International Journal of Science and Healthcare Research
Vol. 9; Issue: 3; July-September 2024
Website: ijshr.com
Original Research Article *ISSN: 2455-7587*

Understanding Cardiopulmonary Resuscitation Knowledge in Physiotherapy Undergraduates - A Cross-Sectional Study

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DOI: https://doi.org/10.52403/ijshr.20240322

ABSTRACT

Background: CPR is a lifesaving technique. It aims to keep blood and oxygen flowing through the body when a person's heart and breathing have stopped. When the heart stops breathing, Cardiopulmonary resuscitation (CPR) is used to save the patient's life. After a cardiac arrest, immediate CPR can double or triple the possibilities of survival. C-A-B [chest compression, airway and breathing], should be commenced when a victim/patient is unresponsive and not breathing normally. Early compressions can improve outcomes by keeping the brain and heart perfused with the oxygenated blood in the circulatory system prior to collapse. When patients receive timely cardiopulmonary resuscitation from qualified medical personnel, cardiac arrests and the deaths that accompany them are decreased. When using exercise as a therapeutic approach, physiotherapists must be proficient in CPR not only to handle potential adverse cardiac events during exercise, but also because early defibrillation and widespread application of CPR can drastically lower the death rate from a heart attack. In this study, we evaluated physiotherapy students' understanding of cardiopulmonary resuscitation in Surat.

Aims: The study aimed to assess the knowledge regarding the Cardiopulmonary resuscitation in Physiotherapy undergraduates in Surat, Gujarat.

Objectives: The objective of this study is to assess knowledge of CPR by using online google form questionnaire.

Method: A cross-sectional study of physiotherapy students in Surat was conducted. An online survey was conducted with a self-administered questionnaire. The data was collected from 103 physiotherapy students in Surat aged 18-27 years. A CPR knowledge questionnaire was completed by the students and the result was analyzed with Microsoft Excel 2019.

Result: Results suggest that the students were a good understanding of the importance of CPR in clinical practice and stand average in knowing its indications and effectiveness. Whereas, 62% of them were completely aware of the universal compression ventilation ratio, and 45% were aware of the current order of CPR being compression, airway, and breathing.

Conclusion: In this study, it concludes that awareness of CPR is good among physiotherapy students in Surat.

Keywords: Cardiopulmonary resuscitation knowledge, Physiotherapy students, Awareness of CPR

INTRODUCTION

Cardiac arrest, sometimes referred to as circulatory arrest or cardiorespiratory arrest,

is the stoppage of normal blood flow followed on by an ineffective cardiac contract. SCA, or sudden cardiac arrest, is a medical emergency. [1] For decades, scientists and medical professionals have been focused on the task of resuscitating patients who have experienced cardiac arrest. Still, the bulk of patients never receive effective resuscitation. [2] Survival rates following cardiac arrest are often poor and are influenced by factors such as timing of defibrillation, quality of cardiopulmonary resuscitation (CPR), and early intervention. [3]

The main goals of basic life support (BLS) are to identify a victim of cardiac arrest or any foreign body obstruction as soon as possible, administer cardiopulmonary resuscitation, and defibrillation. [4] The likelihood of the victim surviving is increased in the shorter amount of time between the moment of arrest and the administration of chest compression or defibrillation. [5] The American Heart Association (AHA) and the European Council for Regulation (ERC)periodically updates and publishes guidelines for emergency cardiovascular care and CPR [6]

In India, there is no development of compulsory CPR training schedules and stringent need to renew the license/ certification for basic life support for hospital-based health care providers which results in wide gap in knowledge and practice of CPR [7]. According to studies, performing CPR right away after a ventricular fibrillation collapse increases the patient's odds of survival by two or even three times. On the other hand, the odds of survival drop by 7% to 10% for every minute. when CPR is postponed [8]. Responders like bystanders, hospitals, emergency medical services, and the larger health services and resuscitation network (consisting of professionals, laypeople, and the community) are a few examples of these. In the event of an OHCA, how we interact with them and allow them to function as a team could affect their chances of surviving. [9]

The following are the measures that a single healthcare professional must do to administer BLS:

1. Verify that the patient is not moving or responding, is not breathing normally, or is just gasping.
2. Turn on the emergency response system. If there is an automated external defibrillator (AED) nearby, obtain one.
3. In the event that an AED is not accessible, begin adult cardiac arrest rescue breathing and chest compressions (use cycles of 30 compressions to 2 ventilations).
4. Open the airway and check the breathing.
5. Take two breaths that cause the person's chest to lift if they are not breathing.
6. Start chest compressions again right away, pushing hard and deeply at a minimum depth of 2 inches (5 cm) and a minimum pace of 100 to 120 per minute. Never go faster than 120 /min. [10]

