

# Knowledge and attitude toward anaphylaxis during local anesthesia among dental practitioners in Chennai – a cross-sectional study

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**Objective:** Anaphylaxis is one of the local anesthetic dental emergencies that lead to morbidity and mortality. Hence, this study aimed to assess the knowledge and attitude of dental practitioners in Chennai toward managing anaphylaxis in patients who are given local anesthesia.

**Participants and methods:** Seventeen questions were formulated regarding anaphylaxis reactions and its treatment. The questions were given to a random selection of dentists practicing in private clinics in Chennai.

**Results:** Two hundred dentists responded to the questionnaire. The results indicated that the majority of the participants had knowledge of one or more symptoms relating to anaphylaxis. However, none of the participants demonstrated that they knew about all symptoms relating to anaphylaxis. The results also did not vary with age. Only 62% of the dentists surveyed were equipped with emergency kits in their clinic.

**Conclusion:** The present study has revealed the lack of knowledge among dentists in Chennai in relation to anaphylactic reactions and its management. Knowledge of practicing dentists in this area can be increased by providing continuing education programs consisting of workshops and hands-on courses.

**Keywords:** anaphylaxis, allergy, emergency drugs, local anesthetic

## Introduction

Anaphylaxis is defined as “an acute potentially life threatening hypersensitivity reaction, involving the release of mediators from mast cells, basophils, and recruited inflammatory cells”.<sup>1</sup> Vasoactive mediators actively released by mast cells, which are immunoglobulin E-mediated, cause systemic anaphylaxis.<sup>2</sup> Warmth and itch mainly in the axilla and groin area combined with anxiety and panic can be the early visual symptoms. Skin testing and serology such as tryptase levels help in initial diagnosis of anaphylaxis at the clinical level.<sup>3</sup> If it goes unnoticed or untreated, the reaction may gradually progress into urticarial rash, and inflammation of neck and face leading to spasm of the bronchi and laryngeal edema.<sup>1</sup>

If an administered drug causes an immune-mediated hypersensitive reaction such as an anaphylactic reaction, it can even be a threat to life. Management of risk factors and careful monitoring to avoid allergens and triggers can greatly help in prevention of anaphylaxis.<sup>4</sup> A session with an allergist is recommended for diagnosis and successful handling of these cases when a drug allergy is suspected.

Allergic reactions caused by local anesthesia are due to either the anesthetic itself or due to the additives in the solution. Allergic reactions pertaining to the local

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anesthesia alone are found to be very rare, contributing to <1% of all the adverse reactions reported.<sup>5-9</sup> However, a thorough knowledge of these reactions serves to be fruitful as it gives the patient the best chance of recovery.

Studies have been conducted in other countries to evaluate the knowledge and attitude of dentists in managing anaphylaxis caused by local anesthesia.<sup>10-12</sup> Those studies reveal that there was inadequate knowledge among dentists in identification and management of such reactions. In Chennai, India, no study has yet been conducted in this area. As a result, the present study aimed to determine the level of knowledge of dentists in Chennai regarding the symptoms, signs, and management of anaphylaxis.

## Participants and methods

A survey was conducted among dental practitioners at Chennai in 2017 from February 2017 to July 2017 over a period of 6 months. Ethical clearance was obtained from the institution ethical committee before commencement of the survey (Karpaga Vinayaga Educational Group, Institutional Ethics Committee, EC reference no.: 1/2017). A structured, closed-ended questionnaire (Table 1) was framed and validated by three external members. The questionnaire consisted of 17 questions, of which three questions were based on demographic data, two questions were based on the preference of local anesthetic, three were based on administration of test dose, six were based on the signs and symptoms of anaphylaxis due to local anesthetic, and the last three questions were based on the knowledge of dentists about the medical management of anaphylaxis.

The enrollment process included a random selection of dentists with equal representation from all 10 zones of Chennai without gender discrimination, which included both general and specialty practitioners. Those who were willing to participate in the study were enrolled in the study after obtaining informed consent.

The questionnaire was distributed among the dentists by one investigator and the completed responses were collected in their dental offices by another investigator so as to avoid bias. The data obtained from the fully completed questionnaires were entered in an excel sheet and subjected to statistical analysis with chi-square test using SPSS 20 software.

## Results

The study group consisted of 200 dentists, with mean age being 35±5 years. Seventy-three percent of the study population were general dentists with a mean professional period of 10±3 years. The data obtained from demographic details were subjected to statistical analysis using chi-square test.

Ninety-one percent of dentists preferred lignocaine as the local anesthetic of choice and 98% of them had a preference for local anesthetic with adrenaline.

Even though 94% of dentists had the habit of eliciting history of drug allergy before initiating the treatment, only 3% admitted that they give test dose on routine basis.

