Assessment of perception of oral healthcare professionals in management of medical emergencies in children: A cross-sectional study

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Abstract

Background: Medical emergency is an acute condition which can occur when least expected. It is more common to occur in a dental setup as this environment can be stressful for a patient. Children are more prone to emergencies as their dental procedures usually takes place under sedation. Therefore, it is mandatory for a dentist to have adequate knowledge, proper attitude and good training in handling any medical emergency seen in children during their dental treatment.

Objectives: To assess the perception of oral healthcare professionals in management of medical emergencies in children.

Method: A cross-sectional survey comprising 270 participants was conducted on oral healthcare professionals including interns, postgraduate students, practising dentists and faculty dentists. An 18-item validated questionnaire containing four domains of professional demographic data, knowledge, attitude and practice were distributed among the participants. Descriptive analysis was used followed by Chi Square test to check for association between age, gender, educational qualification and years of experience.

Results: The level of knowledge, attitude and practices was lower in graduate dentists than postgraduate dentists. The correlation between knowledge, attitude and practices was found to be highly statistically significant (p=0.001).

Conclusions: The study concluded that while knowledge and attitude levels were high in the population, there is a gap in practices of the dentists to handle a medical emergency

(Key words: Attitude, Children, Dentists, Knowledge, Medical emergency, Practice)

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Introduction

Medical emergency is an acute condition that may be life-threatening and can occur when least expected. A dental setup is a place where an emergency situation can easily occur[1]. Life threatening situations in a dental office may occur commonly due to the high level of anxiety in patients and a stressful dental environment. Since children are not miniature replica of adults, management of any medical emergencies in them has a different approach altogether[2]. A dental surgeon should have an adequate knowledge of and should be aware of such emergencies and thus be prepared to handle it. A dental set up should be well equipped with a medical emergency kit which could consist of separate paediatric specific dosage to deal with emergencies seen in paediatric patients[3,4].

Commonly occurring medical emergencies in children in a dental setup include foreign body induced airway obstruction, allergic reactions, anaphylaxis, local anaesthetic drug overdose, acute asthmatic attack, seizures, hypoglycaemic reactions and syncope[5]. In paediatric patients, anxiety, lack of patience and continuous movement during dental treatment can commonly lead to foreign body aspiration. If this enters into the respiratory tract, it can cause airway obstruction and lead to death by asphyxiation[3]. Results of a survey of emergencies in 10-year period indicated that syncope is the most common medical emergency seen in a dental setup. This is followed by hysteria, mild allergy, seizures, airway obstruction, hyperventilation, aspiration, drug and local anaesthetic overdoses and cardiac arrest[6]. Dental procedures under local anaesthesia, sedation and general anaesthesia can contribute to such medical emergencies[7]. Very few studies have been conducted on assessment of knowledge, attitude and practices to handle commonly occurring medical emergencies in children among dental health care professionals. Also, very few studies have been conducted to check training levels of the

participating population which was assessed in this study. Thus, we designed a study by means of a questionnaire to evaluate the perception of oral healthcare professionals in management of medical emergencies in children. Also, to spread awareness about emergency situations that can occur and be prevented with proper precaution and to encourage dentists to attend various medical emergency related workshops to update their skills regularly.

Objectives

To assess the knowledge, attitude and practices of oral healthcare professionals in management of medical emergencies in children.

Method

A cross sectional study was conducted by interviewer-administered structured questionnaire from 16th January 2023 to 28th February 2023 in the Department of Paediatric and Preventive Dentistry, KAHER's KLE VK Institute of Dental Sciences, Belagavi.

Sample size: This was calculated using the sample size calculating formula, $n = \frac{Z^2 pq}{d^2}$ (Z = Standard normal value (Z=1.96 at 5% alpha error) p=49.50%, q= 51.50%, d= precision 6%)[9]. A sample of 267 was obtained which was rounded to 270.

Inclusion and exclusion criteria: Participants consisted of oral healthcare professionals which included faculty dentists, practising professionals, dental postgraduate students and dental interns. Undergraduate students and participants who did not give their consent were excluded from the study.

A questionnaire consisting of 18 questions covering various aspects essential for this study was prepared by taking references from paediatric dentistry textbooks and articles published in the past[1,3,5,6,8]. The questionnaire had 4 parts. First part included demographic data of the participants, whether they treat children and have attended any medical emergency workshops. Second part dealt with knowledge of medical emergencies seen in children. Third part assessed attitude and last part dealt with the practices of the participants and their training levels to handle a medical emergency. The responses to the questions were measured on a five-point Likert Scale: "strongly agree", "agree", "neutral", "disagree", "strongly disagree".

