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Knowledge, attitude, and practice of dentists in the management of medical emergencies in India: A cross-sectional study

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ABSTRACT

Background: A medical emergency is an acute, unanticipated medical reaction or complication that threatens the patient's life or health and necessitates rapid attention or intervention. Since these emergencies can be life-threatening, the dentist's readiness is critical to avoid morbidity, mortality, and legal complications. Therefore, this study aims to assess dental students' and practitioners' knowledge, attitude, and practice in managing medical emergencies in India.

Material and methods: A cross-sectional study was conducted at a private dental institute among 420 participants (318 males and 102 females) using a customized questionnaire consisting of sixteen questions - one open-ended and fifteen closed-ended. The data obtained was analysed using Chi-square test, Kruskal-Wallis H test, Mann –Whitney *U* test, and Spearman's rank correlation coefficient test.

Results: Out of the 420 respondents, 416 (99.05 %) respondents believed that it is essential to obtain patients' vital signs (blood pressure, pulse, respiratory rate, temperature) before starting any treatment. However, 345 (82.14 %) respondents had not taken any course in managing medical emergencies and only 196 (46.67 %) respondents were confident in handling a medical emergency. There was a statistically significant association ($P < 0.05$) between the various qualifications and responses for the majority of the questions.

Conclusion: There is a general lack of knowledge among all the respondents and a lack of positive attitude among undergraduates in dealing with medical emergencies.

1. Introduction

A medical emergency is an acute, unanticipated medical reaction or complication that threatens the patient's life or health and necessitates rapid attention or intervention.[1,2] Such emergencies are 5.8 times more probable in a dental setting than in a medical office.[3] Treatment apprehension, insufficient pain control, old age, lengthy procedures like multiple implant placement, invasive procedures, and side effects from anaesthesia or medication are some of the factors which can precipitate a medical emergency.[4] Since such emergencies are life-threatening, the dentist's readiness is critical to avoid morbidity, mortality, and legal complications.[5]

Some of the frequently encountered medical emergencies on a dental chair are syncope, angina pectoris, postural hypertension, aspiration of foreign objects, cardiac arrest, hypoglycaemia, seizures, anaphylaxis, and bronchospasm.[5] Apt dealing with such emergencies as well as treatment and patient care greatly depends on the dentist's knowledge and preparation. Dentists can avert up to 90 % of medical emergencies by taking a detailed history of the patient, doing a thorough examination, and occasionally modifying patients' treatment procedures.[6]

Advances in the quality of healthcare and increased life expectancy are leading dentists and dental students to treat a greater number of elderly and medically compromised patients who may have pre-existing chronic conditions that can predispose them to emergencies during dental treatment.[7] Therefore, a dentist must be efficient in recognizing and managing medical emergencies as well as be competent in resuscitation methods.[4] Dental professionals should be well versed in emergency interventions such as cardiopulmonary resuscitation (CPR) and basic life support (BLS) and, if required, advanced methods such as the administration of specific medications.[8]

Although the syllabus for dental undergraduates contains basic information on the management of medical emergencies, the

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undergraduates lack the training that is required to execute this knowledge while managing such situations.[9]

Keeping the above particulars in mind, the aim of this study was to assess the knowledge, attitude, and practice of dental undergraduates, postgraduates, interns, and practitioners in the management of medical emergencies in a dental setup and the objectives of the study were to:

1) Assess the knowledge of dental undergraduates, postgraduates, interns, and practitioners in the management of medical emergencies. 2) Assess the attitude of dental undergraduates, postgraduates, interns, and practitioners in the management of medical emergencies. 3) Assess the practice of dental undergraduates, postgraduates, interns, and practitioners in the management of medical emergencies. 4) Calculate the knowledge, attitude, and practice scores for the various qualifications 5) Assess any correlation between knowledge, attitude, and practice scores among various qualifications.

This article is presented in accordance with the STROBE reporting checklist.

2. Material and Methods

A cross-sectional questionnaire-based study was conducted at a private dental institute between July 2022 to October 2022 amongst dental undergraduates, interns, postgraduates, and practitioners from various parts of India. Ethical clearance was obtained from the Institutions Ethical Committee (Certificate no.1525).

