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RESEARCH

An evaluation of knowledge and practices toward the basic life support/ cardiopulmonary resuscitation among undergraduate dental students

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ABSTRACT

Introduction: Life-threatening emergencies may occur in dental practices. The objective of this study was to evaluate knowledge towards basic life support (BLS)/cardiopulmonary resuscitation (CPR) and its practices among dental undergraduate students. **Methodology:** An educational intervention study was carried out among 3rd and 4th year dental undergraduate students in an academic hospital located in Vadodara, Gujarat, India. For the purpose of the study, a questionnaire with 18 questions was developed, The intervention was done in the form of training and was divided into theoretical and practical parts. The questionnaire was distributed before and after training. **Results:** Overall, 93 undergraduate dental students were enrolled in the study. Of these 48 (51.6%) were 3rd year students, while 48.4% ($n = 45$) were in their 4th year of dental education. A significant difference was noted in the mean pre- and post-training scores on BLS/CPR knowledge amongst the 3rd (5.73 ± 1.94 vs. 12.04 ± 2.14; $P < 0.001$) and 4th year students (9.24 ± 2.22 vs. 12.56 ± 1.75; $P < 0.001$). **Conclusion:** Sensitization in the form of educational intervention led to remarkable improvement in knowledge about BLS/CPR.

Key Words: Basic life support, cardiopulmonary resuscitation, dental students, educational intervention

Introduction

Cardiopulmonary resuscitation (CPR) is an emergency procedure in which the heart and lungs are made to work by manually compressing the chest overlying the heart and forcing air into the lungs. Formally introduced in 1960, CPR is a simple and effective procedure that helps to sustain life in early critical minutes after cardiac and respiratory arrest [1]. In 1966, American Heart Association developed the first CPR guidelines [2]. The main aim of basic life support (BLS)/CPR is early recognition of sudden cardiac arrest and activation of the emergency response system. It has been proved that early access of emergency medical care can save significant lives around the globe [3-5].

Life-threatening emergencies may occur in dental practices. These are plausibly attributed to the risks associated with the administration of local anesthetics and the usage of dental materials that may induce a hypersensitivity reaction in select cohort of patients. Further, association of medical comorbidities such as hypertension, diabetes mellitus, and congestive heart failure may inherently predispose a risk for an adverse event [6]. In the event of a cardiac arrest, the absence of CPR reduces the chances of survival by 7%–10% every lost minute following arrest [7]. This reiterates the significance of CPR among health-care professionals including dentists and allied health professionals. Knowledge about appropriate CPR administration protocols can aid in averting life-threatening adverse events in dental practice, and stabilizing patients until definitive medical care can be instituted [8].

A Bulgarian study stated that 73% of dental students were self-confident in recognizing emergency medical situations but reported deficiency in practical skills relating to CPR/BLS [9]. Therefore, it is pertinent for dentists to be well versed with prevention and management of such emergencies in dental practices. Proper practices of technique of BLS/CPR are essential to effectively resuscitate a patient, and thereby require knowledge of the technique during dental undergraduate education [9]. To this effect, the current study sought to evaluate the awareness regarding BLS/CPR and its practical implementation among 3rd and 4th year dental undergraduate students.

Methodology

A cross-sectional study was conducted following approval from the Institutional Ethical Committee. The study participants included 3rd and 4th year dental students enrolled at our institute, a tertiary dental hospital and college located in Vadodara, Gujarat, India. The objectives of the study were explained, and all participants were assured that their

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participation in this study will be voluntary and anonymous. Informed consent was obtained, and all measures to protect the confidentiality of the study information were implemented.

An 18-point questionnaire was utilized to obtain data on knowledge of dental students about BLS/CPR [10]. The questionnaire was reviewed by expert faculties from departments of anesthesia, dentistry, and emergency medicine. The correct responses were given a score of 1, while wrong responses were coded as 0, with the maximum possible score on the test being 18. This questionnaire was utilized to gather pre and post training data. The total time duration to complete the questionnaire for study participants was set at 30 min. In cases of any questions or concerns regarding the questionnaire, certified instructor provided clarification. The same questionnaire was given before and after the end of the educational intervention.

The educational intervention was divided into a theoretical and a practical part. The theoretical part consisted of a PowerPoint presentation spanning over 2 hours in one session which included details about the CPR (indication, precaution, importance of CPR, various steps of CPR, etc.,) followed by practical session that covered 2 hours of video and practical demonstration and hands-on-training of correct steps of CPR on a mannequin.

Descriptive and inferential statistical techniques were utilized. Categorical variables are reported as frequencies and proportions. The differences across the means of pre- and post-test scores across the dental student groups were analyzed using a paired *t*-test. All statistical tests were performed using Online MedCalc Software (11.5.0), and type-I error set at 5% was deemed of statistical significance.

Results

Overall, the study received participation from 93 undergraduate dental students (3rd year: 48; 4th year: 45). An overview of student characteristics along with the result of pre- and post-CPR/BLS training mean scores is depicted in Table 1. The mean test score before CPR training among 3rd year dental students was estimated at 5.73 ± 1.93. A marked improvement following BLS/CPR training was noted in the post-training test scores (12.04 ± 2.14) ($P < 0.001$). Likewise, a significant improvement in the mean post test BLS/CPR training scores was noted in 4th year dental students compared to their pretest scores (9.24 ± 2.22 vs. 12.56 ± 1.75; $P < 0.001$) [Table 1]. The percentage of respondents giving right answer to each question, before and after training is depicted in Table 2.

