Original Article

Effectiveness of basic life support training course intervention among dental practitioners and students – An experimental study

ABSTRACT

Aim: To determine the level of knowledge and skill of basic life support (BLS) among undergraduate, postgraduate students, and general practitioners with and without regular attendance of the BLS Healthcare Provider course.

Methodology: The study was carried out at two intervals with two groups. A random sample involving undergraduate students, postgraduate students, and dental professionals was selected for both study groups. Group 1 with 440 participants had not attended BLS for Healthcare Providers Course in the last two years. Group 2 with 410 participants had attended the BLS for Healthcare Providers course regularly once a year. First, participants in Group 1 were evaluated using an MCQ test with 30 questions about their knowledge and skills in BLS. Then, a well-trained BLS instructor team from Dental College & Hospital offered BLS healthcare provider courses to students and dentists. Subsequently, Group 2 participants who had completed a BLS course for healthcare providers last year were also assessed for their knowledge and skills in BLS using another MCQ test.

Results: The marks obtained in the tests were tabulated and analyzed. To determine the association between variables with respect to mean knowledge score, t-test was employed. Multiple group comparison was made using analysis of variance and $P < 0.05$ was considered statistically significant. The group 1 participants score a mean of 5.7 marks against the Group 2 with a mean score of 27.4 marks out of 30 marks. Knowledge and skill in BLS skills among those in Group 1 without prior BLS training was mainly low. Dental practitioners performed marginally better than students in both groups.

Conclusions: Based on the results, we make the following observations. With the introduction of BLS training into the academic curriculum and routine BLS hands-on workshops, all healthcare providers will be familiar with the BLS skills to effectively manage the life-threatening emergencies.

Keywords: Basic cardiac life support, cardiopulmonary resuscitation, dentist, knowledge, skill

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INTRODUCTION

Cardiopulmonary resuscitation (CPR) is one of the most valuable skills which comprises a series of lifesaving maneuvers that improve the survival rates of humans following a cardiac arrest.[1-3] Many studies have shown that survival after out-of-hospital cardiac arrest (OHCA) depends mainly on early intervention by the observer and good quality CPR.[4,5] The survival chances decrease by around 9% for every minute delay

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in the initiation of CPR.[6] The public and at least the healthcare professionals like dental surgeons should know how to perform basic life support (BLS) as they encounter incidents of cardiac arrests often in their practice and training.[7]

It is very important that every dental surgeon learns BLS during their graduation training and also regular hands-on training in BLS so that he can be prepared for emergency lifesaving situations such as CPR anytime, anywhere.[8] As a preliminary step, in this study we have tried to explore the level of skill in BLS among dental students and dental surgeons in a South Indian city. We would like to assess the amount of knowledge and skill about BLS among our participants and to emphasize the significance of knowledge and skill to perform CPR when urgently required.

METHODOLOGY

Study participants

In this experimental study, we tried to determine the level of knowledge and skill of BLS among the undergraduate students, postgraduate students, at Dental College and general dental practitioners in South India. The study was carried out from January 2017 to February 2019.

Ethical approval

The study was approved by the institutional ethics committee. All participants received the participant information sheet explaining the details of the study methodology. Voluntary consent was obtained from all participants. The Ethical Clearance was obtained from JSSDC Institutional Ethical Committee with Ref no JSSDCH IEC 45/2018 dated 25/10/2018.

Study method

The study was carried out at two intervals with two groups. A random sample involving undergraduate students, postgraduate students, and dental practitioners was selected for both study groups to avoid bias. The sample size for each group was determined by using the formula $n = (z\alpha + z\beta)^2 \times (\delta/\sigma)^2$. The z$\alpha$: 1.96 at 5% level of significance, the zβ: 0.84 for 80% power of study (the type II error), the δ as mean difference and σ as Standard deviation. The *P* value was < 0.05. The Group 1 had 440 participants and they had not attended any BLS for healthcare provider course in the past two years. Group 2 had 410 participants. Participants in this group regularly attended the BLS for Healthcare Providers course once a year. First, participants in Group 1 were evaluated using an MCQ test with 30 questions about their knowledge and skills in BLS. Then, a well-trained BLS instructor team from offered BLS healthcare provider courses to students and dentists. Subsequently, Group 2 participants who had completed a BLS course for healthcare providers last year were also assessed for their knowledge and skills in BLS using another MCQ test.