So, it should be carried out by the onlookers who saw the incident. CPR is therefore considered a skill for everyone. [11] Despite first described in 1933, the use of internal defibrillation was not feasible until the introduction of external cross-chest defibrillation in 1956 and 1957. [12]

When using exercise as a therapeutic approach, physiotherapists need to be well-versed in CPR because early defibrillation can dramatically lower cardiac mortality. This goes beyond just being able to handle potential adverse cardiac events during exercise. [13] Even though exercising in such settings necessitates knowledge of CPR, physiotherapists are medical professionals who can work in intensive and critical care units and manage patients who should be able to treat heart disease. Therefore, it is critical to evaluate these professionals' knowledge of this topic to support curriculum revisions and continuing education that will empower physiotherapists to improve patient outcomes. [1]

Procedure	Adult[5]	Child[14]	Infant[11]
Compressions			
Where to check pulse (limit pulse check to <10 s)	Carotid artery	Carotid or femoral artery	Brachial artery
Hand placement	Heel of one hand on sternum in center of chest, between nipples. Second hand on top of first with hands overlapped and parallel	Lower half of sternum with heel of one hand or with two hands (for larger children). Do not compress over xiphoid	Sternum with two fingers placed just below nipple line in center of chest
Compression-to-ventilation ratio	One or two rescuers, 30:2	One rescuer, 30:2; two rescuers, 15:2	Neonatal: One rescuer 3:1 ratio of compressions to ventilation, with 90 compressions and 30 breaths to achieve approximately 120 events per minute to maximize ventilation at an achievable rate; 15:2 for cardiac origin
Cycles of compression-to-ventilation	5	5	n/a
Depth of compressions (push in hard and fast, allow chest to recoil fully)	Minimum of 2 in (5 cm)	At least one-third anteroposterior diameter of chest or 2 inches (5 cm)	At least one-third anteroposterior diameter of chest or 1½ inch (4 cm)
Compression rate	100–120/min (do not exceed 120/min)	100–120/min (do not exceed 120/min)	120/min
Breathing			
Obstructive procedure	*Responsive:* If mild, allow victim to clear the airway by coughing. If severe, repeat abdominal thrusts until foreign body is expelled or the choking victim becomes unresponsive. Consider chest thrusts if abdominal thrusts are ineffective, if rescuer is unable to encircle victim's abdomen, or if victim is in the late stages of pregnancy *Unresponsive:* Carefully move victim to the ground, immediately activate EMS system, and begin CPR (compressions first), then look into the mouth before giving breaths. If a foreign body is seen, it should be removed. Follow ventilation with chest compressions	Same as for adult	*Responsive:* If mild, allow infant to clear the airway by coughing. If infant is unable to make a sound (severe obstruction), deliver five back blows (slaps) followed by chest thrusts repeatedly until object is expelled or infant becomes unresponsive. Abdominal thrusts should not be done on infants because they may damage the largely unprotected liver *Unresponsive:* Activate EMS system and begin CPR, 30 chest compressions first, then look into the mouth before giving breaths. If a foreign body is seen, it should be removed. Follow ventilations with cycles of 30 chest compressions and 2 ventilations
Rescue Breathing (Pulse Present)			
Palpable pulse but no spontaneous breaths or inadequate breathing	10–12/min, 1 breath every 5–6 s	12–20/min, 1 breath every 3–5 s; if palpable pulse ≥60/min	40–60/min, 1 breath every 1–1.5 s; if palpable pulse pulse ≥60/min to <100/min