Sample size calculation: Sample size was estimated using the formula $n = z^2pq/d^2$ where 'n' is the sample size, 'z' = 1.96 at 95 % confidence interval, 'p' is expected prevalence – 54.80 %, 'q' = 100-p, 'd' stands for acceptable error/lowest prevalence – 5 %. The sample size calculated was 381 and this study included 420 respondents.

Inclusion criteria: The study included third- and final-year undergraduate students, interns, and postgraduates from various dental institutes and private practitioners.

Exclusion criteria: First- and second-year undergraduate students were excluded, along with individuals who did not consent to the study.

The participants were assured of anonymity and were requested to fill out an informed consent form before filling out the questionnaire.

3. Questionnaire

The customized questionnaire consisted of sixteen questions - one open-ended and fifteen closed-ended questions. The questionnaire included participants' demographic details (name, gender, qualification, institute), eight knowledge-based questions, four practice-based questions, and three attitude-based questions.

The questionnaire was authenticated for the pertinence of the questions to the particulars of the topic of the survey (Face validity) and for the credibility of the options provided (Content validity) with a Content Validity Index score (CVIs) of 0.60 by a subject specialist.

The survey was deemed reliable with a Cronbach's alpha internal consistency score of 0.8.

The questionnaire was circulated as an online link via email or WhatsApp to all the study participants. The responses were charted and subjected to statistical analysis.

4. Statistical analysis

The responses obtained from the participants were tabulated in a Microsoft Excel sheet and were subjected to statistical analysis using Statistical Package for the Social Sciences (SPSS) software version 20.0. (IBM Corp. Released 2011. IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY: IBM Corp.).

The knowledge and practice scores were derived from the sum of correct answers. The knowledge scores were categorized as poor (for less than 50 % of questions answered correctly), moderate (50 %–75 % of questions answered correctly), and good (for more than 75 % of questions answered correctly). The practice score was grouped into adequate (more than 50 % correct answers) and inadequate (less than 50 % correct answers).

The attitude responses were coded as yes (scored as 1) or no (scored as 0). The sum of these responses was used to categorize them as positive (2 or more correct answers) or negative attitude (less than 2 correct answers).

Kolmogorov Smirnov test was employed to check the normality of the data. A Chi-square test was employed to check if there was any significant association between the qualifications and the responses. Kruskal Wallis H and Mann –Whitney U tests were used to compare knowledge and practice scores with qualifications. Spearman's rank correlation coefficient test was used to assess the correlation between knowledge and practice scores. A P value < 0.05 was considered statistically significant.

5. Results

A total of 420 participants (318 males and 102 females) filled out the questionnaire, of which 103 (24.52 %) were third-year undergraduate students, 107 (25.48 %) were final-year undergraduate students, 76 (18.10 %) were interns, 81 (19.29 %) were postgraduate students, and 53 (12.26 %) were practitioners (Table 1).

The participants' responses are tabulated in Table 2.

The Chi-square test was found to be statistically significant ($P < 0.05$) for a majority of the questions across different qualifications (Table 2).

The results of the Kruskal Wallis H and Mann –Whitney U tests are tabulated in Table 3. For knowledge and practices, the mean highest scores were seen in postgraduate students and practitioners with a mean score of 5.72 and 3.30, respectively. The Kruskal Wallis test was found to be significant for the comparison of knowledge and attitude scores. The Mann-Whitney U was found to be the lowest among comparisons between interns and practitioners for knowledge ($P < 0.05$) and attitude score ($P > 0.05$).

A positive (0.1741) and statistically significant (P = 0.0003) correlation was obtained between knowledge and practice scores among various qualifications using Spearman's rank correlation coefficient (Table 4).

Majority of the respondents 300 (71.43 %), 216 (51 %), and 404 (96.19 %) had moderate knowledge, a positive attitude, and adequate practice, respectively, and the chi-square test was statistically significant for an association between the knowledge, attitude, and practice scores among the various qualifications (Table 5).

6. Discussion

Dentists should be well-trained and equipped to manage any medical emergencies that may arise during their dental practice. This includes prevention, identification, and management of the condition. Taking a thorough medical history followed by making appropriate changes in the treatment plan may prevent the precipitation of a medical emergency. Since most medical emergencies occur due to insufficient oxygenation of the heart and brain, management of these emergencies should include an assured supply of oxygenated blood to critical

Table 1
Sociodemographic characteristics of respondents.

