree	1	1.1
Neutral	19	20.9
Agree	63	69.2
Mandatory	8	8.8

Barriers of school teachers toward CPR and AED

The majority of the respondents agreed that they feel a lack of confidence and a sense of incompetence due to a lack of prior exposure to CPR and AED (83.5%). Moreover, the respondents stated that they had limited time to participate in CPR and AED programs (87.9%). In addition, they do not know how to make an emergency call and what to expect (68.1%). Apart from that, the respondents mostly insist on not repositioning the patient during emergency situations due to fear would cause injury (80.2%). The majority of the respondents stated that they had a panic attack and could not handle the situation during an emergency (59.3%). Therefore, they thought that the patient can be survived in such an emergency (70.3%). The respondents believe that CPR training is different from another teaching subjects because it is a matter of life and death (96.7%). (**Table 5**)

Table 4. ***Practice regarding CPR and AED among school teachers (n=91)***

Items	**Frequency (n)**	**Percentage (%)**
How do you determine whether a person needs basic life support (BLS)?		
Does not know	61	67.0
Know	30	33.0
When it is determined that a person's heart and respiration are stopped, what should be done first?		
Does not know	58	63.7
Know	33	36.3
Which number is wanted for urgent emergency medical services request?		
Does not know	15	16.5
Know	76	83.5
Where is the chest compression applied?		
Does not know	52	57.1
Know	39	42.9
What is the ideal number of chest compression in an adult in a minute?		
Does not know	65	71.4
Know	26	28.6
How long should be compression depth in an adult chest compression?		
Does not know	69	75.8
Know	22	24.2
What is the rate of chest compression/mouth to mouth ventilation in adult patients?		
Does not know	76	83.5
Know	15	16.5
How long this Basic Life Support (BLS) certificate be valid?		

Does not know	82	90.1
Know	9	9.9
The AED is a device that can give shock to a patient with cardiopulmonary arrest when necessary and instructs on BLS.		
Does not know	58	63.7
Know	33	36.3
Who can use the Automated External Defibrillation (AED)?		
Does not know	52	57.1
Know	39	42.9

Table 5. Barriers regarding CPR and AED among school teachers (n=91)

Items	Frequency (n)	Percentage (%)
I feel lack of confident and sense of incompetence due to lack of prior CPR and AED exposure.		
No	15	16.5
Yes	76	83.5
I have limited of time to participate in CPR and AED program.		
No	11	12.1
Yes	80	87.9
I don't know how to make an emergency call and what to expect.		
No	62	68.1
Yes	29	31.9
I insist to not reposition the patient during emergency situation due to fear would cause injury		
No	18	19.8
Yes	73	80.2
I had panic attack at that time and can't handle the emergency situation		
No	37	40.7
Yes	54	59.3
I thought the patient could not be saved in such an emergency		
No	64	70.3
Yes	27	29.7
I believe CPR training differ from other teaching subject because it is a matter of life and death.		
No	3	3.3
Yes	88	96.7

Association between socio-demographic and knowledge

Race, academic qualification and witness of CPR and AED are used one way analysis of variance (ANOVA). Meanwhile, for other categories used independent t-test. A significant level was set at <0.05, with a confidence interval of 95%. Apart from that, all categories are not significant because it is more than 0.05. Therefore, there is no association between the socio-demographic and knowledge of CPR and AED among school teachers in Sekolah Menengah Kebangsaan Sultan Abu Bakar, Kuantan, Pahang. (**Table 6**)

Table 6. Socio-demographic and knowledge of school teachers

Items	Frequency (n)	Mean (SD)	T stat (df)	P value
Race			1.084 (2)	0.343**
Malay	77	4.18 (±1.70)		
Indian	2	6.00 (±1.41)		
Chinese	12	4.16 (±1.89)		
Gender			0. 387 (89)	0.093*
Male	15	3.53 (±1.50)		
Female	76	4.35 (±1.74)		
Age			0.550(2)	0.579**
20-39	39	4.00 (±1.74)		
40-49	27	4.40 (±1.78)		
50-59	25	4.36 (±1.68)		
Teaching experience			1.795 (3)	0.154**
1-10	15	3.46 (±2.06)		
11-20	44	4.22 (±1.64)		
21-30	27	4.70 (±1.61)		
31-40	5	3.80 (±1.64)		
Area of teaching (subject)			2.474 (3)	0.067**
Science based	22	4.86 (±1.48)		
Language based	17	4.35 (±1.41)		
Mathematics based	16	4.43(±2.18)		
Literature based	36	3.66 (±1.67)		
Academic qualification			0.717(2)	0.491**
Bachelor	75	4.29 (±1.78)		
Master	10	3.60 (±1.42)		
Others	6	4.33 (±1.50)		
Have you heard word of CPR and AED?				0.419*
No	10	3.80 (±1.39)	0.425(89)	
Yes	81	4.27 (±1.76)		
Have you seen AED before?			0.344 (89)	0.189*
No	79	4.12 (±1.68)		
Yes	12	4.83 (±1.99)		
Do you have witness any cardiac arrest victim?			0.152 (2)	0.859**
No	67	4.20 (±1.76)		
Not sure	9	4.00 (±1.80)		
Yes	15	4.40 (±1.63)		