FIG 1) Steps for Cardiopulmonary resuscitation

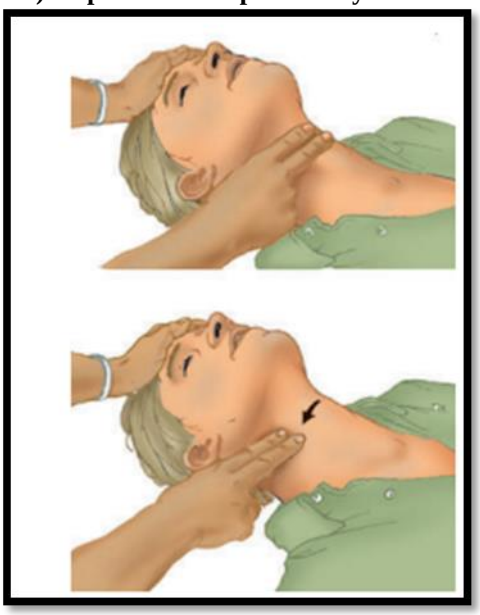


FIG.2) DETERMINING PULSELESSNESS

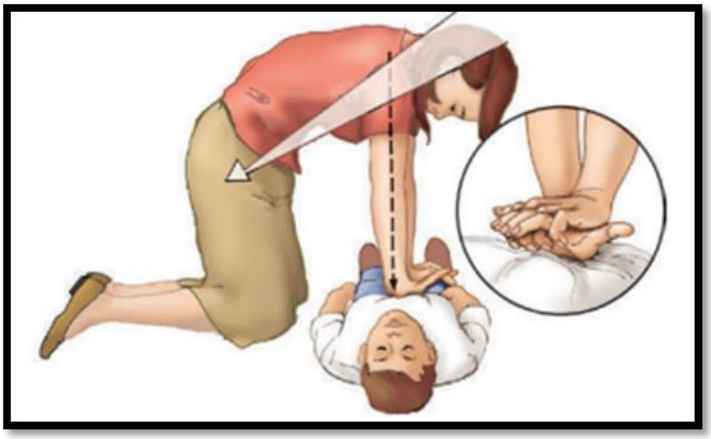


FIG.3)-POSITION OF PRACTITIONER FOR EXTERNAL CARDIAC COMPRESSION. NOTE: INTERLOCKED FINGERS TO PREVENT ON RIB CAGE.

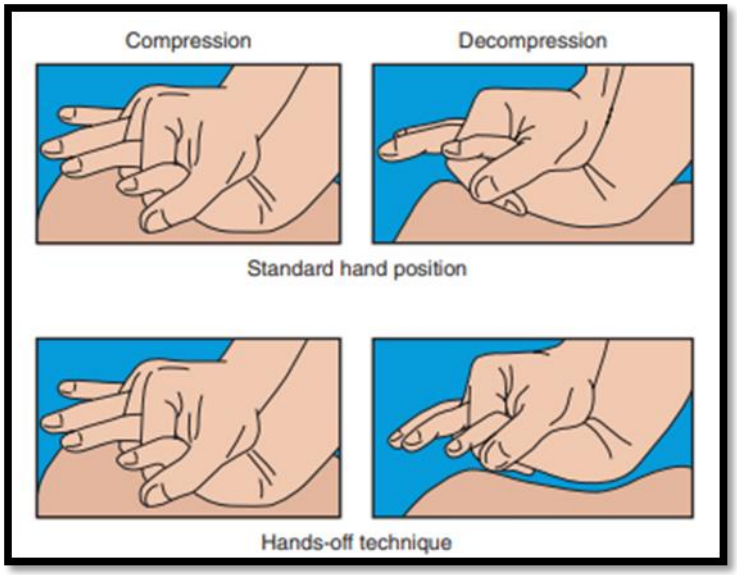


FIG.4)-TECHNIQUE OF HAND POSITION

MATERIALS & METHODS

Study Design: Cross-Sectional study
Study Area: Surat, Gujarat, India
Study Population: Physiotherapy Undergraduates
Sample Size: 103
Sample Method: Convenient sampling
Inclusion Criteria:

- Physiotherapy undergraduates.
- Age group :18-27

Exclusion Criteria:

- Non-medical students
- Physiotherapy post graduates
- Psychological ill individual
- Certified CPR practitioner

TOOLS: Online Google form Questionnaire

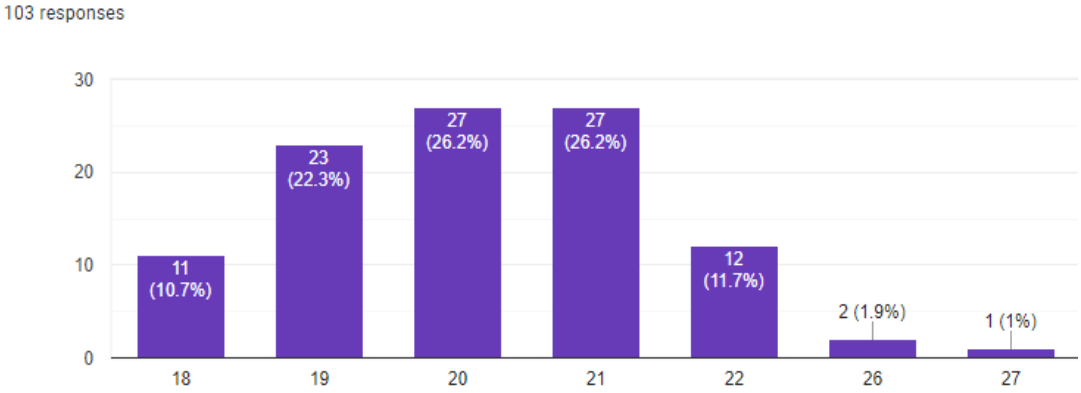
PROCEDURE: The study was conducted via an online survey using Google forms
The participation of every individual was voluntary. Those who could understand English and those who were willing to participate were included in the study. Students will be removed from the study if they refuse to comply going forward and refuse to participate at any stage during the survey. The questionnaire used was self-administered whose validity which is Cronbach alpha was more than 8.
Online consent from each individual has been taken on the first page of the questionnaire.
The study was done in three sections: First section is to know the importance of CPR in clinical practice. The second section of

study is to know the main goal and accuracy of CPR interventions. That includes both correct and incorrect statements. Participants have to choose any of the options and we can have determined from the answers about the knowledge of an individual. The third section tells about indications, methods and effectiveness of CPR.

