

Assessment of Knowledge, Attitude, and Practices Regarding Advanced Local Anesthetic Techniques among Students Attending a Private Dental College in Navi Mumbai, India: A Cross-sectional Study

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ABSTRACT

Aim and objective: Local anesthesia (LA) administration is an anxiety-provoking phenomenon in patients. Several alternative and advanced techniques make LA administration patient-friendly. This study assesses the knowledge, attitude, and practices of these advances, creating awareness and encouraging further studies and innovations to make these techniques more accessible, available, and economical to be utilized in the Indian population for controlling pain by targeting the budding dentists who actively imbibe and are abreast with the current state of affairs.

Methods and materials: A descriptive cross-sectional questionnaire-based study was conducted among the undergraduate and postgraduate students of a private college in Navi Mumbai. The self-administered questionnaire contained 13 questions. The data was analyzed using Statistical Package for Social Sciences (SPSS) version 17 software and a Chi-square test were applied.

Results: A majority of the respondents were unaware of the alternative techniques (59.4%) with a significant difference between undergraduates and postgraduates. 95.7% thought conventional methods caused dental anxiety and 55.1% thought alternatives would be better. The pain management techniques currently used were mostly reassurance and distraction (84.2%) and Topical anesthesia (74.9%). Only 9.6% had actually practiced these techniques, the reason for inexperience being inadequate knowledge. Out of those who had used these techniques, 47.82% saw positive results with patients experiencing less pain.

Conclusion: Knowledge of advanced local anesthetic techniques in the dental fraternity is necessary to enhance practice and provide the best care to the patients. Its inclusion in the curriculum with adequate practical training shall ensure its use efficiently.

Clinical significance: Today dentistry is propelling toward minimally invasive, painless, and patient-friendly procedures. The incorporation of advanced LA techniques to help achieve this goal begin with assessing its awareness among future dentists which would help make them accessible and affordable and contribute toward providing patients a holistic treatment.

Keywords: Anesthesia, Dental anxiety, Dental students, Electronic dental anesthesia, Needless anesthesia, Questionnaire.

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INTRODUCTION

It has been a long journey for dentistry since the 18th century which comprised of manual instrumentation to the dental practices of the 21st century, which has dramatically evolved into a digitalized and technologically advanced modern dentistry. Computers have ingrained every aspect of dentistry right from computer-aided diagnostic systems to advances, such as CAD/CAM and 3D printing.¹ With these advances patients now demand hassle-free and painless dental procedures.

Administration of local anesthesia has always been the most anxiety and fear-provoking phenomenon which acts as a barrier, preventing several adults and children from receiving dental treatments.² Patients managed poorly in pain control led to the instigation of negative response in these patients, which forms an obstacle for the clinician in creating an overall positive patient experience as well as results.³ This necessitates contemporary approaches and the upgradation of the present armamentarium.

There is a constant search for techniques to alleviate the invasive and painful nature of the needle injection. In recent years, researchers have developed alternative methods which enable dental anesthesia to be less invasive and more patient-friendly. To simplify pain management in the dental settings while

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administering local anesthesia, several modalities have been used some of them being topical anesthesia, electronic dental anesthesia, jet-injectors, iontophoresis, vibro-tactile devices, safety dental syringes, and computer-controlled local anesthesia (CCLAD).³ Several studies have been conducted to test the feasibility and success of these techniques which compare them with the

existing cartilage and syringe method of local anesthesia in both adults and children administration.⁴⁻⁸

The existing lacunae of surveys conducted to assess the knowledge, attitude, and practices about these advances necessitate this study. The primary objective of this study is to provide an objective assessment of the knowledge, attitude, and practices of these advances among the future task force of dentistry, creating awareness and encouraging further studies and innovations to make these techniques more accessible, available and economical, and to be utilized in the Indian population for controlling pain by targeting the budding dentists who actively imbibe and are abreast with the current state of affairs.

