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Effect of Structured Training on Knowledge, Attitude, and Practice Regarding Cardiopulmonary Resuscitation among Nursing Students: A Quasi-Experimental Study

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ABSTRACT

Background: *Cardiovascular diseases (CVDs) are the leading cause of mortality worldwide, with Pakistan reporting higher incidence and death rates than the global average. Cardiopulmonary resuscitation (CPR) is vital for survival in cardiac arrest, yet nursing students often lack sufficient knowledge, attitude, and practice (KAP). This study assessed the impact of structured Basic Life Support (BLS) training on students' KAP regarding CPR.*
Methods: *A quasi-experimental pre-test/post-test design was conducted at Thar Institute of Nursing & Allied Health Sciences (TINAHS), Umerkot. A total of 158 undergraduate nursing students were recruited through convenience sampling. Data were collected using a structured questionnaire covering demographics, a 20-item knowledge test, an 8-item attitude scale, and a 14-item practice checklist based on AHA 2015 guidelines. Students underwent a 4–5 hour BLS course, followed by post-test assessment.*
Results: *Pre-test findings revealed limited knowledge, with no student achieving excellent scores. Post-intervention, 22.2% reached excellent knowledge and 69% scored very good. Attitudes improved significantly, with increased willingness and confidence to perform CPR. Practice also improved, particularly in correct pulse checks, chest compressions, and ventilation techniques.*
Conclusion: *Structured BLS training effectively enhanced nursing students' CPR competence. Regular integration of BLS sessions into nursing curricula is strongly recommended to ensure preparedness for emergency care.*

Keywords: *Cardiopulmonary resuscitation (CPR); Basic Life Support (BLS); Nursing students; Knowledge, Attitude, and Practice (KAP); Structured training; Emergency preparedness*

INTRODUCTION

Cardiovascular diseases (CVDs) are the leading cause of death globally. An estimated 19.8 million people died from CVDs in 2022, representing approximately 32% of all global deaths. Of these deaths, 85% were due to heart attack and stroke.[1] According to the 2019 Global Burden of Disease study, the estimated age-standardized incidence of CVD in Pakistan was 918.18 per 100,000 (global, 684.33 per

100,000), and the age-standardized death rate was 357.88 per 100,000 (global, 239.85 per 100,000).[2] Cardiopulmonary resuscitation (CPR) is a vital life-saving intervention for individuals experiencing sudden cardiac arrest, and its timely administration significantly improves survival outcomes. Nurses, being frontline healthcare providers in hospital and community settings, play a crucial role in initiating CPR and ensuring early defibrillation when indicated.[3] Knowledge of CPR encompasses understanding cardiac arrest recognition, chest compression-to-ventilation ratios, and the appropriate use of automated external defibrillators (AEDs).[4] Attitude also plays a pivotal role, as students with positive attitudes are more willing to perform CPR, even in challenging circumstances.[5] However, without regular simulation training and structured practice sessions, skills deteriorate quickly, leaving students less prepared to respond effectively.[6] Several factors influence the knowledge, attitude, and practice (KAP) of nursing students regarding CPR, including the quality of training, curriculum design, institutional support, and clinical exposure. Evidence from recent studies in Pakistan suggests that gaps in CPR education persist, especially due to limited simulation-based training and a lack of standardized assessment of competencies.[7,8] Given the rising burden of cardiovascular diseases in Pakistan and the critical role of nurses in emergency care, this study aims to evaluate the effect of structured cardiopulmonary resuscitation training on the knowledge, attitude, and practice of nursing students. By adopting a quasi-experimental approach, the study seeks to determine improvements in students' competence and confidence, thereby contributing to evidence-based strategies for strengthening nursing education and emergency preparedness in the Pakistani context.

Aim

This study aimed to assess the knowledge, attitude, and practice related to cardiopulmonary resuscitation (CPR) among undergraduate nursing students at TINAHS and to evaluate the effectiveness of structured education in promoting their competency in CPR.

MATERIAL AND METHODS

Research Design: A quasi-experimental study design with a pre-test and post-test approach was used.