Profile	Subcategories	Number in sample N (%)
Gender	Male	102 (24.29 %)
	Female	318 (75.71 %)
Qualification	Third-year	103 (24.52 %)
	Final-year	107 (25.48 %)
	Intern	76 (18.10 %)
	Postgraduate	81 (19.29 %)
	Practitioner	53 (12.62 %)

Table 2
Responses towards knowledge, attitude, and practice-based questions.

Questions and responses	Qualifications					Total N (%)	Chi-square test	*P*-value
	Third year N (%)	Final year N (%)	Intern N (%)	Postgraduates N (%)	Practitioners N (%)			
Knowledge-Based Questions								
Q) Which dental chair position is recommended for a patient having a syncope attack?								
45-degree position	1 (0.97 %)	1 (0.93 %)	0 (0.00 %)	1 (1.23 %)	0 (0.00 %)	3 (0.71 %)	81.7610	**0.0001***
Supine position	13 (12.62 %)	14 (13.08 %)	2 (2.63 %)	4 (4.94 %)	1 (1.89 %)	34 (8.10 %)		
Supine position with feet slightly elevated	58 (56.31 %)	41 (38.32 %)	6 (7.89 %)	37 (45.68 %)	34 (64.15 %)	176 (41.90 %)		
Trendelenburg position	31 (30.10 %)	51 (47.66 %)	68 (89.47 %)	39 (48.15 %)	18 (33.96 %)	207 (49.29 %)		
Q) What is the immediate management for a patient having a hypoglycaemic attack?								
IV Atropine	2 (1.94 %)	2 (1.87 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	4 (0.95 %)	27.8842	**0.0057***
IV Glucose	32 (31.07 %)	17 (15.89 %)	22 (28.95 %)	15 (18.52 %)	11 (20.75 %)	97 (23.10 %)		
Oral Glucose	61 (59.22 %)	84 (78.50 %)	53 (69.74 %)	66 (81.48 %)	42 (79.25 %)	306 (72.86 %)		
Saline Infusion	8 (7.77 %)	4 (3.74 %)	1 (1.32 %)	0 (0.00 %)	0 (0.00 %)	13 (3.10 %)		
Q) In case of a hypoglycaemic attack, which of these will give you an accurate measure of the patient's blood sugar levels?								
Glucometer	77 (74.76 %)	88 (82.24 %)	63 (82.89 %)	77 (95.06 %)	50 (94.34 %)	355 (84.52 %)	30.4503	**0.0023***
Glucose Tolerance Test	17 (16.50 %)	12 (11.21 %)	11 (14.47 %)	3 (3.70 %)	3 (5.66 %)	46 (10.95 %)		
Pulse Oximeter	3 (2.91 %)	6 (5.61 %)	0 (0.00 %)	1 (1.23 %)	0 (0.00 %)	10 (2.38 %)		
Sphygmomanometer	6 (5.83 %)	1 (0.93 %)	2 (2.63 %)	0 (0.00 %)	0 (0.00 %)	9 (2.14 %)		
Q) In case of Anaphylaxis, which is the drug of choice?								
Epinephrine	74 (71.84 %)	87 (81.31 %)	68 (89.47 %)	73 (90.12 %)	50 (94.34 %)	352 (83.81 %)	24.6153	**0.0167***
Anti-histamines	19 (18.45 %)	11 (10.28 %)	4 (5.26 %)	3 (3.70 %)	1 (1.89 %)	38 (9.05 %)		
Corticosteroids	7 (6.80 %)	7 (6.54 %)	4 (5.26 %)	4 (4.94 %)	2 (3.77 %)	24 (5.71 %)		
Vasodilators	3 (2.91 %)	2 (1.87 %)	0 (0.00 %)	1 (1.23 %)	0 (0.00 %)	6 (1.43 %)		
Q) What is the first action in dealing with an unresponsive patient with no pulse?								
Back Blows with Abdominal Thrusts	4 (3.88 %)	2 (1.87 %)	0 (0.00 %)	2 (2.47 %)	2 (3.77 %)	10 (2.38 %)	28.5459	**0.0045***
Call an Ambulance	13 (12.62 %)	15 (14.02 %)	11 (14.47 %)	23 (28.40 %)	18 (33.96 %)	80 (19.05 %)		
Observe	2 (1.94 %)	0 (0.00 %)	0 (0.00 %)	3 (3.70 %)	1 (1.89 %)	6 (1.43 %)		
Start CPR	84 (81.55 %)	90 (84.11 %)	65 (85.53 %)	53 (65.43 %)	32 (60.38 %)	324 (77.14 %)		
Q) Which is the drug of choice for a patient having an epileptic attack?								
Atropine	5 (4.85 %)	10 (9.35 %)	8 (10.53 %)	0 (0.00 %)	0 (0.00 %)	23 (5.48 %)	25.8207	**0.0113***
Cyclosporine	3 (2.91 %)	3 (2.80 %)	0 (0.00 %)	1 (1.23 %)	0 (0.00 %)	7 (1.67 %)		
Diazepam	87 (84.47 %)	91 (85.05 %)	62 (81.58 %)	79 (97.53 %)	50 (94.34 %)	369 (87.86 %)		
Diltiazem	8 (7.77 %)	3 (2.80 %)	6 (7.89 %)	1 (1.23 %)	3 (5.66 %)	21 (5.00 %)		
Q) Which artery is used to check a patient's pulse rate in an emergency?								
Brachial artery	5 (4.85 %)	5 (4.67 %)	5 (6.58 %)	4 (4.94 %)	1 (1.89 %)	20 (4.76 %)	18.6792	0.0965