The 30-question MCQ test was conducted by using the standard MCQ questions from the American heart association BLS provider manual.[9] Questions were asked about the abbreviation of BLS, CPR, CAB, AED, sequential steps in the BLS algorithm, high quality CPR technique, assessment, and resuscitation techniques related to the airways, breathing, circulatory system in unresponsive victims of different ages and cases of suffocation. The MCQ test was evaluated by a separate BLS training team from another institution to avoid bias. The MCQ test was scored using an answer key generated using the BLS manual. The total marks of each participant were treated confidentially and only communicated to the respective participant with a specific request for the total scores scored. Each correct answer was awarded one mark and the wrong answer was awarded zero mark. There was no negative marking for the wrong answer. After excluding the incomplete answer sheets, the total marks achieved by the participants were entered in the data sheet and was statistically evaluated with the SPSS 22 software by using the analysis of variance (ANOVA). The value of for this study was set at *P* less than 0.05. The study methodology has been explained in the flow chart in Figure 1.

RESULTS

The Group 1 had 440 participants and they had not attended any BLS for healthcare provider course in the past 2 years. Group 2 had 410 participants. Participants in this group regularly attended the BLS for Healthcare Providers course
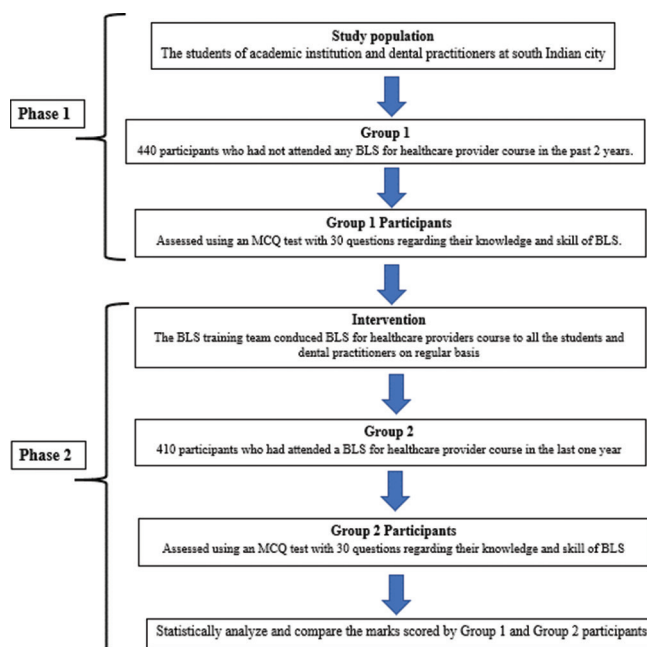

Figure 1: Study methodology flow chart

once a year. The Group 1 had 278 undergraduate students, 51 postgraduate students and 108 dental practitioners. The Group 2 had 245 undergraduate students, 48 postgraduate students, and 124 dental practitioners. Participants in both groups were divided into three categories, based on the marks achieved of 30 marks, such as Category 1 with a score of less than 15 marks, Category 2 with a score between 15 and 25 marks and Category 3 with more than 25 marks. According to the percentage as Category 1 with a score less than 50%, Category 2 with a score between 84 50%, and Category 3 with a score greater than 84%. The results are given in Tables 1 and 2 and shown graphically in Figures 2 and 3. To determine the association between variables related to mean knowledge, the *t* test was used. Several groups were compared using ANOVA. The value of P less than 0.05 was considered statistically significant.

Knowledge and skill in BLS skills among those in Group 1 who had never attended the BLS for Healthcare Providers course before was mainly low compared to Group 2 who had regularly attended the BLS for Healthcare Providers course but not later than a year. Dental practitioners performed marginally better than students in both groups shown in Table 3.

Table 4 with the results of the ANOVA test scores comparing the MCQ test marks in Group 1 without prior participation in the BLS Healthcare Provider course. The *P* value was < 0.05.

The Table 5 with the results of ANOVA test scores comparing MCQ test marks in the Group 2 who attended the in the BLS Healthcare Provider course in previous one year. There is a significant difference in the marks scored by the participants in both groups (P value was < 0.05). The value of P less than 0.05 was considered statistically significant.

Table 6 with the Post Hoc tests results before the BLS and the Table 7 with Post Hoc tests results after the BLS training show that the there is significant difference in the marks scored among dental practitioners and the UG and PG students. Whereas there is no significant difference in the marks scored among the UG and PG students.