Association between socio-demographic and attitude

Socio-demographics such as race, age, teaching experience, area of teaching (subject), and academic qualification were used as one way ANOVA test while gender was used independent t-test. A significant level was set at <0.05, with a confident interval of 95%. Apart from that, only socio-demographic characteristics for gender showed an association between attitudes among teachers with a p-value of 0.004. Therefore, other socio-demographics shown no significant association with a pvalue greater than 0.005. (**Table 7**)

Table 7. ***Socio-demographic and attitude of school teachers***

Items	Frequency (n)	Mean (SD)	T stat (df)	P value
Race			2.735 (2)	0.070**
Malay	77	1.87 (±1.31)		
Indian	2	0.00 (±0.00)		
Chinese	12	2.33 (±1.43)		
Gender			2.118 (89)	**0.004***
Male	15	2.80 (±1.52)		
Female	76	1.71 (±1.24)		
Age			0.047 (2)	0.954**
20-39	39	1.87 (±1.45)		
40-49	27	1.85 (±1.29)		
50-59	25	1.96 (±1.27)		
Teaching experience			0.669 (3)	0.574**
1-10	15	1.86 (±1.45)		
11-20	44	2.00 (±1.39)		
21-30	27	1.62 (±1.18)		
31-40	5	2.40 (±1.51)		
Area of teaching (subject)			2.193 (3)	0.095**
Science based	22	1.90 (±1.26)		
Language based	17	1.64 (±1.53)		
Mathematics based	16	2.62 (±1.25)		
Literature based	36	1.66 (±1.26)		
Academic qualification			0.354 (2)	0.703**
Bachelor	75	1.86 (±1.30)		
Master	10	2.20 (±1.39)		
Others	6	1.66 (±1.86)		
Have you heard word of CPR and AED?			2.420 (89)	0.638*
No	10	1.70 (±1.76)		
Yes	81	1.91 (±1.29)		
Have you seen AED before?			1.354 (89)	0.701*
No	79	1.91 (±1.38)		
Yes	12	1.75 (±1.05)		
Do you have witness any cardiac arrest victim?			1.371 (2)	0.259**
No	67	1.88 (±1.33)		
Not sure	9	1.33 (±1.32)		
Yes	15	2.26 (±1.38)		

Association between socio-demographic and practice

Race, age, teaching experience, area of teaching (subject), and academic qualification were used as one way ANOVA test while gender were used independent t-test. A significant level was set at <0.05, with a confident interval of 95%. Apart from that, only socio-demographic characteristics for gender showed an association between practices among teachers with a p-value of 0.004. Therefore, other socio-demographics showed no significant association with a p-value greater than 0.05. (**Table 8**)

Table 8. ***Socio-demographic and practice of school teachers***

Items	Frequency (n)	Mean (SD)	T stat (df)	P value
Race			1.416 (2)	0.248**
Malay	77	3.53 (±2.50)		
Indian	2	6.50 (±0.70)		
Chinese	12	3.08 (±3.62)		
Gender			2.118 (89)	**0.004***
Male	15	2.80 (±1.52)		
Female	76	1.71 (±1.71)		
Age			1.836 (2)	0.166**
20-39	39	3.92 (±3.27)		
40-49	27	3.77 (±2.18)		
50-59	25	2.68 (±1.88)		
Teaching experience			1.003 (3)	0.395**
1-10	15	3.40 (±3.06)		
11-20	44	3.88 (±2.90)		
21-30	27	3.37 (±2.15)		
31-40	5	1.80 (±1.30)		
Area of teaching (subject)			0.049 (3)	0.985**
Science based	22	3.54 (±3.14)		
Language based	17	3.64 (±2.02)		
Mathematics based	16	3.31 (±2.21)		
Literature based	36	3.58 (±2.90)		
Academic qualification			2.458 (2)	0.091**
Bachelor	75	3.76 (±2.64)		
Master	10	1.80 (±1.31)		
Others	6	3.66 (±3.88)		
Have you heard word of CPR and AED?			2.420 (89)	0.638*
No	10	1.70 (±1.76)		
Yes	81	1.91 (±1.29)		
Have you seen AED before?			1.354(89)	0.701*
No	79	1.91 (±1.38)		
Yes	12	1.75 (±1.05)		
Do you have witness any cardiac arrest victim?			0.902 (2)	0.409**
No	67	3.31 (±2.54)		
Not sure	9	4.11 (±3.55)		
Yes	15	4.20 (±2.67)		

DISCUSSIONS

Association between socio-demographic characteristics and knowledge, attitude and practice toward CPR and AED among school teachers

The present study' findings indicates that school teachers generally lack sufficient knowledge about Basic Life Support (BLS) and Cardiopulmonary Resuscitation (CPR). For instance, a study reported an average BLS knowledge score of 4.0 ± 1.7 out of a maximum of 12 points [13]. In this study, the mean knowledge

score was 4.22 ± 1.73 out of a maximum of 9 points. Unfortunately, none of the sociodemographic variables measured in this study showed a significant association with knowledge, as indicated by a p-value greater than 0.05. Furthermore, a previous study found that a majority of teachers demonstrated knowledge in assessing consciousness (71.9%) and respiration (51.1%) [14]. While teachers largely understood proper hand placement (77.4%) and hand positioning (80.9%) for effective chest compressions, only 18.0% were aware of the recommended chest compression depth, and 29.1% knew the duration of chest compressions.