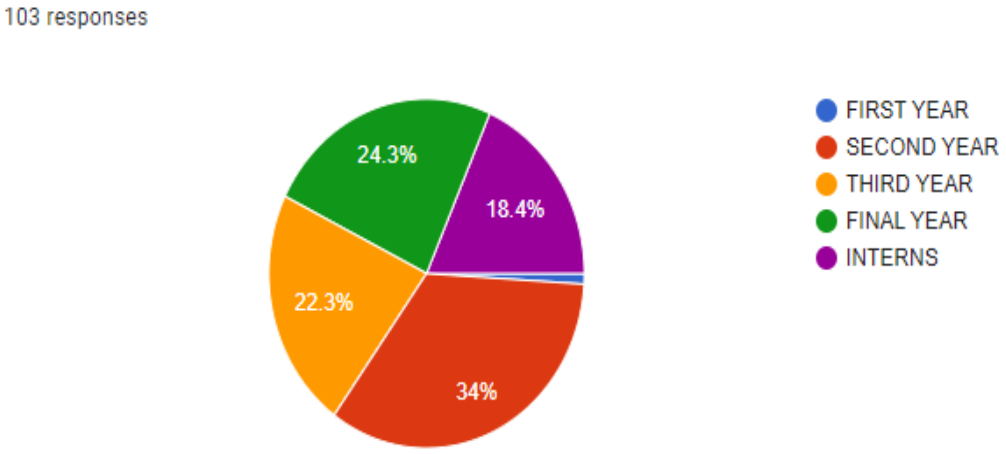
Statistical Analysis: It has been done through Microsoft excel 2019.

RESULT

-AGE



STUDYING YEAR

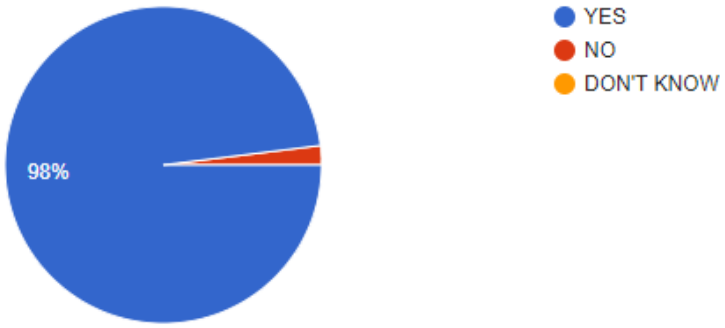


Statement No.	Statement	YES	NO	Don't Know
1.	Importance of CPR	98%	2%	-
2.	Correct CPR Procedure	97.1%	1%	2%
3.	Basic emergency	97.1%	2%	1%
4.	Participate in CPR	95.1%	3.9%	1%
5.	CPR procedure	30.4%	62.7%	6.9%
6.	More of harmful	13.7%	78.4%	7.8%
7.	Waste of man power	8.9%	86.1%	5%
8.	Teaching and Mastering CPR	89.1%	7.9%	3%

[Table/FIG-1]: Percentage of responders to the general statements regarding the importance of CPR in clinical practice.

SECTION: A CARDIOPULMONARY RESUSCITATION [CPR] IN CLINICAL PRACTICE.

I am aware about importance of CPR in clinical practice.