Carotid artery	58 (56.31 %)	58 (54.21 %)	38 (50.00 %)	61 (75.31 %)	36 (67.92 %)	251 (59.76 %)		
Femoral artery	0 (0.00 %)	1 (0.93 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	1 (0.24 %)		
Radial artery	40 (38.83 %)	43 (40.19 %)	33 (43.42 %)	16 (19.75 %)	16 (30.19 %)	148 (35.24 %)		
Q) What is the concentration and route of administration of epinephrine in case of anaphylaxis?								
1:1000 IM	39 (37.86 %)	50 (46.73 %)	40 (52.63 %)	40 (49.38 %)	38 (71.70 %)	207 (49.29 %)	74.5944	**0.0001***
1:1000 IV	31 (30.10 %)	23 (21.50 %)	17 (22.37 %)	17 (20.99 %)	7 (13.21 %)	95 (22.62 %)		
1:100 IM	9 (8.74 %)	6 (5.61 %)	12 (15.79 %)	13 (16.05 %)	4 (7.55 %)	44 (10.48 %)		
1:100 IV	24 (23.30 %)	28 (26.17 %)	7 (9.21 %)	11 (13.58 %)	4 (7.55 %)	74 (17.62 %)		
Practice-Based Questions								
Q) When a patient gets Angina, which of the following drugs would you choose?								
IM Epinephrine	9 (8.74 %)	4 (3.74 %)	3 (3.95 %)	1 (1.23 %)	0 (0.00 %)	17 (4.05 %)	19.9130	0.0687
IV Saline	1 (0.97 %)	1 (0.93 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	2 (0.48 %)		
Oral Dilantin	4 (3.88 %)	2 (1.87 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	6 (1.43 %)		
Sublingual Nitroglycerine	89 (86.41 %)	100 (93.46 %)	73 (96.05 %)	80 (98.77 %)	53 (100.00 %)	395 (94.05 %)		
Q) A patient is cited with airway obstruction during dental treatment due to aspiration of a foreign object; What would you do?								
Ask the patient to cough	3 (2.91 %)	5 (4.67 %)	3 (3.95 %)	0 (0.00 %)	0 (0.00 %)	11 (2.62 %)	16.2272	0.1810
Attempt Heimlich Manoeuvre	28 (27.18 %)	31 (28.97 %)	23 (30.26 %)	12 (14.81 %)	13 (24.53 %)	107 (25.48 %)		
Examine mouth and local area	3 (2.91 %)	1 (0.93 %)	0 (0.00 %)	2 (2.47 %)	1 (1.89 %)	7 (1.67 %)		
All of the above	69 (66.99 %)	70 (65.42 %)	50 (65.79 %)	67 (82.72 %)	39 (73.58 %)	295 (70.24 %)		
Q) Which forceps will you use to retrieve an aspirated foreign object?								
Alli's forceps	36 (34.95 %)	19 (17.76 %)	14 (18.42 %)	12 (14.81 %)	7 (13.21 %)	88 (20.95 %)	43.5688	**0.0002***
Artery forceps	13 (12.62 %)	21 (19.62 %)	9 (11.85 %)	14 (17.29 %)	10 (18.87 %)	67 (15.95 %)		
Babcock forceps	15 (14.56 %)	20 (18.69 %)	8 (10.53 %)	10 (12.35 %)	4 (7.55 %)	57 (13.57 %)		
Magill's forceps	39 (37.86 %)	47 (43.93 %)	45 (59.21 %)	45 (55.56 %)	32 (60.38 %)	208 (49.52 %)		
Q) Which drug will you administer if a patient gets an asthmatic attack?								
Aspirin	2 (1.94 %)	2 (1.87 %)	0 (0.00 %)	0 (0.00 %)	0 (0.00 %)	4 (0.95 %)	13.0705	0.3639
Atropine	7 (6.80 %)	1 (0.93 %)	2 (2.63 %)	4 (4.94 %)	0 (0.00 %)	14 (3.33 %)		
Epinephrine	4 (3.88 %)	4 (3.74 %)	2 (2.63 %)	4 (4.94 %)	2 (3.77 %)	16 (3.81 %)		
Salbutamol	90 (87.38 %)	100 (93.46 %)	72 (94.74 %)	73 (90.12 %)	51 (96.23 %)	386 (91.90 %)		
Attitude-Based Questions								
Q) Do you think that obtaining the vital signs (blood pressure, pulse, respiratory rate, temperature) of a patient before starting any treatment is of any importance?								
No	0 (0.00 %)	1 (0.93 %)	1 (1.32 %)	1 (1.23 %)	1 (1.89 %)	4 (0.95 %)	1.6561	0.7986
Yes	103 (100.0 %)	106 (99.07 %)	75 (98.68 %)	80 (98.77 %)	52 (98.11 %)	416 (99.05 %)		
Q) Are you confident in handling a medical emergency?								
No	66 (64.08 %)	49 (45.79 %)	50 (65.79 %)	41 (50.62 %)	18 (33.96 %)	224 (53.33 %)	20.1892	**0.0004***
Yes	37 (35.92 %)	58 (54.21 %)	26 (34.21 %)	40 (49.38 %)	35 (66.04 %)	196 (46.67 %)		
Q) Have you attended any courses for the management of medical emergencies?								
No	95 (92.23 %)	96 (89.72 %)	68 (89.47 %)	57 (70.37 %)	29 (54.72 %)	345 (82.14 %)	48.9522	**0.0001***
Yes	8 (7.77 %)	11 (10.28 %)	8 (10.53 %)	24 (29.63 %)	24 (45.28 %)	75 (17.86 %)		