Regarding the knowledge about signs and symptoms of local anesthesia, the results reveal that only 63% of them had actually seen a case with adverse reaction to local anesthesia. The results also reveal that even though every participant had some knowledge about the symptoms of anaphylaxis, none

**Table 1** The structured, closed-ended questionnaire results

Questions	Answers
1. Age of the dentist (years):	
a) 25–30	63 (31.5%)
b) 31–45	98 (49%)
c) >46	39 (19.5%)
2. Duration of dental practice (years):	
a) Less than 5	46 (23%)
b) 6–15	112 (56%)
c) >16	42 (21%)
3. You are qualified as a:	
a) General dentist	78 (39%)
b) Specialist dentist	122 (61%)
4. Please write down the names of the local anesthetics that you use in your daily practice:	
a) Lidocaine	182 (91%)
b) Articaine	14 (7%)
c) Prilocaine	110 (55%)
d) Others	4 (2%)

(Continued)

**Table I** (Continued)

Questions	Answers
5. Do you prefer local anesthesia with adrenaline or without adrenaline?	
a) With adrenaline	196 (98%)
b) Without adrenaline	4 (2%)
6. Do you ask your patients if they have any drug allergies before the treatment?	
a) Yes	188 (94%)
b) No	12 (6%)
7. Do you ask your patients whether they got local anesthetic administration done prior for any dental procedures?	
a) Yes	192 (96%)
b) No	8 (4%)
8. Do you give a test dose on a routine basis?	
a) Yes	6 (3%)
b) No	194 (97%)
9. How do you behave when you see a patient with a suspected local anesthesia allergy?	
a) I do not begin the treatment	146 (73%)
b) I make a skin prick test with the suspected drug by myself	4 (2%)
c) I refer the patient to an allergy specialist with the suspected drug for testing	44 (22%)
d) I treat the patient without local anesthesia	2 (1%)
e) Others	4 (2%)
10. How do you behave when you see a patient without any drug allergy, but with any other allergic diseases, such as asthma or hay fever?	
a) I make the treatment without considering the other allergic problems	46 (23%)
b) I accept these problems as a risk factor and refer the patient to the specialist	154 (77%)
11. Have you ever seen a patient with systemic adverse reaction due to local anesthesia?	
a) Yes	126 (63%)
b) No	64 (37%)
12. If you have seen a case with systemic adverse reaction due to local anesthesia, has this occurred during your treatment?	
a) Yes	12 (6%)
b) No	188 (94%)
13. Which symptoms below remind you of anaphylaxis during your treatment?	
a) Nausea and vomiting	18 (9%)
b) Shortness of breath	98 (49%)
c) Skin rash	45 (22.5%)
d) Skin swelling	32 (16%)
e) Hypotension	60 (30%)
14. What reaction do you suspect suggestive of anaphylaxis after test dose?	
a) Skin rashes	112 (56%)
b) Itching	72 (36%)
c) Dyspnea	16 (8%)
d) Sudden fainting	4 (2%)
15. Which one of the drugs below do you keep in your office?	
a) Epinephrine	123 (61.5%)
b) Antihistamine	65 (32.5%)
c) Corticosteroids	71 (35.5%)
d) Glucagon	24 (12%)
e) Salbutamol	22 (11%)
f) None of the above	30 (15%)
16. Which drug should be used as the first choice in management of anaphylaxis?	
a) Epinephrine	136 (68%)
b) Antihistamine	23 (11.5%)
c) Corticosteroids	22 (11%)
d) Glucagon	7 (3.5%)
e) Salbutamol	12 (6%)
17. Which route do you prefer as initial route for epinephrine injection?	
a) Intramuscular	56 (28%)
b) Subcutaneous	92 (46%)
c) Intravenous	34 (17%)
d) I do not know	18 (9%)

of the participants from the group had a thorough knowledge of all the symptoms. This awareness did not differ with age, years of practice, or specialization.

The results of the study reveal that only 62% of the dentists had emergency medicine kits in their clinics. Though 68% of the dentists knew that the preferred choice of treatment for anaphylaxis was epinephrine, only 28% were aware about the route of administration of the drug. Sixty-three percent of dentists suggested alternate route of administration for epinephrine, whereas 9% were totally unaware of how to administer epinephrine. Corticosteroids and antihistamines were considered as the ideal choice of drug for the treatment in anaphylaxis in about 11% of the study population, which was a misconception.

## Discussion

Developed countries have been reporting anaphylactic reactions to local anesthesia following dental procedures, with an incidence ranging from 1 in 3,500 to 1 in 13,000.<sup>13,14</sup> Recent studies have reported an incidence of 1 in 10,000 to 1 in 20,000 and 1 in 6,000 from Australia and Norway, respectively.<sup>10-12</sup> Although the rate of incidence is low, as the consequences of the reaction are severe, dentists should be equipped with the necessary knowledge and equipment to manage the reaction. Therefore, this study was designed to determine the knowledge of dentists from Chennai regarding the symptoms, signs, and management of anaphylaxis to further reduce the rate of incidence.