DISCUSSION

Modern cardiopulmonary resuscitation (CPR) will be 62 years old this year 2022. Modern resuscitation was introduced in the 1950s and external cardiac resuscitation was introduced in the 1960s. Fortunately, the recent history of modern CPR has shown several landmark developments in the last 60 years, and resuscitation continues to enjoy a renaissance of interest worldwide. Several studies conducted in the past have

shown that survival after OHCA depends primarily on early intervention by the observer and high-quality CPR.[4,5] Health professionals, such as dental surgeons, must have adequate knowledge and skills in CPR/BLS. This cross-sectional study was conducted to determine the level of knowledge and skill of BLS among the undergraduate students, postgraduate students, at Dental College and general dental practitioners in South India.

Life-threatening emergencies can occur anytime, anywhere. The most important and urgent is cardiopulmonary arrest. Reports of cardiopulmonary arrest leading to deaths in dental clinics have been reported.[10] Some studies have been carried out on the competence of dentists to resuscitate patients after cardiopulmonary arrest. However, what all these studies have in common is insufficient skill and knowledge among dentists and dentists on BLS and CPR.[8,11-16]

Several studies have shown that healthcare providers who do not perform CPR frequently, such as dentists and dental school students, could quickly forget the knowledge and skills acquired during training within six months of completing the BLS course.[17,18] The results of our study showed that the level

Table 1: The marks scored out of 30 by the participants in Group 1 who had not attended any BLS for Healthcare Providers Course

Group 1 (*n*=440)	Score of <50% or <15 marks	Score between 84 and 50% or 15 to 25 marks	Score of >84% or >25 marks
Dental practitioners	98	10	00
Postgraduate students	43	08	00
Undergraduate students	271	10	00
Total	412	28	00

Table 2: The marks scored out of 30 by the participants in Group 2 who attended the BLS for Healthcare Providers Course in the last year

Group 2 (*n*=410)	Score of <50% or <15 marks	Score between 84 and 50% or 15 and 25 marks.	Score of >84% or >25 marks
Dental practitioners	00	03	121
Postgraduate students	00	02	46
Undergraduate students	00	01	243
Total	00	06	404

Table 3: The Independent samples test results with the mean score obtained by the participants of both the groups

CAT	*n*	Mean	Std. deviation	Std. error mean
Group 1	440	5.7182	4.38029	0.20882
Group 2	410	27.0537	1.63011	0.08051

Table 4: The ANOVA test scores comparing MCQ test marks in the Group 1. The exact *P* value was 0.001

Types of participant	*n*	Mean	Std. deviation	Std. error	95% Confidence interval for mean		Minimum	Maximum
					Lower bound	Upper bound		
UG students	108	7.2963	5.29726	0.50973	6.2858	8.3068	2.00	23.00
PG students	50	7.2000	5.80288	0.82065	5.5508	8.8492	2.00	22.00
Dental practitioner	282	4.8511	3.36390	0.20032	4.4568	5.2454	2.00	23.00
Total	440	5.7182	4.38029	0.20882	5.3078	6.1286	2.00	23.00

Table 5: The ANOVA test scores comparing MCQ test marks in the Group 2. The *P* value<0.05

Types of participant	*n*	Mean	Std. deviation	Std. error	95% confidence Interval for mean		Minimum	Maximum
					Lower Bound	Upper Bound		
UG students	121	27.1488	1.37635	0.12512	26.9010	27.3965	19.00	29.00
PG students	52	26.2885	3.43190	0.47592	25.3330	27.2439	15.00	29.00
Dental practitioner	237	26.9409	1.88793	0.12263	26.6993	27.1825	15.00	29.00
Total	410	26.9195	2.03655	10058	26.7218	27.1172	15.00	29.00

Table 6: The *post hoc* tests results before the BLS training. The *P* value <0.05

		Post hoc tests: Before BLS training				
		Multiple Comparisons				
		Dependent Variable: GROUPS LSD				
(I) CAT	(J) CAT	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1.00	2.00	0.09630	0.72416	0.894	-1.3270	1.5196
	3.00	2.44523*	0.47907	0.000	1.5037	3.3868
2.00	1.00	-0.09630	0.72416	0.894	-1.5196	1.3270
	3.00	2.34894*	0.64962	0.000	1.0722	3.6257
3.00	1.00	-2.44523*	0.47907	0.000	-3.3868	-1.5037
	2.00	-2.34894*	0.64962	0.000	-3.6257	-1.0722

*The mean difference is significant at the 0.05 level. There is significant difference in the marks scored among dental practitioners and the UG and PG students. There is no significant difference in the marks scored among the UG and PG students