*$P < 0.05$ considered statistically significant.

Table 3
Comparison of qualifications with Knowledge and Practice scores by Kruskal Wallis H test followed by Mann –Whitney *U* test.

Qualifications	Knowledge		Practice	
	Mean	SD	Mean	SD
Third-year Students	5.15	1.60	2.79	0.91
Final-year Students	5.25	1.31	2.96	0.92
Interns	4.89	1.16	3.16	0.82
Postgraduates	5.72	1.31	3.27	0.74
Practitioners	5.68	1.01	3.30	0.61
Total	5.30	1.36	3.06	0.85
H-value	22.1950		19.5260	
P-value	**0.0001***		**0.0010***	
Pair-wise comparisons by Mann-Whitney *U* test				
	U	P value	U	*P*-value
Third-year vs Final-year	4918	0.170	4930.5	0.162
Third-year vs Intern	3829.0	0.801	3067.5	0.009*
Third-year vs Postgraduate	2938.5	<0.001*	2936.5	0.001*
Third-year vs Practitioner	1687.5	<0.001*	1874.0	<0.0014*
Final-year vs Intern	3473.5	0.086*	3628.5	0.189
Final-year vs Postgraduate	3511.5	0.023*	3547.5	0.023*
Final-year vs Practitioner	2067.5	0.004*	2291	0.034*
Intern vs Postgraduate	1982	<0.001*	2862.5	0.416
Intern vs Practitioner	1116	<0.001*	1866.5	0.446
Postgraduate vs Practitioner	1966.5	0.399	2137	0.964

*$P < 0.05$ considered statistically significant.