MATERIALS AND METHODS

Study Design, Study Setting, and Study Population

The study was a descriptive cross-sectional study which was conducted following the standard statements of the STROBE guidelines⁹ and was designed with the main aim of the assessment of the demographic details of the dental students, their knowledge regarding advanced local anesthetic techniques, attitude toward the incorporation of these and their current practices of these techniques. The study setting was TPCT's Terna Dental College, Navi Mumbai. It was conducted on a task-force cohort of a dental professional institute. The participants mainly comprised of 3rd BDS, 4th BDS, interns, postgraduate students who have administered local anesthesia to their patients and who were willing to participate in the study and provide written informed consent. The duration of the study was 3 months.

IEC Approval and Other Permissions

The approval for conducting this study was obtained from the Institutional Ethics Committee (Approval no. TDC EC/58/2019). Permission for the study was obtained from the Head of the institute. Suitable dates for the study were selected according to the convenience of the investigator and the participants.

Inclusion and Exclusion Criteria

Written informed consent document was signed by those willing to participate in the study. Only those present on the day of the scheduled survey were included. Dental students who have clinical postings as a part of their curriculum and students who administer local anesthesia were among the ones included. Those absent on the day of the study and unwilling to give consent were excluded.

Pilot Testing

The questionnaire was pretested with the help of a pilot survey conducted among 30 randomly selected dental students to check for the flaws and feasibility of the study and comprehensiveness of the tool. The finalization of the questionnaire was done after ambiguous and unsuitable questions were modified based on the result of the pretest.

Sample Size Estimation and Sampling Technique

All the dental students of the institute were included and were then screened for eligibility criteria and out of the 340 frames a final sample size of 303 were derived (27 students were not present and 10 students did not give a written informed consent), and a convenience sampling technique was utilized.

Details of the Questionnaire

The questionnaire was self-administered and consisted of 10 close-ended questions and three open-ended questions. The questionnaire constituted of 13 questions in total with two being demographic, three related to knowledge, three related to attitude, and the remaining five related to their practices. The psychometric properties of these questions were analyzed for reliability (using the Cronbach's alpha test which gave a value of 0.7) and for face and content validity.

Statistical Analysis

The data procured from these pretested questionnaires were coded and entered into Statistical Package for Social Sciences (SPSS) version 17 software. Normality of the data was assessed prior to analysis using Shapiro-Wilk's test/Kolmogorov-Smirnov test. Descriptive analysis through frequency distribution was calculated and a Chi-square test was applied. A *p*-value of less than 0.05 was considered significant. Some questions had multiple choices to choose from; therefore, the total sum of percentages is not always 100%.

RESULTS

Knowledge

A majority of participants were unaware of the alternative forms of administering local anesthesia (59.4%), and there was a significant difference ($p \leq 0.000$) between the undergraduates and postgraduates with 68.3% of the postgraduates being aware of the newer techniques (Fig. 1). A large percentage of unaware participants wanted to acquire information about these advanced techniques through hands-on practice (10.2%) and the least percentage from conferences (0.3%), while a majority of them wanted a combination of seminars, live demonstrations, hands-on, and conferences (40.9%) to give them comprehensive knowledge regarding these techniques.

The dental students who were aware of newer local anesthetic techniques were further assessed for which techniques they were aware of. The majority of them were aware of intrasosseous anesthetic techniques (33.3%) followed by Dentipatch (31.4%) (Fig. 2). There is a significant statistical difference between the knowledge of undergraduates as compared to that of postgraduates ($p < 0.05$).