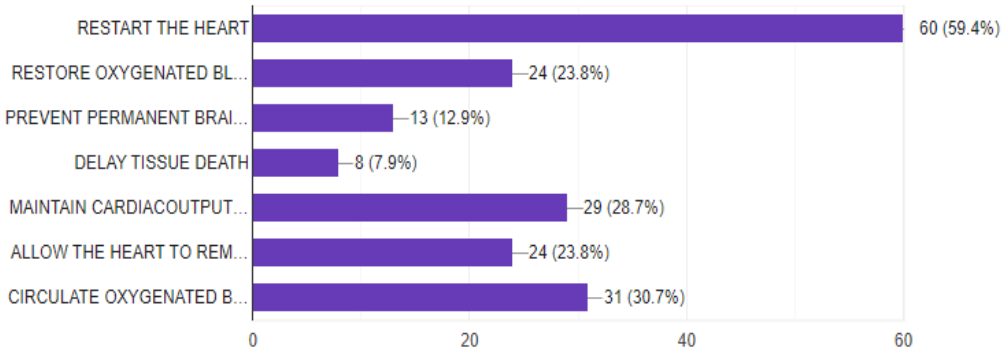


Statement No.	Statement	TRUE	FALSE	Don't know
1.	CPR	99%	1%	-
2.	Attempted always	12.1%	84.8%	3%
3.	Within 6-7 minutes	60%	23%	17%
4.	Artificial respiration	41.4%	22.2%	36.4%
5.	Survive	66%	15%	19%
6.	Irreversible damage	55%	16%	29%
7.	No connection to the victim	55.6%	17.2%	27.3%
8.	Ceases for >10 hours	52.6%	13.4%	34%
9.	Return of spontaneous circulation	69.4%	14.3%	16.3%
10.	Defibrillator	60.6%	12.1%	27.3%
11.	Compression-only CPR	59.2%	21.4%	19.4%
12.	Survival rate	72.4%	8.2%	19.4%
13.	Less effective in children	38.1%	16.5%	45.4%
14.	Calm and contented	75.3%	9.3%	15.5%
15.	Misrepresented	64.6%	12.5%	22.9%

[TABLE/FIG-2]: Percentage of responders to the statements regarding the indications, methods, and effectiveness of CPR.

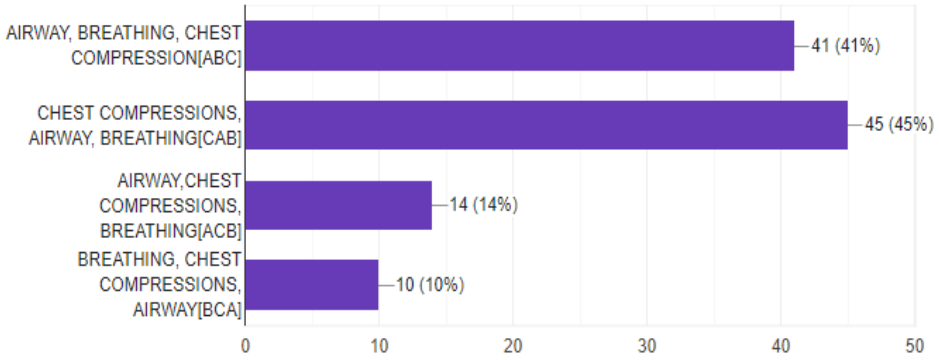
SECTION: B THE MAIN GOAL AND ACCURACY OF CARDIOPULMONARY RESUSCITATION[CPR] INTERVENTION. THIS STUDY INCLUDES BOTH CORRECT AND INCORRECT STATEMENTS.

The purpose of Cardiopulmonary resuscitation [CPR]:

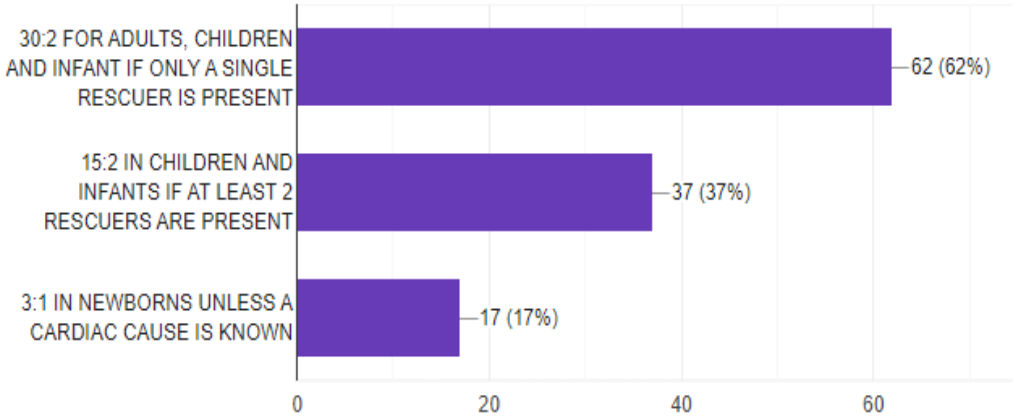


-59.4% participants believed that CPR is done to restart the heart and only 7.9% believe that it is done to delay tissue death.