Table 4
Correlation between knowledge and practice scores among the various qualifications using Spearman's rank correlation coefficient.

Qualifications	N	r	*P*-value
Third-year	103	0.2649	**0.0069***
Final-year	107	0.2944	**0.0021***
Intern	76	−0.0486	0.6769
Postgraduate	81	0.0110	0.9226
Practitioner	53	0.1657	0.2358
Total	420	0.1741	**0.0003***

*$P < 0.05$ – statistically significant.

organs.[10]

In our current study, 318 (75.71 %) respondents were female and 102 (24.29 %) were male. Our findings align with previous research conducted by Jacek Smereka et al.[2] (89.74 %), Ayesha Tariq Niaz et al.[4] (77 %), Sandhya Joshi et al.[11] (59.7 %), Oluwaseun Fasoyiro et al.[1] (59.6 %), Seemala Jyotsna et al.[5] (57.4 %), and Farzad Mojarrad et al.[8] (57 %), all of which also reported a higher prevalence of female participants. In contrast, studies by Jonathan M. Broadbent et al.[12] (75 %), Habib Allah Shojaeipour et al.[13] (61.4 %), and L. Surya Chandra Varma et al.[14] (56.81 %) reported a predominance of male participants. Notably, Mostafa Alhamad et al.[15] (males: 50.3 %, females: 49.7 %) and Azita Azad et al.[6] (males: 50 %, females: 50 %) observed an equal number of male and female participants in their studies.

In the present study, 176 (41.90 %) respondents knew the correct dental chair position for managing syncopal patients ($P = 0.0001$). This result closely mirrors the findings of Haifa Fahad Albelaihi et al.,[16] who reported a similar response rate of 43 %. However, our study's knowledge rate was notably lower than that reported by Aadil Ahamed et al.[17] (100 %), Priyanka Sharma et al.[7] (Interns: 90 %, Postgraduates: 82 %), Renuka Nagarale et al.[18] (86.6 %), L. Surya Chandra Varma et al.[14] (MDS: 83.85 %, BDS: 78.57 %), Sandhya Joshi et al.[11] (71.8 %), and Oluwaseun Fasoyiro et al.[1] (50.9 %).

With respect to the management of a hypoglycaemic patient, 72.86 % of the participants in our study indicated that they would administer oral glucose to the patient ($P = 0.0057$). This response rate closely corresponds to the findings reported by Renuka Nagarale et al.[18] (86.66 %). Additionally, a study conducted by Jonathan M. Broadbent et al.[12] documented 31 instances of hypoglycaemic attacks successfully managed by administering oral glucose. Across various studies, the availability of oral glucose in clinics or emergency drug kits received positive responses from different percentages of participants: 88.6 %,[19] 82.2 %,[20] 81.4 %,[21] 70 %,[15,18] 67.1 %,[13] 35.1 %,[1] and 11 %.[22] In our study, 84.52 % of participants responded that they would use a glucometer to monitor a patient's blood sugar level in the event of a hypoglycaemic attack ($P = 0.0023$). Regarding the availability of glucometers in clinics, 71.4 %,[19] and only 10 %[23] of respondents affirmed their availability.

In our study, a significant proportion of respondents (369; 87.86 %) exhibited awareness of diazepam being the drug of choice in the abortive treatment of epilepsy ($P = 0.0113$). The degree of awareness observed in our study stands out significantly when contrasted with similar research. For instance, Aadil Ahamed et al.[17] reported an 80 % awareness rate, while Renuka Nagarale et al.[18] and Haifa Fahad Albelaihi et al.[16] found much lower awareness rates at 23.33 % and 18 %, respectively. Regarding the availability of diazepam in dental emergency kits, Shweta Kumarswami et al.[21] reported the highest positive response (85 %), followed by Mohammad Reza Khami et al.[24] (54 %), Habib Allah Shojaeipour et al.[13] (35.7 %), Mostafa Alhamad et al.[15] (28.3 %), Tanupriya Gupta et al.[20] (20.5 %), Nalisha Mohamed Ramli et al.[23] (5.6 %), and P. J. Chapman et al.[22] (5 %).

In our current study, 395 (94.05 %) respondents expressed their preference for sublingual nitroglycerine for the management of an anginal patient. This response rate significantly surpasses that reported by Aadil Ahamed et al.[17] (80 %), Haifa Fahad Albelaihi et al.[16] (57.5 %), and Aveek Mukherji et al.[3] (30 %). With respect to the availability of

Table 5
Knowledge, attitude, and practice scores among various qualifications.

