DOI: https://doi.org/10.54393/pjhs.v6i2.2621

PAKISTAN JOURNAL OF HEALTH SCIENCES
(LAHORE)
https://thejas.com.pk/index.php/pjhs
ISSN (E): 2790-9352, (P): 2790-9344
Volume 6, Issue 02 (February 2025)

Original Article

OPEN ACCESS

Knowledge, Attitudes and Practices of Basic Life Support among University-Enrolled Undergraduate Medical Students in Karachi

Qurrat Ul Aen Inam[1*], Sadia Saleem[2], Sadia Afzal[3], Bilal Aheed[1], Arisha Issa[1] and Asifa Maheen[1]

[1]Department of Biochemistry, Jinnah Sindh Medical University, Karachi, Pakistan
[2]Department of Biochemistry, University of Karachi, Karachi, Pakistan
[3]Department of Biochemistry, Dow University of Health Sciences, Karachi, Pakistan

ARTICLE INFO

Keywords:

Basic Life Support, Practical Skills, Knowledge, Medical Students

How to Cite:

Inam, Q. U. A., Saleem, S., Afzal, S., Aheed, B., Issa, A., & Maheen, A. (2025). Knowledge, Attitudes and Practices of Basic Life Support among University-Enrolled Undergraduate Medical Students in Karachi: Knowledge and Practices of Life Support among Undergraduate Medical Students. Pakistan Journal of Health Sciences, 6(2), 158-163. https://doi.org/10.54393/pjhs.v6i2.2621

***Corresponding Author:**

Qurrat Ul Aen Inam
Department of Biochemistry, Jinnah Sindh Medical University, Karachi, Pakistan
qurat.inam@jsmu.edu.pk

Received date: 4th December, 2024
Acceptance date: 20th February, 2025
Published date: 28th February, 2025

ABSTRACT

Basic Life Support (BLS) involves a core set of skills necessary to preserve life during medical emergencies. Both practical abilities and knowledge are crucial for managing life-threatening situations. **Objectives:** To assess the knowledge, attitudes and practices of BLS among undergraduate students enrolled in the medical program at a university in Karachi. **Methods:** The cross-sectional study was carried out from February 2022 to May 2022 at the Jinnah Sindh Medical University, Karachi, and included medical students of both genders from the first to the fifth year of the academic program. Data were gathered through a self-administered organized questionnaire. Data were analyzed using SPSS version 22.0. **Results:** Out of 310 medical students, 54.2% were female, and 45.8% were male. The study revealed that only 22.3% had taken the BLS course. 55.3% of medical students had adequate theoretical knowledge, while their practical skills in BLS were weak. The majority of the students, 73.4% were not confident in performing Cardiopulmonary Resuscitation (CPR), and only 8.7% had performed BLS on patients. 4% stated that they could use Automated External Defibrillators (AEDs). The attitude of medical students toward BLS was largely supportive, with 94% believing that BLS is essential for all medical students and should be integrated into the academic curriculum. **Conclusions:** It was concluded that Undergraduate medical students possess sufficient theoretical knowledge of BLS (CPR), while there is a significant gap in their practical skills. For this, continuous hands-on training in critical life-saving techniques should be included in the undergraduate program throughout their medical education.

INTRODUCTION

Worldwide, the burden of morbidity and mortality due to Cardiovascular Diseases (CVDs) is rising. The global mortality due to cardiovascular arrest rose from 12.4 million in 1990 to 19.8 million in 2022 [1]. The primary cause of death is sudden cardiac arrest. It is concerning that the survival rate is still under 10%, mainly due to sudden cardiac arrests occurring outside of hospitals [2]. Karachi's annual incidence of cardiac arrest is 166 per 100,000 people [3], with survival rates alarmingly low, 0% in traumatic cases and less than 2% in non-traumatic cases [4]. The high mortality rate can be easily reduced with some simple manoeuvres and resuscitation skills. It is important to have the knowledge and experience of cardiopulmonary resuscitation (CPR) skills to manage these emergencies effectively. Basic life support (BLS) is the fundamental set of skills required to sustain life during medical emergencies like respiratory or cardiopulmonary arrest when heartbeat or breathing has stopped. It is the most important component of the survival sequence that improves the chances of survival by CPR and increases the ratio of hospital discharges [5]. BLS includes a range of techniques to maintain vital functions such as airway patency, breathing456r, and circulation. It also involves identifying signs and symptoms of critical conditions and understanding how to apply and administer these techniques effectively [6]. Cessation of blood flow to the

