

KNOWLEDGE AND SELF-REPORTED PREPAREDNESS OF FINAL YEAR DENTAL STUDENTS REGARDING MEDICAL EMERGENCIES DURING DENTAL PROCEDURES – A MULTI-CENTER STUDY

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ABSTRACT

A dental student competent in recognizing and managing medical emergencies will have a safe practice in the future. The objective of this study was to assess the knowledge and self-reported preparedness of senior dental students regarding medical emergencies during dental procedures.

This cross-sectional study was conducted among final-year dental students in all dental teaching hospitals of Rawalpindi and Islamabad in Pakistan. All final-year students enrolled for the session 2021 in dental colleges of two cities were included in this research study (n=350). A closed-ended questionnaire was used for the data collection procedure consisting of questions related to self-assessed medical emergency preparedness and participants' knowledge / competency regarding specific medical emergencies. A scoring system was used for rating the responses of the participants. Demographic variables were expressed in frequencies and percentages. Comparisons between responses of male and female students regarding self-assessed medical emergency preparedness and knowledge of specific medical emergencies / procedures were made using Pearson's chi-square test of association. Point Biserial test was used to determine a correlation between knowledge score and responses to self-assessed medical emergency preparedness (scale variable vs. dichotomous nominal variable). Association / correlation was considered statistically significant with a P value ≤ 0.05 .

Out of 325 students, 204 participated with a response rate of 62.7%. The mean age of the students was 22.89(± 1.108) years. Female and male students constituted 76% (n=155) and 24% (n=49) respectively. Half of the respondents (103, 50.5%) scored "good" in self-assessed medical emergency preparedness. The majority of the male students scored "good" as compared to female students (65.3% vs. 45.8%) with a statistically significant association (p=0.20). Most of the students (128, 68.7%) scored "fair" when asked about specific medical emergencies. Respondents with high knowledge scores tend to; inquire about medical history, obtain filled health history forms, had knowledge about emergency drugs / their routes of administration, and administer intramuscular injection with a weak positive statistically significant correlation (p ≤ 0.05).

The scores regarding self-reported preparedness and knowledge of undergraduate students towards medical emergencies in our study were mediocre and demanded more emphasis on educating and reinforcing medical emergency skills and knowledge at the undergraduate level.

Key words: Medical Emergencies, Dental Students, Knowledge, Self-reported preparedness, Dental Education

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INTRODUCTION

A medical emergency can be described as an unwanted, unexpected reaction or complication which usually requires immediate attention or intervention.¹ A few of the commonly encountered medical emergencies in dental chairs are vasovagal syncope, allergic reaction to local anesthesia, choking, asthmatic attack, seizures, and aspiration of instruments during dental treatment. Dental anxiety can also provoke a medical emergency.^{1,2} The reported prevalence of medical

emergencies during dental procedures is 0.22-0.7 per dentist per year in general practice.³ Another state-wide survey conducted in Germany reported that 57 % of dentists had faced at least 3 emergencies in a period of 12 months.⁴ Sound knowledge regarding emergency recognition and management is important as emergencies can be life-threatening and can end up in medico-legal consequences.^{4,5} It is highly significant to impart proper knowledge and training in dental schools at the undergraduate level.

Multiple studies had been conducted around the globe to assess the knowledge, awareness, and self-reported preparedness of dentists regarding the management of medical emergencies, administration of BLS, and emergency medicines.⁶⁻⁸ Most of these studies concluded unsatisfactory knowledge and confidence of dentists in managing medical emergencies. Very few studies are conducted to assess the knowledge and self-reported preparedness of dental undergraduate students around the globe.^{1,9,10} Despite the fact that students indicated they have good preparedness for medical emergencies during dental procedures, their knowledge and confidence regarding handling emergencies were not satisfactory.^{1,9} Another study reported that only 10.5% of undergraduate students had satisfactory knowledge to manage medical emergencies.¹

Basic knowledge of recognition of medical emergencies and their management must be the object of undergraduate dental training and education. A dental student competent in recognizing and managing medical emergencies will have a safe practice in the future. The undergraduate dental curriculum plays an important role in imparting this safe practice in future years. In our country, medical emergencies and urgencies are taught in the subject of general medicine and oral and maxillofacial surgery to undergraduate dental students. Knowledge of the competency of undergraduate dental students in managing medical emergencies is also very important for the academic and curriculum committees. The objective of this study was to assess the knowledge and self-reported preparedness of final year dental students in dental colleges of two cities about medical emergencies during dental procedures.