Level	Qualification					Total N (%)	Chi-square test	*P*-value
	Third-year N (%)	Final-year N (%)	Intern N (%)	Postgraduate N (%)	Practitioner N (%)			
Knowledge								
Poor	13 (12.62 %)	13 (12.15 %)	9 (11.84 %)	6 (7.41 %)	1 (1.89 %)	42 (10.00 %)	17.340	**0.027***
Moderate	69 (66.99 %)	76 (71.03 %)	62 (81.58 %)	53 (65.43 %)	40 (75.47 %)	300 (71.43 %)		
Good	21 (20.39 %)	18 (16.82 %)	5 (6.58 %)	22 (27.16 %)	12 (22.64 %)	78 (18.57 %)		
Attitude								
Negative	65 (63 %)	46 (43 %)	49 (64 %)	33 (41 %)	11 (21 %)	204 (49 %)	36.15	**<0.001***
Positive	38 (37 %)	61 (57 %)	27 (36 %)	48 (59 %)	42 (79 %)	216 (51 %)		
Practice								
Inadequate	9 (8.74 %)	5 (4.67 %)	1 (1.32 %)	1 (1.23 %)	0 (0.00 %)	16 (3.81 %)	11.899	**0.018***
Adequate	94 (91.26 %)	102 (95.33 %)	75 (98.68 %)	80 (98.77 %)	53 (100.0 %)	404 (96.19 %)		

*$P < 0.05$ – statistically significant.

nitroglycerine as an emergency drug, 70 %,[13] 65 %,[24] and 23.4 %[15] of the respondents affirmed its availability in the dental emergency kit.

In our present study, 352 (83.81 %) respondents selected epinephrine as their drug of choice for managing anaphylaxis ($P = 0.0167$), and 207 respondents (49.29 %, $P = 0.0001$) correctly identified its concentration and route of administration (1:1000, IM). These response rates notably exceeded those observed by Haifa Fahad Albelaihi et al.[16] (33 %) and Aveek Mukherji et al.[3] (61 %), yet closely resembled those reported by Aadil Ahamed et al.[17] (80 %) and Renuka Nagarale et al.[18] (80 %).

Three hundred and twenty-four (77.14 %) participants in our study expressed their readiness to initiate cardiopulmonary resuscitation (CPR) for an unresponsive patient without a pulse ($P = 0.0045$). This response rate exceeds that documented in prior research by Priyanka Sharma et al.,[7] where 67.2 % of postgraduates and 57.7 % of interns responded that they would initiate CPR on any unresponsive patient. Comparable responses were noted in other studies conducted by Renuka Nagarale et al.[18] (60 %), L. Surya Chandra Varma et al.[14] (56.8 %), Haifa Fahad Albelaihi et al.[16] (51 %), and Oluwaseun Fasoyiro et al.[1] (47.4 %).

In a study conducted by Aadil Ahamed et al.,[17] it was found that 80 % of the participants demonstrated awareness of managing airway obstruction, which is consistent with the study led by L. Surya Chandra Varma et al.,[14] which reported a similar awareness rate of 61.7 %. Farzad Mojarrad et al.[8] also reported awareness among 55 % of their respondents. In contrast, Oluwaseun Fasoyiro et al.[1] and Renuka Nagarale et al.[18] studies revealed lower positive response rates of only 33.3 % and 26.66 %, respectively. In our study, 295 (70.24 %) respondents displayed knowledge of the correct management of airway obstruction (ask the patient to cough, examine the mouth and local area, and attempt the Heimlich Maneuver), and 208 (49.52 %) respondents were aware of the use of Magill forceps to retrieve the foreign object ($P = 0.0002$).

In our present study, an impressive 416 (99.05 %) respondents demonstrated a clear awareness regarding the importance of obtaining patients' vital signs before commencing any dental treatment. This level of awareness closely aligns with the results of previous studies by Aadil Ahamed et al.[17] (100 %), Priyanka Sharma et al.[7] (100 % of both postgraduates and interns), Oluwaseun Fasoyiro et al.[1] (91.2 %), and L. Surya Chandra Varma et al.[14] (83.06 %). Notably, our study's outcomes markedly surpass those reported by Shweta Kumarswami et al.[21] (38.4 %), Renuka Nagarale et al.[18] (33.33 %), Haifa Fahad Albelaihi et al.[16] (29.4 %), and Jacek Smereka et al.[2] (0.96 %).