Validity of the content was approved by a group of professionals. Participants were instructed regarding filling of the questionnaire and a pilot study was conducted among 20 participants to ensure ease and lucidity of answering the questionnaire. The data were collected by circulating the offline questionnaire among the participants who were willing to participate in the study. Reliability of the administered questionnaire was determined and a Cronbach alpha coefficient value of 0.82 was obtained. These participants were then excluded in the final study, and the questionnaire did not require any modifications.

Ethical Issues: Study approval was obtained from the Institutional Research and Ethics Committee, KLE V.K. Institute of Dental Sciences, Belagavi, India (No. IEC/KLE VKIDS/2022/) on 11.02.23. Informed, written consent was obtained from the study participants.

Statistical analysis: The collected forms were analysed in MS Excel sheet (Microsoft Corp.). Data were entered using IBM SPSS software (version 21.0 Chicago IL, USA) and 'p' value of <0.05 was taken as significant. Data were then subjected to statistical analysis. Association of knowledge, attitude and practice with respect to gender, age, education and years of experience was carried out using Chi square test. Descriptive statistics were generated for all questions, and for each answer, frequency distributions and percentages were examined.

Results

The data for this study was based on the responses received from 270 participants. These belonged to various age groups, gender, specialities and designations. Of the participants 63% were females and 37% were males. The mean age of this population was 26.83 ± 4.77 years. Of the participants 60.4% were postgraduates and 39.6%. were graduates.

Oral healthcare professionals were subjected to a wide variety of questions that tried evaluating their knowledge, attitudes and practices about medical emergencies seen in children in a dental setup. Out of the total participants, 90.7% treated children in a dental setup. Association between participants attending basic life support (BLS) workshops with age, gender, educational qualification and experience was calculated using the Chi-square test; 63.2% postgraduates had undergone BLS training compared to 38.3% graduates which was statistically significant (p-value = 0.0001). In age group 21-25 years, 45% had attended BLS workshops compared to 64% in age group of 26 years and above which was statistically significant (p-value = 0.016).

On evaluation of knowledge, 95.2% of the total participants agreed that BLS workshops should be attended at a regular interval of 2 years. Of the respondents 89.6% were unaware of emergency management of foreign body aspiration in children during dental treatment. The postgraduates and participants with greater year of experience were

aware of the treatment with statistically significant 'p' values of 0.01 and 0.02 respectively (Table 1); 74.1% of participants were aware about the symptoms of absence seizures seen in children on a dental chair. It was also observed that postgraduates had higher level of knowledge about BLS protocols which was indicated by a statistically significant 'p' value of 0.0001 (Table 1).

Table 1: ***Comparison of degrees with responses of knowledge of respondents in each question***