METHODOLOGY

Ethical clearance was obtained from Institutional Ethical Review Committee (ERC Ref No: KA/112/21). The cross-sectional study was conducted from August 2021 to October 2021 in all dental teaching hospitals of Rawalpindi and Islamabad in Pakistan including final-year dental students. Non-probability consecutive sampling technique was used for data collection.

With a confidence level of 95%, a precision level set at 0.05, and using a prevalence value of 10.5% (1) of

the students having satisfactory knowledge, the sample size turned out to be a minimum of 145. All students enrolled in final year (n=325) of Bachelor of Dental Surgery (BDS) for the session 2021 in dental teaching colleges of Rawalpindi and Islamabad were included in this study (7 colleges were included). The only exclusion criteria were the students who voluntarily declined not to take part in the study.

Data Collection procedure

A representative from each of the 7 dental teaching colleges was contacted for the distribution of the questionnaire. The data collection was undertaken online using the software allcounted. The survey form started with a brief introduction of the topic, the purpose of the study, participants' right to voluntary participation, and assurance of anonymity. This was followed by a question "I consent to participate in this research" with two options: yes and no. Choosing option "yes" was considered consent of the participant. The settings in the software allowed only fully completed forms to be submitted by prompting participants to complete the missing sections before the form could be submitted. The link was shared twice to ensure wide coverage of group members who are active at different times (through email and WhatsApp)

Data Collection Instrument

A closed-ended questionnaire as used by Fasoyiro et al (Fasoyiro et al., 2019) was used for the data collection procedure. The questionnaire consisted of three parts; Demographic information (age, gender), 8 questions related to the self-assessed medical emergency preparedness of the participants (yes / no answer) and 10 questions related to participants' knowledge/competency regarding specific medical emergencies and medical procedures (multiple choice responses)

Data were analyzed using Statistical Package for the Social Sciences for Windows (SPSS, version 20, Chicago, IL, USA). Demographic variables were expressed in frequencies and percentages. Using the mean value for dichotomy, scores ≤ 4 were rated as poor, and scores > 4 were rated as good for self-assessed medical emergency preparedness questions. For assessing knowledge, 1 score was given to correct response and 0 scores were given to incorrect response. Knowledge scores varied from 0 to 10 (all incorrect to all correct). Knowledge score was graded as ≤ 3 : poor, 4-6 as fair, and > 6 as good. Comparisons between responses of male and female students regarding self-assessed medical emergency preparedness and knowledge of specific medical emergencies/procedures were made using Pearson's chi-square test of association. Point Biserial test was used to determine a correlation between knowledge score and responses to self-assessed

medical emergency preparedness (scale variable vs. dichotomous nominal variable). Association/correlation was considered statistically significant with a P value ≤ 0.05 .

RESULTS

Out of 325 students, 204 participated in this research with a response rate of 62.7%. The mean age of the students was 22.89(± 1.108) years. Female and male students constituted 76% (n=155) and 24% (n=49) of the total participants respectively. One hundred and three students, which constituted half of the sample (50.5%) scored "good" in self-assessed medical emergency preparedness. The majority of the male students scored "good" as compared to female students (65.3% vs. 45.8%) with a statistically significant association (p=0.020). A greater number of male students as compared to female students had attended workshops or training on emergency management (42.8% vs. 21.9%, p=0.004) and were more confident to give the intramuscular injection (71.4% vs. 41.9% p ≤ 0.00). On the other hand female students were more likely to obtain a filled health history form (83.87% vs. 65.3%, p= 0.005) and vital signs (63.8% vs. 46.9%, p= 0.035) as compared to male students before commencing any treatment. Table 1 shows the responses of students regarding self-assessed medical emergency preparedness along with the comparison of male and female students in detail.

Table 2 shows the number of students who gave correct answers about the management of specific medical emergencies. Out of 204, only 21 (10.3%) had "good" knowledge about medical emergencies. The majority of the students (128, 68.7%) scored "fair" when

asked about specific medical emergencies. Most of the students were unaware of "other options if you don't want to give mouth-to-mouth CPR (194, 95.0%)", "best method of rescue breathing in infants (181, 88.7%)" and "the most appropriate step while planning for extraction of a tooth in patients with prosthetic heart valve (143, 70.0%)". For "other options if you don't want to give mouth to mouth CPR" a marginally significant association was seen between male and female (P= 0.049). No statistically significant association was seen between male and female students and knowledge about other medical emergencies.