Only 196 (46.67 %) participants in our study expressed confidence in their ability to effectively manage a medical emergency ($P = 0.0004$). This level of confidence is similar to what was reported by Sandhya Joshi et al.[11] (44.4 %), Aadil Ahamed et al.[17] (40 %), and L. Surya Chandra Varma et al.[14] (49.50 %), yet it exceeds the response rate recorded by Haifa Fahad Albelaihi et al.[16] (37 %), and Renuka Nagarale et al.[18] (16.66 %). Conversely, several studies conducted by Shweta Kumarswami et al.,[21] Ghassan M. Al-Iryani et al.,[25] Seemala Jyotsna et al.,[5] and Ayesha Tariq Niaz et al.[4] reported significantly higher positive response rates of 94 %, 82 %, 61 %, and 55 %, respectively.

In our study, only 75 (17.86 %) respondents reported attending any workshops or courses related to the management of medical emergencies ($P = 0.0001$), which may help explain the observed low confidence level in handling such situations. Our response rate closely resembled the 16 % reported by Tanupriya Gupta et al.[20] but exceeded the 7.6 % reported by Shweta Kumarswami et al.[21] In contrast, higher response rates were documented in studies conducted by Himanshu Gupta et al.[9] (90.7 % practitioners and 52.3 % postgraduates), Renuka Nagarale et al.[18] (80 %), Oluwaseun Fasoyiro et al.[1] (78.9 %), L. Surya Chandra Varma et al.[14] (74.09 %), Priyanka Sharma et al.[7] (67.2 % postgraduates and 21.2 % interns), Praveen S. Jodalli et al.[19] (57.1 %), Ayesha Tariq Niaz et al.[4] (37 %), and Aveek Mukherji et al.[3] (25 %).

A majority of the respondents in our study demonstrated moderate knowledge, and most of the undergraduates displayed a negative attitude toward the management of medical emergencies (Table 4). These results are consistent with those reported by Farzad Mojarrad et al.,[8] Oluwaseun Fasoyiro et al.,[1] Ghassan M. Al-Iryani et al.,[25] and Aveek Mukherji et al.[3] These findings may potentially impede a dental student or dentist's ability to recognize, prevent, and effectively manage medical emergencies, consequently impacting the quality of patient care.

7. Strengths and limitations

The novelty of the present study – this study sheds light on an important aspect of dental care that is often overlooked: managing medical emergencies. It suggests that the current training programs may not be sufficient and highlights the need for improving the same given the growing number of elderly and medically compromised patients visiting dentists in present times.

This study is not representative of all dentists. The number of interns, postgraduates, and practitioners was relatively low compared to the third and final-year students, making it difficult to equally assess the knowledge, attitude, and practice scores among them.

8. Suggestions

The present study raises questions on the levels of knowledge, attitude, and practice of dental students and dentists nationwide. It can therefore be used as a scaffold to conduct larger nationwide studies with additional questions on the knowledge, attitude, and practice towards handling medical emergencies to assess the same.

Some additional suggestions to improve the knowledge, attitude, and practice of dentists in managing medical emergencies.

1. Developing and implementing comprehensive training programs that cover all aspects of managing medical emergencies in dental clinics, focusing on both theoretical and practical aspects and including simulated emergency scenarios to provide hands-on experience.
2. Regular training and refresher courses should be conducted to ensure dental professionals are up-to-date with the latest techniques and protocols for managing medical emergencies.
3. A positive attitude should be encouraged among dental professionals by highlighting the importance of preparedness, promoting teamwork, and ensuring that all team members feel confident and empowered to respond to emergencies.
4. Establishing clear protocols and guidelines for managing medical emergencies can help ensure that all team members are aware of their roles and responsibilities. These protocols should be reviewed and updated to reflect current best practices.

9. Conclusion

This study discovered that although the undergraduate curriculum includes topics on the management of medical emergencies, there is a lack of knowledge and a negative attitude among the respondents in dealing with medical emergencies.

Declaration of competing interest

The authors declare no competing interests.

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