Table 7: The *post hoc* tests results after the BLS training. The *P* value<0.05

		Post hoc tests: After BLS training				
		Multiple Comparisons				
		Dependent Variable: GROUPS LSD				
(I) CAT	(J) CAT	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1.00	2.00	0.86030*	0.33580	0.011	0.2002	1.5204
	3.00	0.20783	0.22627	0.359	-0.2370	0.6526
2.00	1.00	-0.86030*	0.33580	0.011	-1.5204	-0.2002
	3.00	-0.65247*	0.31012	0.036	-1.2621	-0.0428
3.00	1.00	-0.20783	0.22627	0.359	-0.6526	0.2370
	2.00	0.65247*	0.31012	0.036	0.0428	1.2621

*The mean difference is significant at the 0.05 level. There is significant difference in the marks scored among dental practitioners and the UG and PG students. There is no significant difference in the marks scored among the UG and PG students

of knowledge and skills were low and when BLS training was not performed regularly, at least once a year. Regular BLS training is very effective in improving the knowledge and skill of BLS among medical and dental students in academic institutions.[14,17,19,20] In our study, the total score of the MCQ test with 30 questions with a maximum of 30 marks was statistically evaluated with the Student T-Test. The results showed that the participants of Group 1 without BLS training in the last two years had a mean value of 5.7182, when compared to the participants of the Group 2 with BLS training in the last year with a mean value of 27.0537, which was significant (P value – 0.001). It is very evident from this finding that the knowledge and skill of BLS skills among those without prior BLS training were mostly low. When comparing the type of participant, the dentists performed marginally better than the students in both groups.
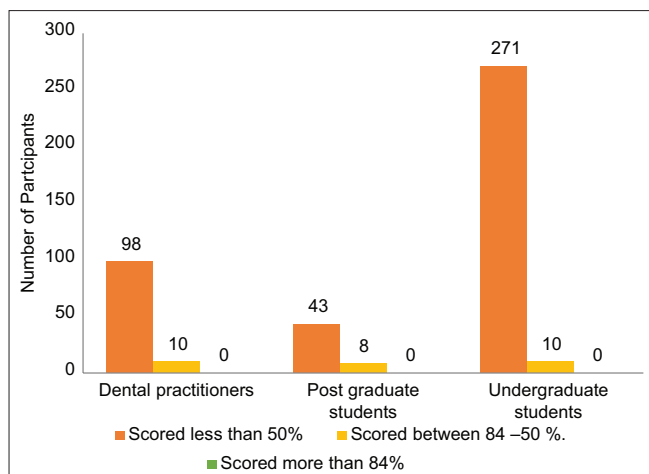
H T Srinivas *et al*.,[17] conducted a survey among healthcare providers regarding awareness of BLS, the study showed that the awareness regarding BLS among their study groups was very poor. Their outcome calls for standardizing BLS training and making it a mandatory part of all healthcare providers. In a study by Asmita Chaudhary *et al*.,[21] showed that the participants without BLS training scored very less in the test when compared to participants with regular training in BLS. The result of this study is comparable to that of our study.

CONCLUSIONS

The findings of our study showed that the knowledge and skill of BLS skills among those without previous BLS training in the previous two years were mainly low. Additionally, the knowledge and skills of the participants improved significantly after attending the BLS course for healthcare providers. When comparing the performance results of undergraduate students, postgraduate students, and dental practitioners, it was found that dental practitioners performed slightly better than dental students. Therefore, standardizing education in BLS and making it a compulsory part of teaching in dental profession has become indispensable. Dental students and dental practitioners should attend compulsory BLS training courses on a regular basis to provide safe dental care to patients. This study was done during the coronavirus disease 2019 (COVID-19) pandemic wherein conducting the practical skill assessment was not possible due to COVID prevention protocols being followed strictly. Using only MCQ test for the assessment of BLS training and not doing practical skill assessment could be the limitations for this study.

Declaration of patient consent

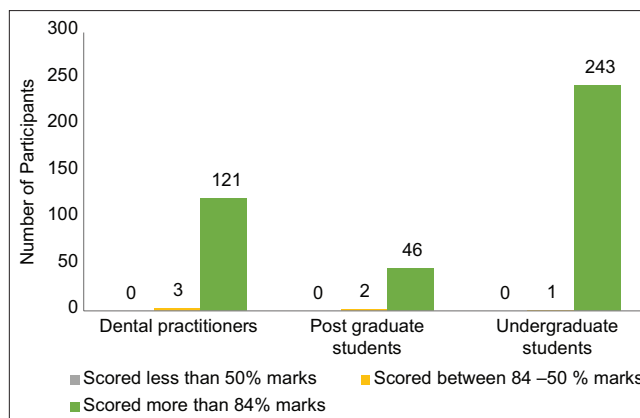The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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