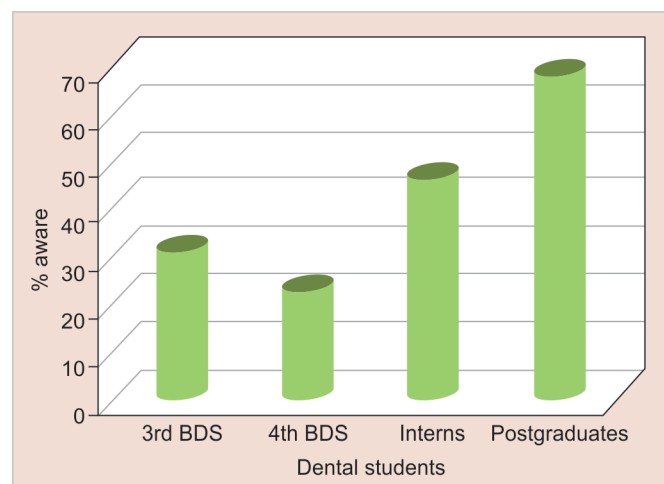


Fig. 1: Awareness about alternative forms administering local anesthesia

Attitude

A total of 95.7% of the dental students agreed that administration of local anesthesia with conventional needles and syringe provokes dental anxiety or fear in patients. About 55.1% of the students were of the view that alternative techniques if utilized could make administration of local anesthesia a more patient-friendly procedure. When questioned about the advantages of computer-assisted local anesthesia specifically, 10.2% of the respondents thought a slow rate of administration is what makes it superior to conventional methods. A major section (40.6%) of the respondents had no knowledge about these advantages (Table 1).

Practices

Of the 303 respondents, 63.7% had sometimes and 29.4% had most of the times encountered situations wherein their patients experienced pain during administration of local anesthesia with just 5.3% stating that their patients never experienced pain. This response showed a significant difference in the experience of the UGs as compared to that of PGs ($p \leq 0.000$). Several techniques utilized by these students to reduce the pain experienced by their patients of which the most popular techniques were Reassurance and Distraction of the patient (84.2%) and application of topical anesthesia (74.9%). A significant difference was seen in the responses of UGs and PGs ($p < 0.05$) (Table 2). A significant difference was found between males and females when it came to the utilization of reassurance and distraction as a management

technique with males (94.0%) practicing it more than females (81.4%) ($p = 0.012$). An important finding that needs to be noted is that out of 303 only 9.6% had actually practiced any of the new techniques with PGs (30%) having practiced them more than UGs (11.6%) ($p = 0.000$). Out of those who had used these techniques, 47.82% saw positive results with patients experiencing less pain with the use of the newer techniques. When those who had not practiced any of the newer techniques were questioned 47.9% gave inadequate knowledge as the reason for this (Fig. 3).

DISCUSSION

Patient comfort can be a significant contributor to successful treatment outcomes and also encourages compliance with follow-up appointments. Strategies and technologies that enhance patient comfort may help reduce stress for both the patients and the clinicians.^{10,11} The alternative methods of delivering anesthesia in dentistry with most research done on are electronic dental anesthesia, jet-injectors, vibro-tactile devices, and computerized control local anesthesia delivery systems.^{12,13} Even if these procedures are well-accepted by patients to date, their efficacy in general dentistry has been reported to be limited.

The current study explored the knowledge, attitude, and practices regarding these techniques among dental students. Another study has been conducted to determine the curricular structure, techniques, and materials used in local anesthesia teaching to dental students in European dental schools but it does