Alarmingly, only 16.2% could locate an Automated External Defibrillator (AED) in the community, highlighting a critical gap in training. In contrast, this study revealed that a majority of teachers lacked knowledge regarding proper chest compression placement (57.1%), the ideal number of compressions (71.4%), depth (75.8%), and rate (83.5%). These findings underscore the need for secondary school education initiatives aimed at improving community safety. Further research is essential to enhance teachers' theoretical awareness of CPR techniques. Similar findings from a study which showed a significant barrier to CPR training among teachers was the lack of awareness about available training opportunities, with 76% indicating they were unaware. Other reasons included time constraints (13%), lack of interest (2%), and prohibitive costs (1%) [15]. Despite these barriers, 96% of teachers recognized the necessity of BLS training, and 88% expressed a willingness to participate in such training if offered free of charge.

A majority (67%) believed that CPR training should be mandatory as part of the teacher training curriculum prior to registration, while 18% thought it should be optional, and 11% advocated for post-employment training. This study found that 44% of teachers were unaware of CPR and AED training availability, highlighting a need for greater community awareness about basic life support training to enhance knowledge, attitude, practice, and address barriers. The American Heart Association recommended integrating CPR training and AED familiarization into the secondary school curriculum [2] and [16]. In China, a survey revealed that 94.4% of respondents expressed interest in attending CPR training, and 93.1% supported the implementation of CPR programs in schools, while 91.8% favored developing a CPR training curriculum [13]. Similarly, this study found that 60.4% of teachers agreed that BLS training should be mandatory for school teachers, suggesting a willingness among educators to participate in CPR and AED training as part of the school curriculum.

Similar results also found with a study where they observed a negative correlation between age and first aid experience among teachers, though they found no significant connection between first aid skills and professional working hours. In this study, gender was significantly associated with attitudes and practices regarding CPR and AED among school teachers, with a p-value of 0.004. Consequently, while no sociodemographic characteristics were significantly associated with knowledge ($p > 0.05$), both male and female teachers' attitudes and practices regarding CPR and AED differed. However, knowledge scores did not correlate with any sociodemographic data [14]. The level of knowledge and skills of school teachers can be significantly improved through adequate educational training in CPR and AED, incorporating both theoretical and practical components.

Barriers toward CPR and AED among school teachers

A majority of respondents expressed a lack of confidence and a sense of incompetence due to insufficient prior exposure to CPR and AED (83.5%). This low confidence level is likely influenced by the absence of legislation mandating CPR and AED training in Malaysia. Only 13.3% of teachers felt competent to conduct training, and half found it challenging to access quality CPR training materials [17]. Additionally, 87.9% cited limited time to participate in CPR and AED programs, while 68.1% felt uncertain about making emergency calls or knowing what to expect. Furthermore, 80.2% of respondents were hesitant to reposition patients during emergencies due to fears of causing injury, and 59.3% reported experiencing panic attacks that hindered their ability to handle emergency situations. Despite these challenges, 70.3% believed that patients could survive a medical emergency with timely intervention. Many respondents expressed a lack of clarity regarding their responsibilities and liability in such situations, with 96.7% acknowledging the critical nature of CPR training compared to other subjects.

This emphasizes the urgent need for more comprehensive training courses in CPR and AED for school teachers, ensuring they are prepared to act effectively in emergencies. This study faced several limitations, including time constraints and a small sample size. These limitations were primarily due to a lack of cooperation from respondents. Consequently, the findings cannot be generalized to other schools, as the sample was drawn from only one institution. Future research should focus on developing guidelines and training materials tailored for teachers to enhance their knowledge, attitudes, and practices regarding CPR and AED, as well as to address the identified barriers.

4. CONCLUSIONS

Overall, this study found a significant association between gender and attitudes and practices related to CPR and AED, indicating that both male and female teachers can influence the level of engagement with these life-saving techniques. However, the total knowledge scores were not associated with any of the sociodemographic variables examined. Despite this, the level of knowledge and skills among school teachers can be significantly improved through adequate educational training in CPR and AED, which should include both theoretical and practical components.

Acknowledgement

We would like to extend our sincere thanks to all individuals and organizations who contributed to the success of this manuscript. Special gratitude goes to our research team, whose dedication and hard work made this study possible. We are also grateful to our institution for their support and resources throughout the project. Lastly, we would like to thank the participants of the study, whose valuable input has greatly enriched the findings. Without their contribution, this manuscript would not have been possible.

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