DOI: https://doi.org/10.54393/pjhs.v6i2.2621

brain for just four minutes after a cardiac arrest can lead to damage, which becomes irreversible after seven minutes. BLS is a simple yet effective method that allows anyone to sustain life if administered within the first few minutes of collapse [7]. Knowledge and practice of BLS and easy CPR techniques guarantee the survival of the patient until more advanced medical intervention is available [8]. BLS requires no special resources, yet its significance is immeasurable. In the current situation, everyone should know life-saving techniques, but this knowledge and awareness are essential for healthcare professionals. Healthcare professionals are a vital part of the healthcare system. Few studies have been conducted on medical undergraduates in Pakistan, and no prior research has assessed the knowledge, attitude and practices regarding BLS among undergraduate medical students in Karachi.

This study aims to evaluate the knowledge, attitude and practices of BLS among undergraduate medical students. This study will provide baseline data and identify knowledge gaps, which will help formulate resuscitation training programs at medical institutions.

METHODS

The cross-sectional study was carried out at Jinnah Sindh Medical University (JSMU), Karachi, Pakistan, from February 2022 to May 2022, after approval of institutional review board letter no. JSMU/IRB/2021/-538. It employed a cross-sectional design, with a sample size of 310 students calculated based on 50% prevalence, 95% confidence level and 5% error margin using Open Epi software. The sample was chosen through a convenient sampling technique with inclusion criteria limited to medical students of both genders, aged 17-23 years from 1st to 5th year enrolled in the MBBS program at Jinnah Sindh Medical University. Students who refused to take part were not included. Participants were informed about the study's objectives, procedures, and their right to withdraw at any time without any negative consequences. All data collected were anonymized, and personal identifiers were removed to maintain confidentiality. Data were stored securely, with access restricted to the research team, in compliance with data protection regulations. After obtaining informed consent from the students, data were gathered using a structured questionnaire designed based on published surveys [9, 10]. A preliminary study involving 17 participants (10 medical students and seven professionals from the areas of critical care and emergency medicine) was conducted to assess the comprehensibility of the questionnaire. An anonymous questionnaire was divided into three parts. The first part, consisting of 13 questions, focused on theoretical knowledge about CPR, including, its components and the steps involved in performing it. The second part consists of 6 questions related to the training status and practices of BLS services among medical students. The third part comprises three questions related to attitudes towards the importance of BLS, opinions on including BLS as part of the curriculum and reasons for insufficient practical knowledge of BLS. The data were processed using Statistical Package for the Social Sciences (SPSS) version 22.0. Descriptive statistics was employed to summarize the study results. Frequency and proportion tables were utilized to present the categorical variables. The normality of the data distribution was assessed using the Shapiro-Wilk test. A one-sample binomial test was used to compare the observed proportions of categorical responses. A comparative analysis of BLS Knowledge Attitude and Skills (KAP) across different academic years was conducted using one-way ANOVA. Univariate and multivariate linear regression analyses were performed to identify predictors of KAP scores, with subgroups based on year of study, gender, and prior BLS experience.

RESULTS

Out of the 310 participants, 14 (45.8%) were male and 168 (54.2%) were female participants. The participant's ages varied from 17 to 23 years. Results regarding theoretical knowledge indicate that the majority of participants, 241(77.7%), identified the components of BLS, there was no statistically significant difference (p=0.249) between males and females in identifying the components of BLS, 247 (79.7%) students selected the correct location to palpate for a pulse during CPR, 283 (91.29%) students correctly identified how to recognize someone in need of CP, 249 (80.3%) students knew the first step when someone becomes unresponsive, 223 (71.9%) students identified the correct location for chest compressions in CPR. Nearly half of the students, 129 (41.6%), knew how long they should check the carotid pulse on adults, 153 (49.4%) students identified the correct steps to take when encountering a situation that requires resuscitation, 166 (53.5%) students selected the correct sequence of steps in CPR, 193 (62.3%) students knew the correct chest compression to ventilation ratio for adult CPR. However, only 60 (19.4%) students knew how frequently to check for a pulse during rescue breaths on an unconscious patient, 110 (35.5%) students identified the first response to a Choking Incident, 66 (21.3%) students selected the correct rate of chest compression in adult CPR and 108 (34.8%) students knew Automated external defibrillators (AED). A significantly higher proportion (p<0.001) of students lack knowledge about AED (Table 1).