Studies have reported that local anesthetic and vasoconstrictor are used in low concentrations by the majority of practicing dentists.<sup>15</sup> Among adverse drug reactions, anaphylactic drug allergy is highly unpredictable as it is not related to dosage and can be fatal.<sup>16</sup> Reactions can also be often confused by practitioners as hypersensitivity to local anesthetic solution may include toxicity to the anesthetic agent and/or the vasoconstrictor as well or as anxiety reactions.<sup>16</sup>

Ester-type anesthetics express more possibility of allergic reactions when compared to the amide group. Not all individuals who reported allergic reactions are allergic to the anesthetic agent (caine). The allergen is most likely to be from the preservatives methyl paraben and metabisulfite.<sup>17</sup>

According to the data obtained in our study, more than half of the dentists were confident about handling anaphylaxis at their dental office, of which males fared better than females, whereas the remaining had an attitude of calling ambulance in case of emergency conditions. The dentists who were not sure of handling these situations lacked hands-on experience and required further workshops and training

programs. The availability of emergency kits at the dental office was at a lower level (26%), which could be attributed to the ignorance and general lack of interest of dentists toward the preparedness for medical emergency.

If a significant incident of anaphylaxis is encountered, intramuscular (IM) injection of epinephrine into the lateral thigh is the first line of treatment.<sup>18</sup> The results of the present study show that 68% of the dentists were confident that epinephrine was the first-line drug of choice in management of anaphylaxis, but only 28% had knowledge about the route of administration of epinephrine during an anaphylactic episode.

No substitute or alternative can be used to replace epinephrine, though systemic corticosteroids and antihistamine can also be used to treat severe systemic reactions.<sup>19,20</sup> In this study 11% of dentists admitted use of these alternatives as the first choice in the management of anaphylaxis.

The observations from the present study reflect the alarming situation about the capability of dentists in Chennai to deal with an emergency situation of anaphylaxis due to local anesthesia. Although rigorous training is given in Indian dental colleges about the theoretical aspect of emergencies, the clinicians in this study did not demonstrate knowledge of managing anaphylactic emergencies in the clinics. Also, the results have indicated that most clinics are not completely equipped to manage an emergency situation. Inexperience and unfamiliarity to manage medical crisis may lead to adverse consequences and legal actions by patients, as a dentist is ultimately the responsible person for managing all emergency situations in a dental clinic.<sup>21</sup>

## Important facts about anaphylaxis and its management in dental clinic

The National Institute of Allergy and Infectious disease and the Food Allergy Research and Education had put forth the definition of anaphylaxis as any serious allergic reaction that is rapid in onset and may cause death.<sup>22</sup> The signs and symptoms may be as mild as an urticarial rash or swelling of lips to as severe as difficulty in breathing, wheeze, or persistent cough due to bronchospasm, persistent dizziness, or collapse due to hypotension with or without skin manifestations.<sup>23</sup>

Emergency management of anaphylaxis in the clinic as per the guidelines of Australasian society of clinical immunology and allergy would be as follows:<sup>23</sup>

1. Identify the emergency.
2. Patient should be laid flat. Neither allowed to stand or walk. In case of breathing difficulty, patient is allowed to sit.

3. Administration of IM injection of adrenaline in outer mid thigh.  
Adrenaline 1:1,000 dilution (0.01 mg/kg upto 0.5 mg per dose), which should be repeated every 5 minutes as needed. Use of adrenaline auto-injector could also be considered, which is available online in two different color codings. 0.15 mg (green-labeled device) – 10–20 kg  
0.3 mg (yellow-labeled device) >20 kg  
Adrenaline auto-injector has an added advantage of increased shelf life than conventional adrenaline ampoule but expensive.<sup>23</sup>
4. Adrenaline should be administered for anaphylaxis by intravenous (IV) route only if the patient becomes profoundly hypotensive or develops a cardiopulmonary arrest or those who fail to respond to multiple doses of IM adrenaline because of the potential cardiovascular adverse effects of IV administration of adrenaline.<sup>22</sup>

## Conclusion

The occurrence of anaphylaxis during dental procedures is rare; however, when it occurs it could lead to adverse consequences. The present study has revealed the lack of knowledge of dentists in managing such reactions. This has to be overcome by increasing the awareness of dentists in basic life support. Attending continuing dental education programs consisting of workshops and hands-on courses in this field should be mandatory.

## Disclosure

The authors report no conflicts of interest in this work.

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