Study Setting: The study was conducted in Thar Institute of Nursing & Allied Health Sciences (TINAHS), Umerkot.

Sample: A total of 158 undergraduate nursing students from TINAHS, Umerkot, were recruited using a non-randomized convenience sampling technique. The required sample size was calculated with the aid of Raosoft® software, ensuring an adequate level of precision and reliability for the study outcomes.

Inclusive criteria

- Student nurses who were studying in a selected institute.
- Student nurses who were willing to participate

Exclusion criteria

- Student nurses studying in the 1st semester
- Student nurses who were not willing to participate.
- Nursing students who were on leave
- Paramedical student

Tools of Data Collection

A structured questionnaire was employed for data collection in this study. The tool comprised four sections:

1. **Socio-Demographic Data Sheet:** This section gathered information on participants' general characteristics, including age, gender, and year of education.
2. **Knowledge Assessment:** A structured knowledge questionnaire consisting of 20 items was developed to evaluate students' theoretical understanding of cardiopulmonary resuscitation (CPR).
3. **Practice Assessment:** The practice component included 14 items designed in accordance with the 2015 American Heart Association (AHA) Basic Life Support (BLS) guidelines to assess students' self-reported CPR-related skills.
4. **Attitude Assessment:** This section comprised 8 items based on the content of AHA BLS guidelines, aimed at measuring students' perceptions, confidence, and willingness to perform CPR in clinical settings.

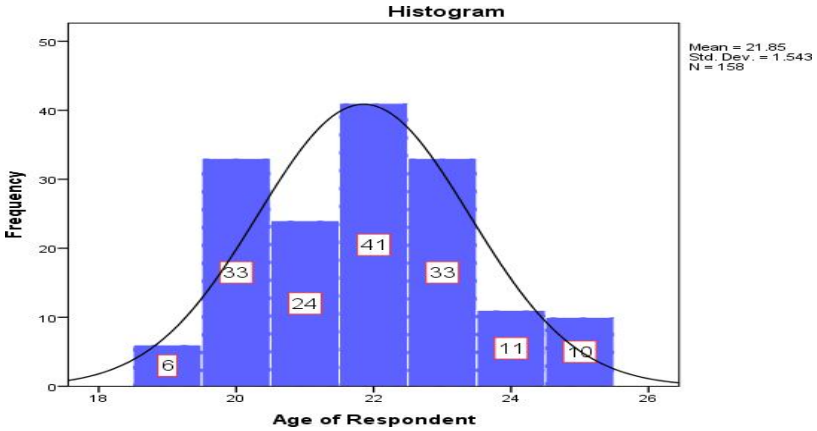
Procedure for data collection- Data collection commenced after obtaining formal approval from the Principal of TINAHS. Following permission, participants were informed about the study, and baseline data were obtained by administering the structured questionnaire individually before the commencement of the teaching program.

The intervention consisted of a Basic Life Support (BLS) training course with a duration of 4–5 hours. The training covered essential components, including scene safety, patient assessment, activation of the emergency response system, chest compressions, airway and breathing management, and the use of an automated external defibrillator (AED) for adult patients presenting with cardiac arrest (unresponsive, apneic, and pulseless). Each component was taught as a discrete critical skill, followed by hands-on practice sessions to ensure comprehension and skill acquisition.

The teaching program was delivered using a multimodal instructional format, incorporating PowerPoint presentations, algorithms, instructional videos, and live demonstrations. Upon completion of the training, post-intervention data were collected using the same structured questionnaire to evaluate changes in knowledge, attitude, and practice among participants.