DOI: https://doi.org/10.54393/pjhs.v6i2.2621

Table 1: Knowledge of Medical Students Regarding BLS (n=310)

Sr.no	Questions	n (%)
1.	What are the three main components of BLS?	241 (77.7%)
2.	How frequently should you check for a pulse while administering rescue breaths to an unconscious patient?	60 (19.4%)
3.	Where should you feel for a pulse on an unconscious adult while performing CPR?	247 (79.7%)
4.	How much time should you spend checking for a carotid pulse in an adult?	129 (41.6%)
5.	How will you recognize someone in need of CPR	283 (91.29%)
6.	What do you do when you encounter a situation that requires resuscitation? (Assume no scene danger)	153 (49.4%)
7.	If your friend suddenly begins showing signs of choking while eating, what would be your initial response?	110 (35.5%)
8.	Select the correct sequence of steps in CPR	166 (53.5%)
9.	If a family member suddenly complains of chest pain and becomes unresponsive at home but is still breathing, what should be your first step?	249 (80.3%)
10.	Where should chest compressions be applied during CPR?	223 (71.9%)
11.	Choose the appropriate rate for chest compressions during adult CPR.	66 (21.3%)
12.	Choose the correct chest compression to ventilation ratio for adult CPR.	193 (62.3%)
13.	Do you know about AED?	108 (34.8%)

Regarding the training status of the students, a large number of students, 241 (77.7%), did not take any training, and 235 (75.8%) students knew that their knowledge about BLS was not sufficient. Concerning the practice of BLS among medical students, 266 (85.8%) students agree that BLS should not be performed only in a healthcare facility. About half of the students, 158 (51%), have seen BLS being performed, but the majority of the students, 283 (91.3%), did not perform BLS on a patient. A significant number of students, 228 (73.5%), were not confident in performing CPR; there was no statistically significant difference in the reported confidence levels in performing CPR between participants who attended a BLS training course and those who did not (p=0.69). A significant number of students, 297 (95.8%), were not confident in using an AED (Table 2).

Table 2: Practices of BLS among Medical Students (n=310)

Sr.no	Questions	Responses	
		Yes	No
		n (%)	n (%)
1.	Have you ever participated in a BLS training course?	69 (22.3%)	241 (77.7%)
2.	Do you believe BLS should be performed only in a healthcare facility?	44 (14.2%)	266 (85.8%)
3.	Have you ever seen BLS being performed?	158 (51.0%)	152 (49.0%)
4.	Have you ever performed BLS on a patient?	27 (8.7%)	283 (91.3%)
5.	Are you confident in performing CPR?	82 (26.5%)	228 (73.54%)
6.	Can you use an AED?	13 (4.2%)	297 (95.8%)

Relating to the attitude of students towards BLS, 235 (75.8%) students responded that they do not believe their knowledge of BLS is sufficient. 292 (94.2%) students believed that all medical students need to know about BLS. A significantly higher number of students, 293 (94.5%), agreed that BLS training should be incorporated into the medical curriculum (p<0.001) (Table 3).

Table 3: Attitudes towards BLS among Medical Students (n=310)

Sr.no	Questions	Responses	
		Yes	No
		n (%)	n (%)
1.	Do you feel that your knowledge of BLS is sufficient?	75 (24.2%)	235 (75.8%)
2.	Do you believe that all medical students should be trained in BLS?	292 (94.2%)	18 (5.8%)
3.	Do you believe BLS training should be included in your medical curriculum?	293 (94.5%)	17 (5.5%)

The comparative analysis indicates a significant difference in the BLS KAP scores across different academic years (p <0.001). The mean scores progressively increase from the 1st year (12.89), 2nd year (13.58), 3rd year (13.45), 4th year (14.64), to the 5th year (16.47) (Table 4).

Table 4: Comparative Analysis of BLS Knowledge Attitudes and Skills across Different Academic Years

Sr. no	Years of Study	Frequency	Mean ± SD	p-value
1.	1st Year	19	12.89 ± 2.5	p<0.001
2.	2nd Year	38	13.58 ± 2.0	
3.	3rd Year	66	13.45 ± 2.0	
4.	4th Year	130	14.64 ± 2.0	
5.	5th Year	57	16.47 ± 1.8	
Total		310	14.49 ± 2.1	

Both BLS training and year of study significantly predict student marks, while gender has no meaningful impact. BLS training shows the strongest effect, with students who received training scoring 3.344 points higher in the univariate and 2.895 points higher in the multivariate analysis when adjusted for other variables (p<0.001). The year of study has a moderate positive effect, with marks increasing by 0.896 points per year in the univariate analysis and 0.579 points in the multivariate analysis when adjusted (p<0.001). Gender shows no significant effect in either model (p>0.05) (Table 5).