Question	Graduate *(n=107)* n (%)	Postgraduate *(n=163)* n (%)	Total *(n=270)* n (%)	χ^2	p-value
Workshops related to medical emergency should be attended at a regular interval of 2 years					
Strongly agree	65 (60.7)	98 (60.1)	163 (60.4)		
Agree	38 (35.6)	56 (34.4)	94 (34.8)	6.4570	0.1670
Neutral	04 (03.7)	02 (01.2)	06 (02.2)		
Disagree	0 (0)	02 (01.2)	02 (0.7)		
Strongly disagree	0 (0)	05 (03.1)	05 (1.9)		
First line of treatment following aspiration of extracted tooth if patient is breathing, is immediate start of Heimlich manoeuvre					
Strongly agree	29 (27.1)	50 (30.7)	79 (29.3)		
Agree	64 (59.8)	78 (47.9)	142 (52.6)	13.2540	0.0100*
Neutral	11 (10.3)	10 (06.1)	21 (07.8)		
Disagree	02 (01.9)	16 (09.8)	18 (06.7)		
Strongly disagree	01 (0.9)	09 (05.5)	10 (03.7)		
5-year-old child with blank staring, fumbling, confused speech is a case of absence seizure					
Strongly agree	22 (20.5)	41 (25.2)	63 (23.3)		
Agree	51 (47.5)	86 (52.8)	137 (50.7)	8.4880	0.0750
Neutral	27 (25.5)	21 (12.9)	48 (17.8)		
Disagree	07 (06.5)	12 (07.4)	19 (07.0)		
Strongly disagree	0 (0)	03 (01.9)	03 (01.1)		
Correct algorithm in activation of BLS in any medical emergency is PCABD					
Strongly agree	21 (19.6)	49 (30.1)	70 (25.9)		
Agree	53 (49.5)	59 (36.2)	112 (41.5)	12.2480	0.0160*
Neutral	27 (25.2)	31 (19.0)	58 (21.5)		
Disagree	06 (05.6)	20 (12.3)	26 (09.6)		
Strongly disagree	0 (0)	04 (02.5)	04 (01.5)		
Compression ventilation ratio in children aged between 1 to 13 years if 2 rescuers is 30:2					
Strongly agree	16 (15.0)	49 (30.1)	65 (24.1)		
Agree	54 (50.5)	56 (34.4)	110 (40.7)	14.9840	0.0050*
Neutral	26 (24.3)	29 (17.8)	55 (20.4)		
Disagree	10 (09.3)	22 (13.5)	32 (11.9)		
Strongly disagree	01 (0.9)	07 (04.3)	08 (03.0)		
Chest compression rate in children and infants is 100-120 compressions/minute					
Strongly agree	12 (11.2)	54 (33.1)	66 (24.4)		
Agree	55 (51.4)	72 (44.2)	127 (47.0)	23.4220	0.0001*
Neutral	26 (24.3)	18 (11.0)	44 (16.3)		
Disagree	13 (12.2)	13 (08.0)	26 (09.6)		
Strongly disagree	01 (0.9)	06 (03.7)	07 (02.6)		
Correct hand positioning in chest compressions of children is lower half of chest area					
Strongly agree	14 (13.1)	45 (27.6)	59 (21.9)		
Agree	58 (54.2)	78 (47.9)	136 (50.4)	12.3370	0.0150*
Neutral	25 (23.4)	22 (13.5)	47 (17.4)		
Disagree	10 (09.3)	15 (09.2)	25 (09.3)		
Strongly disagree	0 (0)	03 (01.9)	03 (01.1)		

**p<0.05*

On evaluation of the attitude regarding emergency management, 66.3% of participants were unaware that vital signs should be obtained from all patients undergoing a dental treatment. This was found to be statistically significant when comparison was done between postgraduates and graduates with a 'p' value of 0.028 (Table 2); 90.7% of participants agreed that a dental setup should be equipped with paediatric specific medical kits. This was supported by a statistically significant 'p' value of 0.042 among postgraduates and 'p' value of 0.013 among population with greater experience (Table 2). It was found that postgraduates were more aware about retrieving foreign body from oral cavity than graduates with a statistically significant 'p' value of 0.01 (Table 2).

Table 2: ***Comparison of degrees with responses of attitude and practice of respondents in each question***