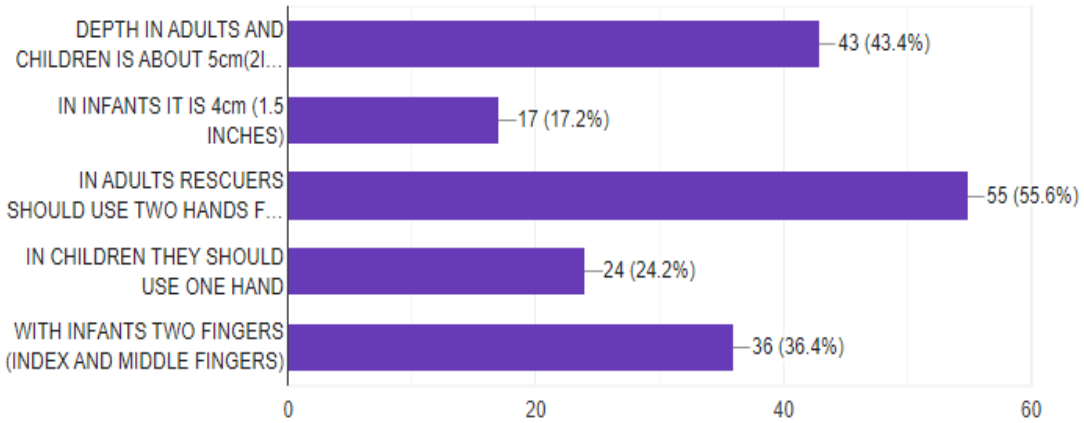
The current order of updated Cardiopulmonary resuscitation [CPR] interventions for all age groups except new born is



-45% knows very well that C-A-B is done during emergency and not the A-B-C.
The recommended universal compression to ventilation ratio with a compression rate of at least 100 per minute in all groups is



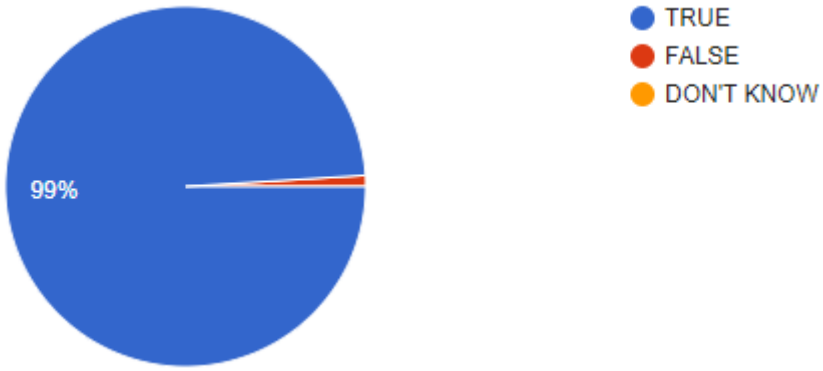
62% people knows that 30-2 for adults, children and infant is given when only a single rescuer is present.
Regarding the chest compression, the following procedures are recommended



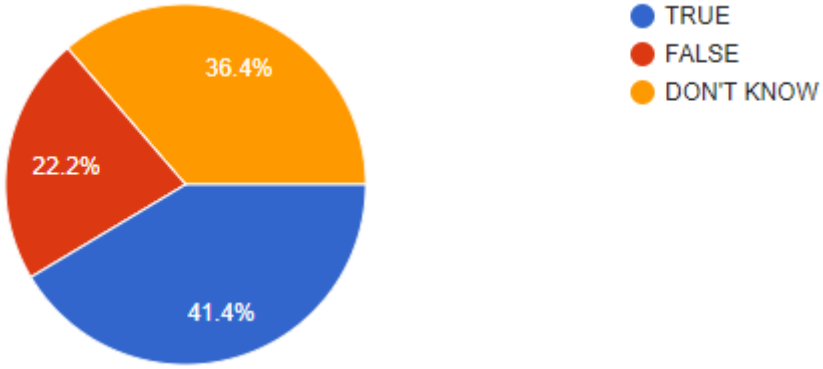
In this question participants knows very well that depth in adults and children is a about 5cm(43.4%) and rescuer should use two hands for the chest compression(55.6%) but don't have understanding about CPR in infants.

SECTION C: INDICATIONS, METHOD AND EFFECTIVENESS OF CARDIOPULMONARY RESUSCITATION

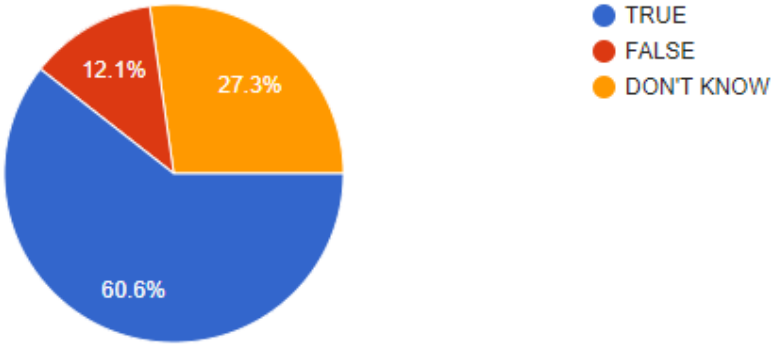
CPR is an emergency procedure which is attempted in an effort to return to life in cardiac arrest.