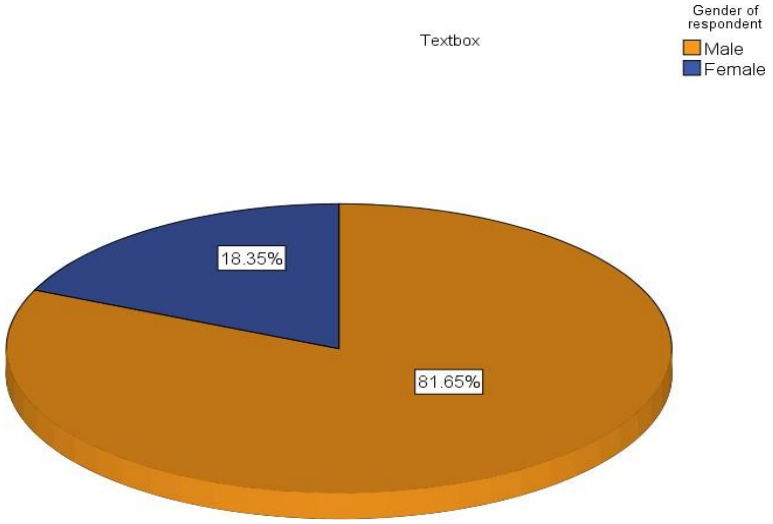
RESULTS

Graph 1: Age Distribution of Participants



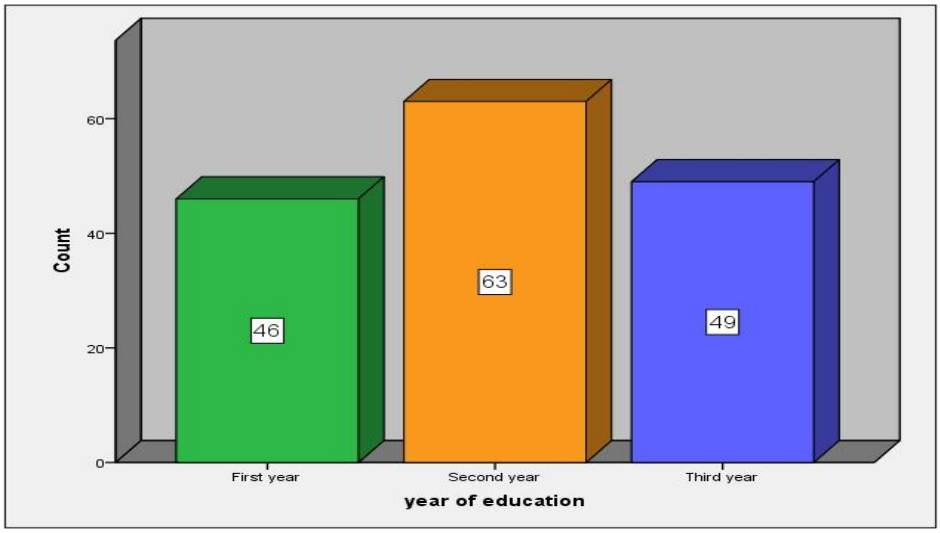
The above histogram indicates the mean age of participants was 21.85 years (SD = 1.54)**,** with ages ranging from 18 to 25 years. The distribution approximates a normal curve, reflecting a relatively homogeneous age group of undergraduate nursing students.