Question	Graduate *(n=107)* n (%)	Postgraduate *(n=163)* n (%)	Total *(n=270)* n (%)	χ^2	p-value
It is important to enquire about medical history and obtain vital signs only from patients with medical emergency					
Strongly agree	39 (36.4)	59 (36.2)	98 (36.3)		
Agree	32 (29.9)	36 (22.1)	68 (25.2)	10.8550	0.0280*
Neutral	09 (08.4)	04 (02.5)	13 (04.8)		
Disagree	20 (18.7)	41 (25.2)	61 (22.6)		
Strongly disagree	07 (06.5)	23 (14.1)	30 (11.1)		
Paediatric specific dosage medical emergency kits is necessary at all dental set ups					
Strongly agree	45 (42.1)	83 (50.9)	128 (47.4)		
Agree	51 (47.5)	66 (40.5)	117 (43.3)	9.9040	0.0420*
Neutral	11 (10.3)	07 (04.3)	18 (06.7)		
Disagree	0 (0)	04 (02.5)	04 (01.5)		
Strongly disagree	0 (0)	03 (01.9)	03 (01.1)		
Emesis manoeuvre should be performed in case of upper respiratory tract obstruction					
Strongly agree	17 (15.9)	33 (20.2)	50 (18.5)		
Agree	53 (49.5)	70 (42.9)	123 (45.6)	8.3310	0.0800
Neutral	33 (30.8)	39 (23.9)	72 (26.7)		
Disagree	03 (02.8)	14 (08.6)	17 (06.3)		
Strongly disagree	01 (0.9)	07 (04.3)	08 (03.0)		
Blind finger sweeps should be done in mouth to retrieve foreign body					
Strongly agree	10 (09.3)	30 (18.4)	40 (14.8)		
Agree	57 (53.3)	63 (38.7)	120 (44.4)	13.3760	0.0100*
Neutral	27 (25.2)	31 (19.0)	58 (21.5)		
Disagree	12 (11.2)	31 (19.0)	43 (15.9)		
Strongly disagree	01 (0.9)	08 (04.9)	09 (03.3)		
You are trained in administering drugs parenterally in a child					
Strongly agree	01 (0.9)	15 (09.2)	16 (05.9)		
Agree	07 (06.5)	26 (16.0)	33 (12.2)	21.9290	0.0001*
Neutral	18 (16.8)	15 (09.2)	33 (12.2)		
Disagree	70 (65.4)	77 (47.2)	147 (54.4)		
Strongly disagree	11 (10.3)	30 (18.4)	41 (15.2)		
You are trained in performing Heimlich maneuverer in children and infants					
Strongly agree	02 (01.9)	19 (11.7)	21 (07.8)		
Agree	06 (05.6)	33 (20.3)	39 (14.4)	28.2740	0.0001*
Neutral	15 (14.0)	16 (09.8)	31 (11.5)		
Disagree	75 (70.1)	72 (44.2)	147 (54.4)		
Strongly disagree	09 (08.4)	23 (14.1)	32 (11.9)		
You are trained in performing CPR in children and infants					
Strongly agree	01 (0.9)	18 (11.0)	19 (07.0)		
Agree	12 (11.2)	36 (22.1)	48 (17.8)	27.6920	0.0001*
Neutral	21 (19.6)	13 (08.0)	34 (12.6)		
Disagree	65 (60.7)	71 (43.6)	136 (50.4)		
Strongly disagree	08 (07.5)	25 (15.3)	33 (12.2)		
You are trained to administer oxygen via mask in children					
Strongly agree	04 (03.7)	16 (09.8)	20 (07.4)		
Agree	14 (13.1)	44 (27.0)	58 (21.5)	19.5030	0.0010*
Neutral	16 (15.0)	16 (09.8)	32 (11.9)		
Disagree	64 (59.8)	62 (38.0)	126 (46.7)		
Strongly disagree	09 (08.4)	25 (15.3)	34 (12.6)		
If given a chance, will you attend PALS related workshops to upgrade your knowledge					
No	10 (09.3)	15 (09.2)	25 (09.3)	0.0020	0.9680
Yes	97 (90.7)	148 (90.8)	245 (90.7)		
Total	107 (100,0)	163 (100,0)	270 (100,0)		

**p<0.05*

Assessment of practices was done by asking questions like training in parental drug delivery, Heimlich manoeuvre, performing cardiopulmonary resuscitation in children and infants and administration of oxygen via mask to the respondents. Evaluation of association of levels of practice using Chi square test was found to be higher in the age group 26 to 30 years with 35.9% and 69.7% in the age group above 31 years. There was a very highly statistically significant 'p' value of

0.0001 obtained when comparison was done with age group of 21-25 years. In levels of practice seen in gender, higher levels were seen in males (44%) as compared to females (27.7%) with statistically significant 'p' value of 0.006. Comparison on basis of educational qualification showed that postgraduates had higher levels of practice (41.1%) than graduates with statistically significant 'p' value of 0.001. Higher level of practices was seen among the participants who had an experience of 11 years and above (77%) than those who had 6-10 years of experience (54.8%) and the least were found in those having less than 5 years of experience. (Figure 1)