Respondents with high knowledge scores tend to; inquire about medical history, obtain a filled health history form, had knowledge about emergency drugs/ their routes of administration, and administer an intramuscular injection. A weak positive statistically significant correlation was observed between total knowledge score and above mentioned self-assessed medical preparedness responses (Table 3).

DISCUSSION

Half of the students (50.5%) scored "good" in self-assessed medical emergency preparedness. A study conducted in Nigeria reported that 72% of dental students scored "good" in self-assessed medical emergency preparedness.¹ Less than half of the Jordanian students' had an optimal level of medical emergency knowledge and skills.⁹ As far as "inquiring about medical history" was concerned our results were in agreement with studies conducted on dental students in Nigeria and dental graduates in India.^{1,11} However, for other questions regarding self-assessed emergency preparedness, Nigerian students responded better

TABLE 1: NUMBER OF STUDENTS IN TOTAL AND GENDER WISE (MALE AND FEMALE) WHO ANSWERED "YES" TO QUESTIONS REGARDING SELF- ASSESSED MEDICAL EMERGENCY PREPAREDNESS

Self-assessed medical emergency preparedness among the final year dental students (n= 204)				
Variables	Number of students answering "Yes" n (%)	Gender		P-value*
		Male Total=49 n(%)	Female Total=155 n (%)	
Self-assessed medical preparedness score	101(49.5)	17 (34.6)	84 (54.1)	0.020**
• Poor	103 (50.5)	32 (65.3)	71 (45.8)	
• Good				
Do you enquire about medical history including medication and allergy?	192(94.1)	46(93.8)	146 (94.1)	0.935
Do you obtain filled health history proforma of the above from the patients	162(79.4)	32(65.3)	130 (83.87)	0.005**

Do you obtain or have access to the vital signs (blood pressure, pulse, respiration, temperature) of patients before commencing any treatment?	122(59.8)	23(46.9)	99 (63.8)	0.035**
Do you think you can handle any emergency condition with your patient during dental procedure?	79(38.7)	24 (48.9)	55 (35.4)	0.091
Have you attended any workshop on emergency training or management programs?	55(27.0)	21 (42.8)	34 (21.9)	0.004**
Do you have the knowledge about emergency drugs and their routes of administration?	140(68.6)	35 (71.4)	105 (67.7)	0.628
Can you give an intramuscular injection?	100 (49.0)	35 (71.4)	65 (41.9)	0.00**
Can you give an intravenous injection?	62(30.4)	20 (40.8)	42 (27.0)	0.691

* Pearson's Chi- Squared Test

** ($P \leq 0.05$ was considered significant)

TABLE 2: KNOWLEDGE OF FINAL YEAR UNDERGRADUATE DENTAL STUDENTS REGARDING SPECIFIC MEDICAL EMERGENCIES/PROCEDURES

Knowledge/competency regarding specific medical emergencies and medical procedures (n=204)	
Medical Emergency/Procedure (Correct answer)	Correct answer n (%)
Immediate action if the patient suffers from syncope during a dental procedure (Place patient in Trendelenburg position and give ammonia inhalant)	124 (60.8)
Immediate action taken if patient is not responding even after shaking and shouting (Activate EMS and start CPR)	147 (72.1)
The most appropriate step while planning for extraction of a tooth in patients with prosthetic heart valve is (Advise antibiotic prophylaxis)	61 (29.9)
Immediate action taken in patients with airway obstruction during dental treatment due to aspiration of foreign body (all of the mentioned procedures)	94 (46.1)
Procedures likely to be performed in patients with prosthetic heart without giving antibiotics (all of the mentioned options)	91 (44.6)
BLS stands for (Basic life support)	183 (89.7)
Location of chest compression is (middle of the chest)	74 (36.3)
Ratio of CPR, for single rescuers in adult patients is (30:02)	114 (55.8)
Other options if you don't want to give mouth to mouth CPR (Chest compression only)	10 (4.9)
Best method of rescue breathing in infants (emphasizing on making an effective seal) is (Mouth to mouth with nose pinched)	23 (11.2)
Medical emergencies knowledge score	55 (27.0)
• Poor	128 (62.7)
• Fair	21 (10.3)
• Good	