Graph 2: Gender Distribution of participants

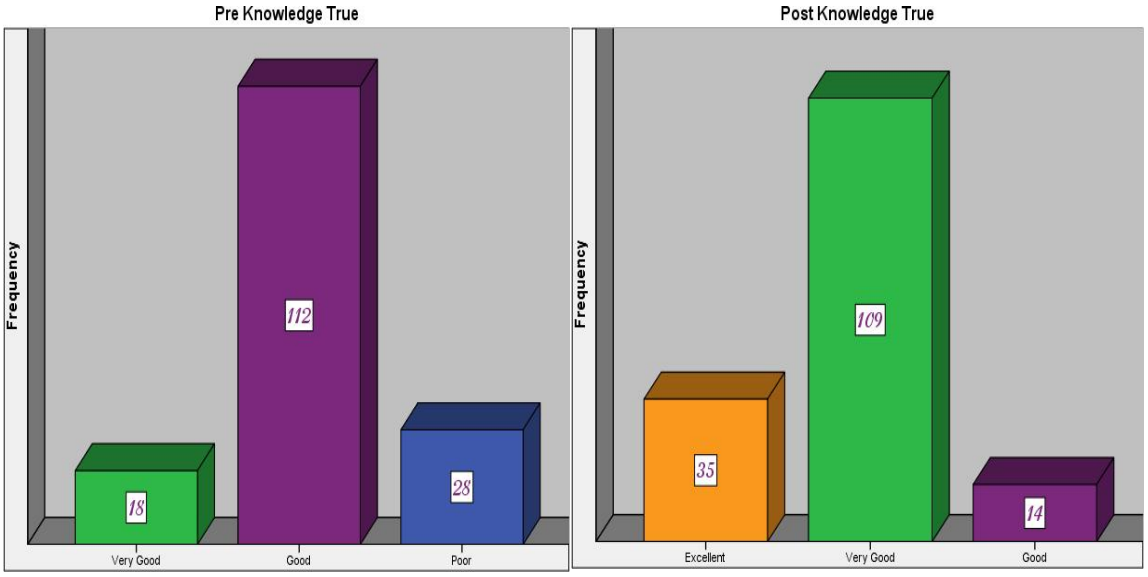


Among the 158 nursing students, the majority were male (81.65%), while female students represented 18.35% of the sample. This indicates that the study population was predominantly male, reflecting the gender enrollment trend at the institute during the period of data collection.

Graph 3: Year-wise distribution of Participants



Graph 4: Cardiopulmonary resuscitation: Pre and Post knowledge Distribution among participants



Graph-4(A) **Graph 4(B)**

Among the 158 nursing students, the highest proportion was in their second year (n = 63; 39.9%)**,** followed by those in the third year (n = 52; 32.9%)**.** Fourth-year students accounted for 26 participants (16.5%)**,** while first-year students were excluded based on the study criteria. The distribution shows that the majority of respondents were in the middle years of their nursing program, which may reflect their relatively greater clinical exposure compared to senior or newly enrolled students.

In the pre-test, none of the 158 students demonstrated *excellent* knowledge. Only 18 students (11.4%)

scored in the *very good* category, while the majority, 112 students (70.9%), fell in the *good* category. A further 28 students (17.7%) were classified as having *poor* knowledge. These findings indicate that before training, most students had only a moderate understanding of CPR principles, with a substantial proportion exhibiting inadequate knowledge.

In contrast, the post-test results demonstrated marked improvement following the structured educational intervention. A total of 35 students (22.2%) achieved *excellent* knowledge scores, while 109 students (69.0%) reached the *very good* level. The remaining 14 students (8.9%) were categorized as *good*, and none of the participants scored in the *poor* category. This upward shift in performance illustrates the effectiveness of the Basic Life Support (BLS)-based training program in significantly enhancing the theoretical knowledge of nursing students regarding CPR.

Nursing students' attitudes toward CPR improved significantly after training. While most students already agreed on the importance of BLS before the session, some misconceptions (e.g., CPR being complex, futile in the elderly, or hesitation in mouth-to-mouth ventilation) were common. Post-test results showed a positive shift, with more students expressing confidence, willingness to perform CPR, and readiness to share knowledge with peers.

Table 1: Pre- and Post-Test Attitude Responses of Nursing Students Regarding Cardiopulmonary Resuscitation (CPR)