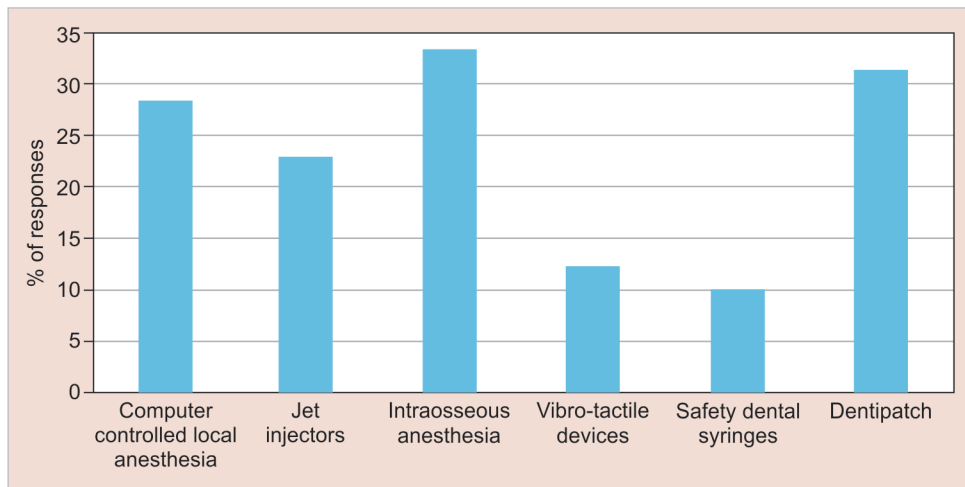


Fig. 2: Awareness pertaining to new local anesthetic techniques

Table 1: Advantages of computer controlled local anesthesia (CCLAD) over conventional needle and syringe

What makes CCLAD makes it better than conventional methods?	3rd Year	4th Year	Interns	PGs
Slow rate of administration	7.8%	16.0%	7.6%	6.7%
Auto-aspiration	3.9%	10.0%	3.3%	3.3%
Easy pen grasp	3.9%	3.0%	2.2%	3.3%
Single tooth anesthesia	0.0%	1.0%	0.0%	0.0%
Accurate identification of PDL	2.0%	0.0%	0.0%	1.7%
Monitoring of exact needle location	9.8%	10.0%	4.3%	10.0%
All of the above	21.6%	17.0%	44.6%	43.3%
I don't know	51.0%	43.0%	38.0%	31.7%

Table 2: Current techniques utilized to reduce pain

What techniques have you utilized to reduce pain during LA administration?	Responses	3rd Year	4th Year	Interns	PGs	P-value*
Topical anesthesia	Yes	72.5%	52.0%	93.5%	86.7%	≥0.001
	No	27.5%	48.0%	6.5%	13.3%	
Slow rate of administration	Yes	25.5%	31.0%	69.6%	38.3%	≥0.001
	No	74.5%	69.0%	30.4%	61.7%	
Local pressure technique	Yes	82.4%	63.0%	88.0%	73.3%	≥0.001
	No	17.6%	37.0%	12.0%	26.7%	
Precooling with ice packs	Yes	7.8%	4.0%	16.3%	6.7%	0.022
	No	92.2%	96.0%	83.7%	93.3%	
Use of warm anesthetic solutions	Yes	15.7%	16.0%	29.3%	18.3%	0.087
	No	84.3%	84.0%	70.7%	81.7%	
Reassurance and distraction	Yes	94.1%	60.0%	97.8%	95.0%	≥0.001
	No	5.9%	40.0%	2.2%	5.0%	

Chi-square test applied.* $P \leq 0.05$ indicates statistical significance

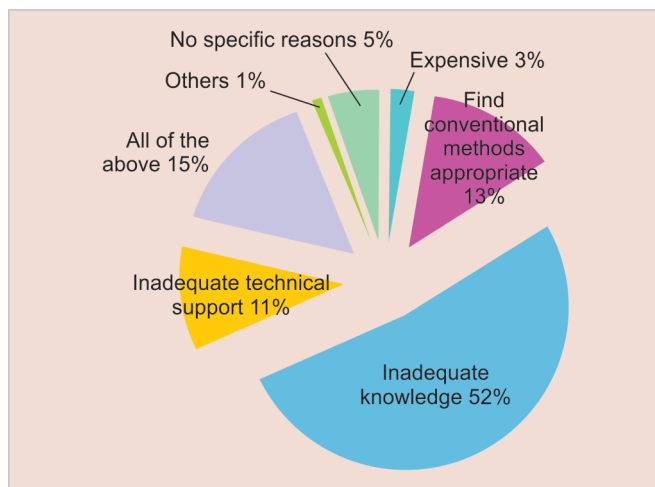


Fig. 3: Reason for not using newer LA administration techniques

not include any questions related to the advanced local anesthesia delivery techniques taught in these dental schools. The study stated that the majority of schools include instruction of infiltration anesthesia of the upper (98%) and lower (92%) jaws in addition to infra-orbital block anesthesia (57%).¹⁴