TABLE 3: CO-RELATION BETWEEN KNOWLEDGE SCORE AND SELF-ASSESSED MEDICAL EMERGENCY PREPAREDNESS

Co-relation* between knowledge score and self-assessed medical emergency preparedness								
	Do you inquire about medical history including medication and allergy?	Do you obtain filled health history proforma of the above from the patients?	Do you obtain or have access to the vital signs (blood pressure, pulse, respiration, temperature) of patients before commencing any treatment?	Do you think you can handle any emergency condition with your patient during dental procedure?	Have you attended any workshop on emergency training or management programs?	Do you have the knowledge about emergency drugs and their routes of administration?	Can you give an intramuscular injection?	Can you give an intravenous Injection?
Knowledge Score	.175**	.150**	.024	.003	.118	.252**	.147**	.053

than our sample.¹ The percentage of students who had attended any workshop on emergency training was inconsiderable in our students' cohort (27%) as compared to final-year dental students in Lagos State (78.9%) and Jordan (42.7%).^{1,9} Our results were comparable to final year dental students at the University of Benin (28.2%).¹² When inquired about handling an emergency situation that occurs during the dental procedure, only 38.7% of the respondents in our study were confident to manage an emergency situation. These results are in contrast to the study conducted by Fasoyiro et al in which 66.7% of the students were confident in handling an emergency situation.¹ Similarly, a study conducted on final-year dental students at Newcastle University of Dental Sciences revealed that 95% of the students were confident in the management of medical emergencies.¹³ At the same time, the majority of the studies carried out across the globe showed the alarming fact that the majority of dental students and dentists are not confident in managing an emergency and many of them never had attended any form of practical training in resuscitation.^{4,14} Only 30.8% of respondents in our study reported that they can administer an intravenous injection. These results were comparable to a study conducted on Brazilian students where the majority of the students felt unable to perform intravenous injections.¹⁵ To sum up, above mentioned results are indicative of the fact that there should be more focus on the skill of administering injectable at the undergraduate level along with conducting workshops or training for emergency management.

The majority of the respondents in our study were female addressing the female predominance in dentistry. The high proportion of female students in dentistry is also evident from other research.^{1,16} In comparison with female students, the majority of the male students scored "good" in self-reported medical emergency preparedness. This result is in contrast with the results obtained from a study showing female students scoring "good" as compared to male students.¹

More than half of the respondents (62.7%) reported "fair" knowledge/competency regarding specific medical emergencies and medical procedures. About 60.8% had the right knowledge regarding the management of syncope. This result was better than the knowledge of students in Nigeria and Saudi Arabia where about 50.9% and 43% of the students respectively knew about immediate action to be taken if the patient suffers from syncope.^{1,17} However, our result was inferior to a study conducted among Indian student where 83% of the students knew how to manage syncope.² A systematic review regarding the etiology and management of syncope in dentistry also revealed that most of the dentists (79.2%) were able to diagnose syncope but they lacked the skill for appropriate management of syncope (86%).¹⁸ Deficiency in knowledge was observed for "Other options if you don't want to give mouth to mouth CPR" and "Best method of rescue breathing in infants (emphasizing on making an effective seal)" with only 4.9% and 11.2% of the students knowing the correct answer respectively. Although the result for "other options if you don't want to give mouth-to-mouth CPR"

is comparable with the study from Fasoyiro et al but significantly higher number of students had knowledge about the best method of rescue breathing in infants in their study.¹ Similarly the knowledge regarding “The most appropriate step while planning for extraction of a tooth in patients with prosthetic heart valve” and “Location of chest compression” was also not satisfactory. These results were inferior to the results reported by other researchers.^{1,2,9} These results are alarming as literature stresses that medical emergencies seem to be growing in the future.^{2,19} A lack of knowledge and competency in managing medical emergencies can result in life-threatening crises and medico-legal situations.^{20,21} The majority of the respondents (72.1%) in our study had the appropriate knowledge regarding activating EMS and starting CPR if the patient is not responding even after shaking and shouting. This result was encouraging and better than results from other studies.^{15,17}

This was a cross-sectional study reporting students' self-preparedness and knowledge about different emergency scenarios. The results obtained from this study may differ from the actual performance of the students in a real or simulated emergency situation as Le TT and colleagues observed that students had good verbal knowledge regarding protocols for emergency management but chair side execution of the knowledge was not satisfactory.²² A follow-up study to assess knowledge of managing medical emergencies followed by performance of students to recognize and manage dental emergencies in a simulated set-ups can generate more reliable results. It is also emphasized in the literature that performing periodic simulated emergency drills at the undergraduate level can improve the confidence, knowledge, and skill of the students in recognizing and managing medical emergencies when occurred in real life.^{1,9,15}

CONCLUSION

The scores regarding self-reported preparedness and knowledge of undergraduate students towards medical emergencies in our study are mediocre and demanded more emphasis on educating and reinforcing medical emergency skills and knowledge at the undergraduate level.

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