Attitude Questions	Pre- Test Result	Post- Test Result
1. BLS training is necessary	Agree= 149 (94.3%) Disagree= 5 (3.2%) I Don't know= 4 (2.5%)	Agree= 155 (98.1) Disagree= 1 (0.6) I Don't know= 2 (1.3)
2. BLS should be part of curriculum	Agree= 130 (82.3) Disagree= 21 (13.3) I Don't know= 7 (4.4)	Agree= 147(93) Disagree= 7 (4.4) I Don't know= 4 (2.6)
3. Undergraduates should do CPR whenever possible.	Agree= 122 (77.2) Disagree=29 (18.2) I Don't know=7 (4.4)_	Agree= 139(88) Disagree= 12(7.6) I Don't know=7 (4.4)
4. If I knew CPR well, I wouldn't hesitate to perform CPR	Agree= 115(72.8) Disagree= 39(24.7) I Don't know=4 (2.5)	Agree= 125 (79.1) Disagree= 26 (16.5) I Don't know=7 (4.4)
5. I would like to transfer my CPR knowledge to colleagues	Agree= 142 (89.9) Disagree=11 (7) I Don't know= 5 (3.2)	Agree= 148 (93.7) Disagree= 7 (4.4) I Don't know= 3 (1.9)
6. I think my Institute is able to provide CPR training.	Agree=135 (85.4) Disagree= 22 (13.9) I Don't know= 1 (0.6)	Agree=138 (87.3) Disagree= 15 (9.5) I Don't know= 5 (3.2)
7. I feel CPR is complex and time consuming	Agree= 109 (69) Disagree= 44 (27.8) I Don't know= 5 (3.2)	Agree= 68 (43) Disagree=77 (48.7) I Don't know=13 (8.3)
8. I feel Mouth to mouth ventilation should be performed if mask is not available on a	Agree= 118 (74.7) Disagree= 31(19.6) I Don't know= 9 (5.7)	Agree= 127 (80.3) Disagree= 27(17.2) I Don't know= 4 (2.5)

Attitude Questions	Pre- Test Result	Post- Test Result
patient during CPR		
9. I feel CPR is energy consuming	Agree= 92 (58.2) Disagree=62 (39.2) I Don't know= 4 (2.5)	Agree= 90 (57) Disagree= 54 (34.2) I Don't know= 14 (8.8)
10. I feel it is futile to perform CPR for elderly patient	Agree=74 (46.8) Disagree=66 (41.8) I Don't know=18 (11.4)	Agree= 93(58.9) Disagree=51 (32.3) I Don't know= 14 (8.9)
11. I think Mouth to mouth ventilation should not be performed on opposite sex during CPR	Agree= 57 (36.1) Disagree=89 (56.3) I Don't know=12 (7.6)	Agree= 68 (43) Disagree=76 (48.1) I Don't know= 14 (8.9)
12. CPR should not be practice if necessary equipment is not easily found	Agree= 64 (40.5) Disagree= 81 (51.3) I Don't know=13 (8.2)	Agree=58 (36.7) Disagree= 91 (57.6) I Don't know= 9 (5.7)
13. I feel Doctors should be responsible for initiating CPR	Agree= 81 (51.3) Disagree= 69 (43.7) I Don't know=8 (5.1)	Agree=79 (50) Disagree= 70 (44.3) I Don't know= 9 (5.7)
14. If I have the opportunity, I would like to avoid CPR	Agree= 49 (31) Disagree= 102 (64.6) I Don't know=7 (4.4)	Agree=58 (30.4) Disagree= 91 (66.5) I Don't know= 9 (3.2)

Table 2: Pre- and Post-Test Practice Responses of Nursing Students Regarding Cardiopulmonary Resuscitation (CPR)

Practice Questions:	**Pre-Test Result**	**Post-Test Result**
1. Have you perform CPR on patient in	Agree= 109 (69) Disagree= 49 (31) Undecided= 00 (0)	Agree= 102 (64.6) Disagree= 54 (34.2) Undecided= 2 (1.3)
2. I do not check for patient pulse rate before commencing CPR	Agree= 75 (47.5) Disagree= 77 (48.7) Undecided= 6 (3.8)	Agree= 44 (27.8) Disagree= 105 (66.5) Undecided= 9 (5.7)
3. I ensure person in cardiac emergency is laid supine on a relatively hard surface before commencing CPR	Agree= 115 (72.8) Disagree= 37 (23.4) Undecided= 6 (3.8)	Agree= 142 (89.9) Disagree= 13 (8.2) Undecided= 6 (3.8)
4. I wear latex gloves before commencing CPR	Agree= 75 (47.5) Disagree= 79 (50) Undecided= 4 (2.5)	Agree= 71 (44.9) Disagree= 80 (50.6) Undecided= 7 (4.4)
5. I use one hands to perform chest compression during CPR	Agree= 80 (50.6) Disagree= 76 (48.1) Undecided= 2 (1.3)	Agree= 47 (29.7) Disagree= 106 (67.1) Undecided= 5 (3.2)
6. I pinch patient nostril before giving mouth to mouth ventilation	Agree= 100 (63.3) Disagree=50 (31.6) Undecided= 8 (5.1)	Agree= 129 (81.6) Disagree=24 (15.2) Undecided= 5 (3.2)
7. I use my palm on the patient forehead and gently tilt the head downward.	Agree= 90 (57) Disagree=60 (38)	Agree= 87 (55.1) Disagree= 69 (43.7)