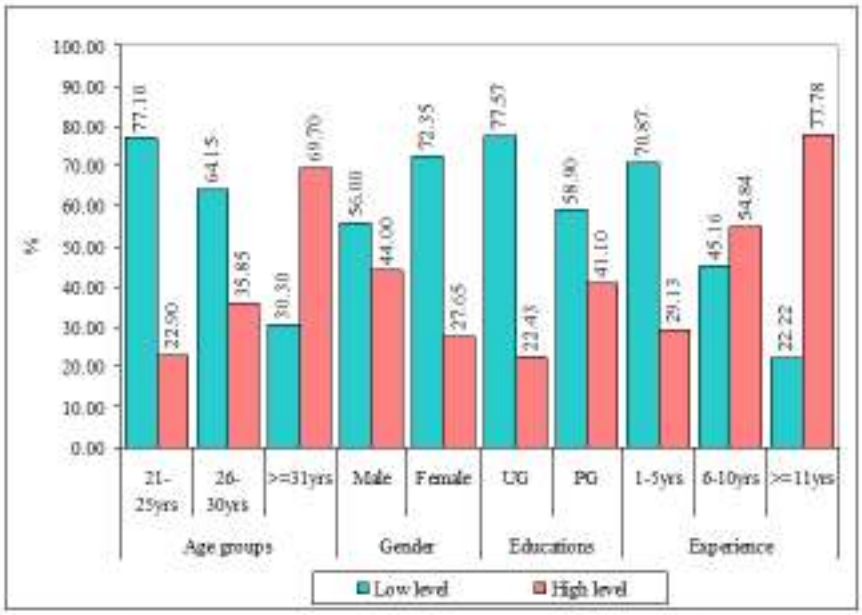

Figure 1: ***Association between levels of practice with age, gender, education and experience***

Correlation between knowledge, attitude and practice scores by Karl Pearson's correlation method was found to be highly statistically significant with 'p' value of 0.0001, 0.0008, 0.0020 respectively. (Figure 2).

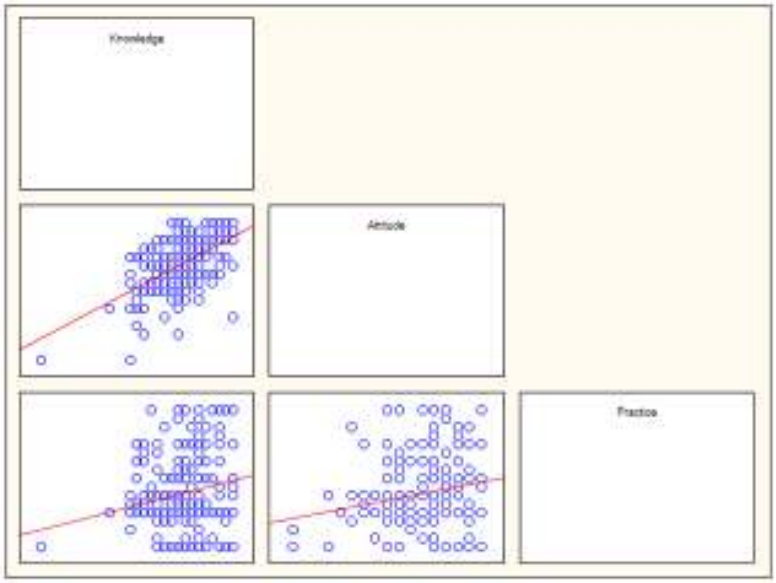

Figure 2: ***Scatter diagram of correlation between knowledge, attitude and practice scores***

Binominal logistic regression was performed between knowledge, attitude and practice with sociodemographic characteristics. There was no significant association between knowledge, attitude

and practice scores with age ('p' values = 0.315, 0.449, 0.161 respectively). There was a significant association between practices and gender ('p' value= 0.001) and males have 0.34 times increased odds of having better practice than female population. There was a significant association between the practice and the designation ('p' value = 0.003). Postgraduates had 3.91 times increased odds of having better practice levels than the graduate population. (Table 3)

Table 3: Relation between sociodemographic characteristics and knowledge/ attitude/ practice

Variable	Parameters	Odds ratio	95% CI	*p*-value
Knowledge	*Age*			
	21-25 years	1[a]	0.43-1.32	0.315
	>25 years	0.75		
	Gender			
	Female	1[a]	0.74-2.08	0.422
	Male	1.24		
	Designation			
	Graduate	1[a]	0.38-1.19	0.172
	Postgraduate	0.68		
Attitude	*Age*			
	21-25 years	1[a]	0.41-1.49	0.449
	>25 years	0.78		
	Gender			
	Female	1[a]	0.53-1.76	0.917
	Male	0.97		
	Designation			
	Graduate	1[a]	0.89-3.31	0.109
	Postgraduate	1.71		
Practice	*Age*			
	21-25 years	1[a]	0.80-3.86	0.161
	>25 years	1.76		
	Gender			
	Female	1[a]	0.17-0.65	0.001*
	Male	0.34		
	Designation			
	Graduate	1[a]	1.60-9.57	0.003*
	Postgraduate	3.91		

[a] *Reference; Statistical analysis used: binomial logistic regression; *p <0.05 significant; CI: confidence interval*

Discussion

The chances of occurrence of medical emergencies in children in a dental setup is low but can occur when least expected[5]. A dentist should be well prepared and trained to handle medical emergencies seen in their patients. This will happen only when he/she is aware and trained enough to manage such medical emergencies. As it is rightly said, "The eyes see what the mind knows". Thus, our study aimed to assess knowledge, attitude and practices of dental health care professionals to handle paediatric medical emergencies in a dental setup.