DOI: https://doi.org/10.54393/pjhs.v6i2.2621

Table 5: Univariate and Multivariate Linear Regression Analysis of Factors Influencing Knowledge, Attitudes, and Practices scores of Medical Students

Sr. no	Variables	Univariate Analysis B (95% CI)	p-value	Multivariate Analysis B (95% CI)	p-value
1.	BLS Training	3.344 (2.580-4.108)	<0.001	2.895 (2.115-3.675)	<0.001
2.	Year of Study	0.896 (0.592-1.200)	<0.001	0.579 (0.285-0.873)	<0.001
3.	Gender	-0.128 (-0.840-0.584)	0.720	-0.022 (-0.646-0.602)	0.943
Constant				11.826 (10.376, 13.276)	<0.001

DISCUSSION

Healthcare professionals must be knowledgeable about the latest protocols and guidelines based on BLS services to manage life-threatening emergencies such as sudden cardiac arrest, airway obstruction, and breathlessness. Through the BLS course, they are proficient in skills such as performing CPR, using an AED, and relieving choking. Unfortunately, the present results revealed that undergraduate medical students had adequate theoretical knowledge of BLS (55.3%), while the majority of students (73.4%) were not confident in performing CPR. This indicates a significant lack of practical training among medical students Results also highlighted that only 22.3% of medical students had taken the BLS training. CPR is the most critical step in emergencies involving sudden cardiac arrest. Insufficient training in BLS (CPR) has been identified as a key factor contributing to the limited knowledge of CPR among doctors and other healthcare professionals in Pakistan [11, 12]. The results further revealed that 51% of medical students had observed BLS being performed on patients in hospital settings, while just 8.7% had performed BLS on patients. This represents a significant gap in their practical skills, they have the theoretical knowledge but lack the hands-on experience needed to perform effectively. Medical students are the healthcare professionals of tomorrow and should be well-trained in these skills. Research shows that the majority of junior doctors are not competent in managing a resuscitation cases [13], and they are often primary doctors who attend to patients in life-threatening conditions. Medical students should undergo continuous hands-on training in life-saving skills in a simulated environment, using manikins, in skills labs or through role-playing emergency scenarios throughout their medical education. Previous study shows that the knowledge and skills of first-year medical students were improved through BLS training, supplemented by hands-on sessions [14]. If the weaknesses in the application of practical skills for life-saving emergencies are not addressed in medical students, it could result in healthcare professionals who are unable to handle life-threatening situations. Recent studies show that healthcare professional has strong BLS knowledge, but their practical application of these skills is inadequate in a tertiary care hospital [15, 16]. Pulseless ventricular tachycardia and ventricular fibrillation are leading causes of cardiac arrest, which can result in sudden death [17]. Prompt defibrillation improves the chances of survival. The results of the current study indicated that a significant number of students (65.2%) lacked knowledge about AEDs, and only 4% stated that they could use an AED, which again emphasizes the need for rehearsing BLS skills in a controlled, non-emergency environment. Implementing a BLS course along with other resuscitation courses in the medical curriculum will not only enhance student's clinical abilities but also arm medical students with life-long skills. Results indicated that 85.8% of students knew that BLS should not be performed only in healthcare settings, which shows their understanding that BLS is a critical skill that may be needed in emergencies anywhere, including public places, workplaces, or at home. The perspective of medical students in the current study toward BLS was largely supportive, with 75.8% expressing that their knowledge of BLS was insufficient. Additionally, a significant number of students (94%) believed that BLS is essential for all medical students and should be integrated into the academic curriculum. The final question of the present study explored the reasons for the insufficiency of practical knowledge of BLS, with 65.2% of students identifying the lack of professional training as the primary cause. This suggests that students have limited chances to engage in hands-on training to develop their skills. A recent study highlights the insufficient focus on BLS and/or CPR education by institutions across Pakistan, with one-third of respondents reporting that they have never attended a session on BLS and/or CPR [18]. The comparative analysis indicates a significant difference in the BLS KAP scores across different academic years. The mean scores progressively increase from the 1st year to the 5th year, suggesting that students in higher academic years tend to perform better. This finding implies that the year of study significantly influences BLS KAP scores, likely due to increased exposure, experience, or learning opportunities during clinical rotations as students' progress in their studies. Univariate and multivariate linear regression analysis of factors associated with BLS KAP scores showed that BLS training was significantly associated with the knowledge and skills of medical students. This suggests that BLS training is a strong determinant of performance, underscoring the importance of early and comprehensive BLS education in improving students' knowledge, attitudes, and practices. These findings align with prior research that emphasizes the positive impact of BLS training on students' confidence and competence in