Artificial respiration are more appropriate than CPR, if a person is not breathing but has palpable pulse (i.e, respiratory arrest)



Defibrillator is an electrical device used as shock to the heart and needed to restore a viable or "perfusing" heart rhythm.



DISCUSSION

This study mainly explains about the knowledge of a physiotherapy undergraduates about cardiopulmonary resuscitation

A total of 103 participants have taken part. There are three sorts of questionnaire surveys: Regarding the significance of CPR, students performed exceptionally well in the first one (98% responded positively), demonstrating a greater collective understanding of the need for CPR.

78.4% of students wisely underestimated the negatively posed question, "CPR was harmful." Sadly, 13.7% of them acknowledged the assertion, while 2% of

them disagreed and said they "did not know." In the second category, the questions focused on the primary objective and precision of CPR intervention. In the third, which addressed CPR's indications, techniques, and efficacy, the majority of them had sound knowledge (as measured by scores, >90% received an outstanding grade, 29.4% received a fair grade, and 34% received a poor grade). 59.4% of students correctly identified every response to the question about the "purpose of CPR" as correct. Only 62% of students answered the question correctly when we questioned them about the "universal compression to ventilation ratio" in the various age groups, and only 45% of them knew that the improved order of CPR intervention is currently C-A-B rather than the prior A-B-C. Using the CPR knowledge questionnaire, only 43.4% of them correctly answered all the questions on the depth of chest compression.

“Cardiorespiratory arrest is the sudden cessation of spontaneous and effective ventilation and systemic perfusion. In the past, whenever the heart stopped working, a patient was considered dead. But we now know that certain interventions, carried out in less than four minutes, would have made the patient survive”

The abrupt loss of both systemic perfusion and spontaneous, efficient breathing is known as cardiopulmonary arrest. In the past, a patient was deemed dead whenever their heart stopped beating. However, we now understand that specific actions, taken in under four minutes, would have allowed the patient to survive.

Meena kumari et.al their study shows that There is a striking disparity in survival outcomes from cardiac arrest across systems of care, with some systems reporting fivefold higher survival rates than others. “Although technology, such as that incorporated in automated external defibrillators (AEDs), has contributed to increased survival from cardiac arrest, no initial intervention can be delivered to the victim of cardiac arrest unless bystanders are ready, willing, and able to act. Moreover, to be successful, the actions of bystanders and other care providers must occur within a system that coordinates and integrates each facet of care into a comprehensive whole, focusing on survival to discharge from the hospital” [11]

A physical therapist is supposed to be knowledgeable and skilled in resuscitation as They work with both hospitalized and out-of-hospital patients. This questionnaire revealed that students studying physiotherapy had mediocre knowledge of CPR and that it needs to be improved.

Dr. Trisha Kshirsagar et.al their study shows that This study highlights the basic knowledge and practice among junior resident doctors and interns. Among both groups, an average of 65.81% questions were correctly answered indicating fair knowledge on CPR. Since interns and junior resident doctors are the first healthcare providers in the majority of medical colleges across India, CPR knowledge and skills are essential for both. Usually in the pre final clinical terms, CPR is taught to medical students. However, knowledge and skills related to it deteriorate slowly with time. Retention of the knowledge is challenging and ongoing training is essential.

Mutlu Vural et.al nursing students' projected total score for CPR knowledge was quite good. On the other hand, the awareness score for CPR was higher than the skill score. After conducting a detailed investigation, it was discovered that their practical approach and knowledge of CPR guidelines were outdated.

The ultimate goal of CPR and post-CPR care is to return the patient to a functional state of health and a prior quality of life. The foundation of first aid and emergency medical care that can improve outcomes beyond recovery of spontaneous circulation is high-quality CPR. To save lives in situations where a patient is not in the hospital, it is crucial that every adult in the community understands CPR. [8]

CONCLUSION

All medical personnel, including paramedics and medical students, are generally required to be proficient in the recognition and treatment of respiratory or cardiac arrest. According to the results of this questionnaire, students studying physiotherapy have more than average level of CPR knowledge. These mild deficiencies might be filled by offering several well-crafted certified CPR training courses, which would ensure that students are well-versed in both practical application and theoretical understanding

Declaration by Authors

Ethical Approval: Approved
Acknowledgement: None
Source of Funding: None
Conflict of Interest: The authors declare no conflict of interest.