Practice Questions:	Pre-Test Result	Post-Test Result
8. I use the same procedure to administer CPR to infant and adult.	Undecided= 8 (5) Agree= 66 (41.8) Disagree=87 (55.1) Undecided= 5 (3.2)	Undecided= 2 (1.3) Agree= 55 (34.8) Disagree= 92 (58.2) Undecided= 11 (7)

Students' CPR practice responses also improved after training. Before the session, many reported incorrect methods, such as not checking pulse, using one hand for compressions, or applying the same technique for infants and adults. After the program, a higher proportion adopted correct practices, including pulse checking, firm surface positioning, proper hand use, and correct ventilation technique. This highlights the effectiveness of structured BLS training in enhancing practical competence.

DISCUSSION

The demographic profile of participants in this study revealed that the majority of nursing students were male and belonged primarily to the second and third years of BS Nursing program, with a mean age of approximately 22 years. The majority of students in this study demonstrated insufficient levels of knowledge, attitude, and practice related to cardiopulmonary resuscitation (CPR). Similar findings were reported by Mohammed et al. (2019), who assessed the knowledge of Basic Life Support (BLS) and CPR skills among medical students and observed significantly low scores across these domains. The present study is consistent with such evidence, highlighting that nursing students also exhibited considerable gaps in knowledge, attitude, and practice before structured training.[9] The current study revealed that before the teaching session, none of the 158 participants demonstrated "excellent knowledge" of CPR. Only 18 students (11.4%) attained a "very good" level, while the majority, 112 students (70.9%), fell into the "good" category, and 28 students (17.7%) exhibited "poor knowledge." These findings closely align with the study conducted by Batool et al. (2022) among nursing students in Lahore, which similarly reported inadequate baseline knowledge of CPR.[4] In terms of attitude, the pre-test findings indicated relatively low scores, reflecting limited confidence and persistent misconceptions among students. However, after the educational intervention, the post-test results demonstrated a clear positive change, with students reporting greater willingness and confidence to perform CPR. These findings are consistent with those of Alfakey et al. (2021), who reported that trained students displayed significantly more positive attitudes toward Basic Life Support (BLS) compared to their untrained counterparts, with a notable difference in their willingness to engage in BLS training ($p < 0.01$).[10]

This study also evaluated the practice component of nursing students in relation to CPR. Before the teaching session, practice scores were low, indicating insufficient preparedness for real-life emergencies. For instance, a considerable proportion of students were unable to correctly identify the need to check a patient's pulse before initiating CPR during the pre-test; however, in the post-test, 66.5% responded accurately. Similarly, while 50.6% of students initially lacked knowledge that both hands are required for effective chest compressions, post-test results showed that 67% demonstrated awareness of this essential technique. These improvements illustrate the effectiveness of the structured BLS training, which was based on the 2015 American Heart Association (AHA) guidelines, in strengthening practical competence. Comparable findings were reported by Mohammed and James (2019), who also observed significant gains in CPR practice among nursing students following targeted educational interventions.[9]

CONCLUSION

This study showed that nursing students had poor baseline knowledge, attitudes, and practices regarding CPR, but significant improvement was observed after structured BLS training based on AHA 2020

guidelines. The program effectively enhanced competence and confidence, highlighting the need for regular CPR training and refresher courses in nursing curricula.

LIMITATIONS

The study was limited to a single institution with convenience sampling, which restricts generalizability. Practice was self-reported rather than directly observed, and long-term retention was not assessed. Future multi-institutional and longitudinal studies with observational assessments are recommended.

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