DOI: https://doi.org/10.54393/pjhs.v6i2.2621

emergencies [19, 20]. The year of study also showed a significant positive effect on BLS KAP scores, with marks increasing as students advanced in their academic careers. This trend may reflect the cumulative nature of medical education, where students gain more exposure to clinical scenarios and practical skills during clinical rotations, which could enhance their understanding and ability to apply BLS knowledge effectively. Interestingly, gender was not found to have any significant effect on BLS KAP scores in either analysis, suggesting that both male and female students perform similarly in BLS-related assessments. Given the poor practical skills in BLS (CPR) among medical students, which can lead to incompetent doctors, it is mandatory to include training in BLS and other resuscitation courses in the medical undergraduate curriculum from the first year, with annual revisions throughout their education until students become proficient in these skills. These life-saving skills are equally important for other medical practitioners and should be included in the allied health sciences programs. When healthcare professionals gain expertise in these life-saving skills, it will result in reduced mortality and morbidity rates in emergencies, both in and outside of hospitals.

CONCLUSIONS

Based on our study, we conclude that undergraduate medical students have adequate theoretical knowledge but are deficient in practical skills regarding BLS. BLS and other life-saving techniques should be included in the undergraduate curriculum from the first year and revised annually to ensure students become competent during their studies.

Authors Contribution

Conceptualization: QI
Methodology: QI, SS, SA, BA, AI, AM
Formal analysis: QI, SS, SA, BA, AI, AM
Writing review and editing: QI, SS, SA, BA, AI, AM

All authors have read and agreed to the published version of the manuscript

Conflicts of Interest

All the authors declare no conflict of interest.

Source of Funding

The author received no financial support for the research, authorship and/or publication of this article.

REFERENCES

[1] George AM, Fuster V, Murray CJ, Roth GA, Mensah GA, Abate YH *et al.*, Global Burden of Cardiovascular Diseases and Risks, 1990-2022.

[2] Nishiyama C, Kiguchi T, Okubo M, Alihodžić H, Al-Araji R, Baldi E *et al.*, Three-year trends in out-of-hospital cardiac arrest across the world: Second report from the International Liaison Committee on Resuscitation (ILCOR). Resuscitation.2023 May;186:109757.doi:10.1016/j.resuscitation.2023.109757.

[3] Razzak JA, Mawani M, Azam I, Robinson C, Talib U, Kadir MM. Burden of out-of-hospital cardiac arrest in Karachi, Pakistan: Estimation through the capture-recapture method. Journal of the Pakistan Medical Association. 2018 Jul; 68(7): 990-3

[4] Mawani M, Kadir M, Azam I, Razzak JA. Characteristics of traumatic out-of-hospital cardiac arrest patients presenting to major centers in Karachi, Pakistan—a longitudinal cohort study. International Journal of Emergency Medicine.2018 Dec; 11:1-9. doi: 10.11 86/s12 245-018-0214-7.

[5] Sodhi K, Singla MK, Shrivastava A. Impact of advanced cardiac life support training program on the outcome of cardiopulmonary resuscitation in a tertiary care hospital. Indian Journal of Critical Care Medicine: peer-reviewed, official publication of Indian Society of Critical Care Medicine.2011 Oct; 15(4): 209. doi: 10.41 03 /0972-5229.92070.

[6] Abid S, Abid HB, Zaidi SH, Wahab A, Ahmed H, Zahid MA. Knowledge of basic life support amongst Medical/Paramedical Professionals in a Tertiary Care Hospital in Karachi, Pakistan. Journal of Health and Rehabilitation Research.2024 Jun 22; 4(2):1602-6. doi :10.61919/jhrr.v4i2.1098.

[7] Khan IA. Awareness, knowledge and attitudes of basic life support among Community Health Officer (CHO) trainees at Baba Raghav Das Medical College Gorakhpur, UP, India. International Journal of Medical and Biomedical Studies.2021; 5: 59-64. doi: 10.32 55 3/ijmbs.v5i12.2294.