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How to cite this article: Kunjal Patel, Nisha Pathak. Understanding cardiopulmonary resuscitation knowledge in physiotherapy undergraduates - a cross-sectional study. *International Journal of Science & Healthcare Research.* 2024; 9(3): 179-189. DOI: *10.52403/ijshr.20240322*

Cardiopulmonary Resuscitation Knowledge Questionnaire.

A. General questions to know the importance of cardiopulmonary resuscitation (CPR) in clinical practice.

1	I am aware about importance of CPR in clinical practice	Y	N	DK
2	According to me, knowledge about correct CPR procedure is mandatory to all health care professionals and it should be made compulsory	Y	N	DK
3	I believe CPR is a basic emergency need for the betterment of mankind and health status	Y	N	DK
4	I would like to participate in CPR awareness programs and have lifesaving experience	Y	N	DK
5	I believe CPR procedures are arduous, unethical, incorrect and purely inhuman	Y	N	DK
6	Rather than being beneficial, it is more harmful to the patients	Y	N	DK
7	Conducting CPR is simply a waste of man power and time	Y	N	DK
8	Teaching and mastering CPR intervention should be made mandatory to all medical undergraduates	Y	N	DK

B. The main goal and accuracy of cardiopulmonary resuscitation (CPR) intervention. This study includes both correct and incorrect statements.

1) The purpose of cardiopulmonary resuscitation (CPR):			
1.	Restart the heart [ ]	2.	Restore oxygenated blood to the brain [ ]
3.	Prevent permanent brain damage [ ]	4.	Delay tissue death [ ]
5.	Maintain cardiac output to keep vital organs alive [ ]	6.	Allow the heart to remain responsive to defibrillation attempts [ ]
7.	Circulate oxygenated blood [ ]		
2) The current order of updated cardiopulmonary resuscitation (CPR) intervention for all age groups except newborns is			
1.	Airway, Breathing, Chest compressions (ABC)	2.	Chest compressions, Airway, Breathing (CAB)
3.	Airway, Chest compressions, Breathing (ACB)	4.	Breathing, Chest compressions, Airway, (BCA)
3) The recommended universal compression to ventilation ratio with a compression rate of at least 100 per minute in all groups is			
1.	30:2 for adults, children and infant if only a single rescuer is present [ ]		
2.	15:2 in children and infants if at least 2 rescuers are present [ ]		
3.	3:1 in newborns unless a cardiac cause is known [ ]		
4) Regarding the chest compression the following procedures are recommended			
1.	Depth in adults and children is about 5 cm (2 inches) [ ]	2.	In infants it is 4 cm (1.5 inches) [ ]
3.	In adults rescuers should use two hands for the chest compressions [ ]	4.	In children they should use one hand [ ]
5.	With infants two fingers (index and middle fingers) [ ]		

C. Indications, Methods and Effectiveness of Cardiopulmonary Resuscitation

1	CPR is an emergency procedure which is attempted in an effort to return life in cardiac arrest	T	F	DK
2	It has to be attempted always inside of a hospital not outside	T	F	DK
3	CPR is generally only effective if performed within 6–7 minutes of the stoppage of blood flow to vital organs	T	F	DK
4	Artificial respirations are more appropriate than CPR, if a person is not breathing but has palpable pulse (i.e., respiratory arrest)	T	F	DK
5	On average, 85–90% of people who receive CPR survive if conducted by experienced personnel	T	F	DK
6	The brain may sustain damage after blood flow has been stopped for about 4 mins and irreversible damage after about 7 mins	T	F	DK
7	According to the recent survey people with no connection to the victim are more likely to perform CPR than a member of their family	T	F	DK
8	If blood flow ceases for>10 hrs, virtually all cells of the body die	T	F	DK
9	CPR is generally continued until the person regains return of spontaneous circulation or is declared dead	T	F	DK
10	Defibrillator is an electrical device used as shock to the heart and needed to restore a viable or "perfusing" heart rhythm	T	F	DK
11	Compression-only CPR by the lay public is recommended to an adult having cardiac arrest out of hospital	T	F	DK
12	The survival rate is very high if immediate CPR is done followed by defibrillation within 3–5 minutes of sudden cardiac arrest	T	F	DK
13	Compression-only CPR is less effective in children than in adults, as cardiac arrest in children is more likely to have a non-cardiac cause	T	F	DK
14	It is always better to be calm and contented while conducting CPR rather than look frightened	T	F	DK
15	CPR is often severely misrepresented in movies and television as being highly effective in resuscitating a person who is not breathing and has no circulation	T	F	DK
CPR - cardiopulmonary resuscitation; DK - do not know; F - false; N - no; T - true; Y - yes				

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