The fact that the majority of the respondents thought that conventional needles and syringes is the cause of dental anxiety and fear (95.7%) among patients and the fact that a majority of the dental students were unaware of alternative techniques (59.4%) is the major finding of this study.

The knowledge of dental students regarding the advantages of CCLAD over conventional techniques shows a lot of discrepancy with the majority of them being unaware of all the merits of this system. A large number of respondents did not advocate the importance of a slow rate of administration of anesthetic solutions for pain reduction in patients; thus, indicating their unawareness about the importance of the principle behind CCLAD. The difference between the knowledge of undergraduates when compared to that of postgraduates is of significance in several aspects of this study highlighting the need to bridge the gap between these students

as a large number of practicing dentists comprise undergraduates. The need to concentrate on advances in dentistry during undergraduate courses is necessary to change this scenario.

Nearly 55.1% of the dental students had a positive attitude toward incorporating these techniques in their practice in order to make the treatment more patient-friendly. About 47.82% had experienced improved results when these techniques were utilized. Though which techniques showed positive results has not been clarified in this study.

Even those aware of alternative techniques were not aware of all the available techniques to make LA administration more comfortable for their patients with a majority of them unaware of safety dental syringes and vibro-tactile devices. Those aware have not utilized these techniques. This indicates the lack of adequate knowledge about alternative techniques being the most plausible explanation of the huge gap between those aware of the techniques and still not having practiced them which is further substantiated in this study (52%). This could possibly be because of inadequate hands-on training received during their UG and PG. Further questioning showed that the majority of the students preferred a combination of lectures and hands-on practice to increase their knowledge about these techniques (40.9%).

Consequently, further efforts need to be made to teach students about alternative techniques in explicit detail and with hands-on practice and demonstrations in order to encourage the use of these advances in India and to overcome the shortcomings of these techniques with further research.

To the best of our knowledge, no studies have been conducted to assess the knowledge, attitude, and practices regarding alternative techniques of local anesthesia among dental students or in any other study population. The main limitation was that the study was conducted among the students of only one private dental college with the majority of the participants being females. In addition, some other factors that are associated with self-reporting studies such as a personal bias and social-desirability bias could also have affected the results of this study in some ways.

It is recommended that further studies be conducted among dental students of private and government dental colleges in various parts of the country to determine the difference in the knowledge imparted in these institutions. Also, this study could

be conducted among the dental practitioners of the country to determine whether the scenario is the same among them as well.

CONCLUSION

With the constant evolution of the field of dentistry and with a plethora of new technologies coming into play it gets extremely important for any dental practitioner to rightly choose the technology which would enhance his practice and ultimately help provide the best possible treatment to the patients. For this, it is important to be aware of all the new advances.

The student participants' responses indicate the importance of alternative anesthetic techniques in dentistry. Nevertheless, this study necessitates that the dental school curriculum should include adequate practical training as well as theoretical knowledge to be imparted to these students to encourage further research in this field.

CLINICAL SIGNIFICANCE

Dentistry being an ever-evolving field is now propelling toward minimally invasive treatment modalities. Several of the dental procedures from pediatric to adulthood are still based on the administration of local anesthesia. To make this administration of LA seamless and painless and to make the treatment more patient-friendly and holistic necessitates the incorporation of these advanced techniques into our routine dental practice. The first initiative toward this goal is to access its awareness at the level of budding dentists, the implementation of which would further make it accessible and affordable.

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