[8] Steen PA and Kramer-Johansen J. Improving cardiopulmonary resuscitation quality to ensure survival. Current Opinion in Critical Care.2008 Jun; 14(3): 299-304. doi: 10.1097/MCC.0b013e3282f827d3.

[9] Bilal MM, Shah SB, Rehman TU, Sadiq N, Lakho GR. Knowledge, attitude, and awareness of cardiopulmonary resuscitation among university enrolled medical and non-medical students of Pakistan: An online study. Pakistan Journal of Medical Sciences.2024Mar;40(4):767.doi:10.12669/pjms.40.4 .7933.

[10] Khan S, Bahadur S, Ullah Jan A, Anwar R, Rehman G. Competency of Medical Students Regarding Basic Life Support (BLS) in Adults and Children: Training Need Assessment in Peshawar.National Editorial Advisory Board. 2019 Feb; 30(2): 39.

[11] Irfan B, Zahid I, Khan MS, Khan OA, Zaidi S, Awan S *et al.*, Current state of knowledge of basic life support in health professionals of the largest city in Pakistan: a cross-sectional study. Bio-Medical Central Health

DOI: https://doi.org/10.54393/pjhs.v6i2.2621

Services Research.2019 Dec; 19: 1-7. doi: 10.1186 /s129 13-019-4676-y.

[12] Ghauri SK, Javaeed A, Shah F. Dismal situation of cardiopulmonary resuscitation knowledge and skills among junior doctors in twin cities of Pakistan. Pakistan journal of medical sciences.2019 Sep;35(5): 1295. doi: 10.12669/pjms.35.5.785.

[13] Chew KS, Hashairi FM, Zarina ZI, Farid AS, Yazid MA, Hisamudddin NA. A survey on the knowledge, attitude and confidence level of adult cardiopulmonary resuscitation among junior doctors in Hospital Universiti Sains Malaysia and Hospital Raja Perempuan Zainab II, Kota Bharu, Kelantan, Malaysia.Medical Journal of Malaysia. 2011 Mar; 66(1): 56-9.

[14] Kochhar S, Samagh N, Sharma J, Kaur A, Verma M. Knowledge and Skill Retention in First-Year MBBS Students After Basic Life Support Training: A One-Year Longitudinal Study. Bio-Medical Central Medical Education.2024 Sep; 24(1): 971. doi: 10.1186/s12909-02 4-05922-0.

[15] Poudel M, Bhandari R, Giri R, Chaudhary S, Uprety S, Baral DD. Knowledge and attitude towards basic life support among health care professionals working in emergency of BPKIHS. Journal of BP Koirala Institute of Health Sciences.2019 Jul; 2(1): 18-24.doi:10.3126/jb pkihs.v2i1.24962.

[16] Khan S, Ullah N, Khan MA, Naz S, Maula F, Khan H *et al.*, Knowledge of Basic Life Support Among Health Care Professional Working in Tertiary Care Hospitals of KP (Pakistan). Journal of Asian Development Studies. 2023 Sep; 12(3):547-55.

[17] Israel CW. Mechanisms of sudden cardiac death. Indian Heart Journal.2014 Jan; 66: S10-7.doi:10.1016/j .ihj.2014.01.005.

[18] Usman M, Ullah I, Rahman FU, Ullah I, Fahad S, Touheed J *et al.* A Comparative Study of Doctors and Nurses Regarding the Knowledge, Attitude and Practice of Basic Life Support in Tertiary Care Hospitals of Peshawar.Journal of Health and Rehabilitation Research.2024Feb;4(1):688-93.doi:10.61919/jhrr .v4i1.447.

[19] Manuel MS, Aggabao BC, Doctor Bona CA. Knowledge, attitude, and practices about chemical laboratory safety of the faculty, staff and students of Kalinga State University. Indian Journal of Science and Technology.2021Dec;14(45):3295-303.doi:https:// doi.org/10.17485/IJST/v14i45.822.

[20]Mansour A, Alsager AH, Alasqah A, Altamimi AS, Alsuhaibani A, Aljabr AA *et al.* Student's knowledge, attitudes, and practices related to cardiopulmonary resuscitation at Qassim University, Saudi Arabia. Cureus. 2019 Nov; 11(11). doi: 10.1155/2018/3687472.