Medical emergency workshops were attended by 63.2% postgraduates whereas only 38.3% of graduates have attended BLS workshops. This was found to be in accordance with a study by Varma LSC *et al*[9]. According to American Heart Association (AHA), BLS courses should be attended regularly every 2 years and the course certificate is valid for 2 years, to which 95.2% of total participants of this study agreed[10].

Only 10.4% participants were aware about the correct line of treatment of foreign body aspiration which was found to be less than the percentage of population knowing the treatment in study by Ahmed R, *et al*[11]. Absence seizures are usually seen in children aged 4-10 years with maximum incidence in 5–7-year-old children and common symptoms of these are blank staring or staring spells[12]; 74.1% of the population agreed to this question; 67.4% of participants were aware about correct order of activation of BLS. This was found to be higher than a similar study by De Mauro LM, *et al*[8]. This could have been probably because of higher knowledge observed in the current study population.

As recommended by AAPD in accordance with AHA, compression ventilation ratio in presence of 2 or more rescuers in children aged between 1 to 13 years is 15:2, chest compression rate in children and infants is 100-120 compressions/minute and the correct hand positioning to perform chest compressions in a child aged 1 year to puberty is

lower half of breastbone[15]. When the participants were asked about recommended steps, ratios and techniques to perform cardiopulmonary resuscitation in children, including activation of BLS like correct algorithm, compression ventilation ratio, rate of chest compressions and correct hand positioning, only 56.5% of them had appropriate knowledge of these protocols.

Only 33.7% of the participants agreed upon taking medical history and recording vital signs from all patients before undergoing dental treatment. However, this percentage was found to be less than that of studies by Čuković-Bagić I, *et al*[3], Ahmed R, *et al*[11] and Tasleem AS, *et al*[13]. Of the participants, 90.5% agreed that a medical emergency kit with essential drugs consisting of paediatric specific dosage and required equipment should be readily available in a dental office[3,4]. In case of upper respiratory tract obstruction, suctioning of foreign body should be done. If this does not help, emesis manoeuvre should be performed[14]; 64.1% of the participants were aware about it. Blind finger sweeps are contraindicated to retrieve a foreign body from oral cavity as it may further push the body into oropharyngeal region[14]. However, only 40.7% of the participants were aware about this.

Of the participants, 81.9% were not trained to administer drugs parenterally in a child. This was in accordance with a study by Jodalli PS, *et al*[1] in which 69.5% and 58.1% did not know how to administer intravenous and intramuscular injections respectively. However, the postgraduate participants had better training in parenteral drug administration than graduate participants with a significant 'p' value of 0.0001 which was similar to the findings of Varma LSC, *et al*[9] where 78.9% of postgraduate students could administer intramuscular injections and 75.2% could administer intravenous injections. This was found to be in contrast to a study by Tasleem AS, *et al*[13] in which 20% of dental interns were aware about how to administer intravenous injections.

Heimlich manoeuvre should be performed when the patient is choking. Since this condition can be common in children, dentists treating children in their dental setup should be trained to relieve patient from choking[3]; 77.8% of total respondents were not found to be trained in performing Heimlich manoeuvre in children which was found to be in contrast to a study by Ahmed R, *et al*[11] where 52.9% of the population knew the correct management of choking in children. Of the participants, 75.2% were not trained to perform CPR in children and infants and the percentage was comparatively higher in the graduate population and this was in accordance with studies by Devishree RA, *et al*[7] and De Mauro LM, *et al*[8]; 32.4% of undergraduates were not trained and were less confident on using oxygen face mask which was found in accordance with a study by Jodalli PS, *et al*[1].

It is very important for every oral health care professional to be trained in handling a medical emergency. This training should be an integral part of the BDS and MDS curriculum. A compulsory hands-on training programme should be mandatorily taught to the students. Dentists should update their skills by attending BLS workshops and courses regularly. It is recommended that a study be done on a larger sample size in a larger geographical area.

Conclusions

The majority of participants had adequate knowledge and attitude towards various medical emergencies and handling them in a dental setup. However, the practice levels of the participants were not adequate.

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