Discussion

In India, the undergraduate curriculum in dental course proposed by Dental Council of India includes emergency medical management within the domain of general medicine and oral and maxillofacial surgery [11]. Considering the fact that general medicine and oral maxillofacial surgery are parts of curriculum for dental students enrolled in their 3rd and 4th years, we allowed participation from students only enrolled in these years. In our study, female participants were more than male participants. In a similar study conducted in Malaysia, female participants outnumbered males [12]. We noted a significant improvement in the knowledge of dental students post-intervention. In a study evaluating emergency medicine faculty members, Chandrasekaran et. al. noted remarkable improvement in knowledge following BLS/CPR training [13]. Avabratha et. al. evaluated knowledge of dental interns across three medical colleges from Karnataka [14]. The authors noted a high proportion of interns (45.2%) lacked appropriate knowledge regarding resuscitation, a finding similar to our study in pre-intervention assessment. In an another study by Gupta et. al [15]. among dentists at Udupi and Mangalore, significant improvement in knowledge regarding CPR among participants post-training was observed.

Laurent et. al. evaluated the competency of final year dental students in handling of life-threatening emergency situations relating to dental practice such as anaphylaxis and cardiac arrest during or following a dental procedure [9]. Most students responded not being confident enough to manage a cardiac arrest, indicating the necessity to provide education and training to students regarding BLS/CPR techniques. In the same study, it was observed that there was a significant increase in knowledge after training. Study by Sharma and Attar among interns was found to not only improve

Table 1: Characteristics of 3rd and 4th year dental students included in the study

	3rd year (*n*=48)	4rd year (*n*=45)	Overall (*n*=93)	*P*
Gender, *n* (%)				
Male	11 (22.93)	13 (28.89)	24 (25.81)	
Female	37 (77.07)	32 (71.11)	69 (74.19)	
CPR training scores				
Pretest score, mean±SD	5.73±1.94	9.24±2.22	-	<0.001 (both groups)
Posttest score, mean±SD	12.04±2.14	12.56±1.75		

SD: Standard deviation, CPR: Cardio pulmonary resuscitation

Table 2: Question wise response of cardio pulmonary resuscitation amongst dental students (*n*=93)

Questions	3rd year dental students (*n*=48)		4th year dental students (*n*=45)	
	Pretest* (%)	Posttest** (%)	Pretest* (%)	Posttest** (%)
What is the full form of "BLS"?	97.92	100.00	97.78	97.78
What is full form of AED?	10.42	95.83	33.33	91.11
Location of chest compression in adults?	20.83	93.75	28.89	93.33
Location of chest compression in infants during CPR?	14.58	22.92	17.78	33.33
Depth of chest compression in adults?	4.17	93.75	64.44	100.00
A 5 years old boy found unresponsive. The scene was safe. What statement is correct?	29.17	29.17	31.11	17.78
Sequence of new BLS modification?	2.08	93.75	93.33	97.78
Performance of rescue breathing in infants?	18.75	6.25	44.44	33.33
If you do not want to give mouth to mouth breathing, following can be done except?	41.67	50	42.22	66.67
You are witnessing an adult unresponsive victim who has been submerged in fresh water and just removed from the water. He has spontaneous breathing but he is unresponsive. What is the first step in FRR?	2.08	14.58	0.00	8.89
You are witnessing an infant who started suddenly choking while he was playing with the toy, you have confirmed that he is unable to cry (or) cough, what will be your first response?	64.58	77.08	82.22	75.56
Rate of chest compression in adult and pediatric during CPR?	4.17	89.58	51.11	100.00
The universal recognized distress signal for choking?	64.58	89.58	40.00	91.11
The ratio of compressions to ventilations during adult one person CPR is?	22.92	93.75	84.44	91.11
When performing chest compressions in infant, the following can be used to compress chest?	58.33	77.08	46.67	73.33
When can you stop performing CPR?	54.17	89.58	84.44	82.22
What would you use to clear your airway if you were alone and choking?	60.42	81.25	73.33	86.67
The following statement regarding, when not to start CPR are correct, except?	2.08	6.25	8.89	15.56

*Shows percentage of students giving correct answers pretest (before training), **Shows percentage of students giving correct answers posttest (after training). BLS: Basic life support, CPR: Cardio pulmonary resuscitation, FRR: First Response Rate, AED: Automated External Defibrillator

knowledge and practices of BLS/CPR but also enhanced the confidence of medical and dental interns to handle medical and dental emergency during internship [16]. A study conducted by Manikandan et. al. noted a lack of awareness regarding BLS/CPR among medical faculties and students [17]. The study recommended BLS/CPR skills should be a part of the undergraduate curriculum and students must master the skills during their studies [17]. Reddy et. al. concluded that there is significant poor knowledge about BLS/CPR among undergraduate dental students, due to either lack of training or the part completely missing from the dental curriculum [10]. This study emphasized that need of training not only among dental students but all health-care professionals [10].

Despite the obvious merit in our study highlighting the importance of BLS/CPR training among senior dental students, our study has inherent weaknesses. The sample size in our study was relatively small, and therefore limits generalization.

Conclusion

Our study demonstrates the utility of BLS/CPR training in mitigating knowledge gaps among senior dental students. It

would be worthwhile to explore the implementation of routine CPR/BLS training course in dental curriculum to update knowledge and skills regarding BLS/CPR for future dentists.

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Authors' Contributions

MRS conceptualized the study and took part in data collection, manuscript writing and final editing. MBV guided and helped in analysis of the data and preparation of manuscript. He also provided the critical inputs. SNG helped in training organization, data collection and revision of the manuscript.

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Competing Interests

The authors declare that they have no competing interests.

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