

# Awareness of Newer Local Anesthesia Techniques among Dental Undergraduates

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**Running Title:** *Newer local anesthesia*

**Abstract:** *It has been reported that pain and anxiety go hand in hand with dental procedures, especially when extraction and minor surgeries are involved in the treatment plan. Many times, patients have shown reluctance to undergo treatment mainly because of fear of local anesthesia and associated pain. The aim of the study was to understand the knowledge of newer local anesthesia delivery techniques and systems among dental undergraduates. A survey was conducted comprising 10 questions and it was circulated among dental undergraduate students of various dental colleges. There were 149 respondents in the survey conducted. The study was carried out within a time period of December 2019 to March 2020. Ethical approval was obtained from the scientific review board. The collected data was compiled, reviewed, tabulated, and exported to SPSS software for statistical analysis. Within the limitations of the survey few of the parameters were found to be statistically significant. The survey found that 69% of the total population were aware about the new trends in local anesthesia delivery systems, but lacked necessary knowledge in a few individual techniques. And 89% of the total population showed keen interest in learning and advocating these newer techniques in their study.*

**Keywords:** accupal; CCLAD; extraction; local anesthesia; newer techniques; vibrajjet; recent advances

## 1. Introduction

Pain is a term that is always linked with dentistry from the time immemorial. The credibility of a dental practitioner is always assessed by the public based on the comfort that the dentist renders. Around 20 to 30 percent of people have anxiety and concerns about pain with dental procedures. Anxiety can delay getting treatment and that can make the problem worse. And many sources suggest that anesthetics have been used around for over 175 years [1, 2]. The most important skill required of all dental practitioners is believed to be the ability to provide cautious and effective local anesthesia. The injection of local anesthetic is found to be the pronounced source of patient fear [3–5] and inability to obtain adequate pain control with minimal discomfort remains a significant concern of dental practitioners [6, 7]. The achievement of good local anesthesia requires knowledge about the agents being used, the intricate neuroanatomy, and best techniques and devices available. The agents and anesthetic delivery equipment available today provide the practitioner an array of options to effectively manage the pain associated with dental procedures [8–10].

Some of the recently developed local anesthetic delivery systems is focused on alleviating the fear of the needle take advantage of the gate control theory of pain management, which suggests that pain can be lessened by alternative activation of nerve fibers through the use of vibration [11]. Examples for them are vibrajjet, accupal, dental vibe etc. Vibrajjet is a small battery - operated attachment that snaps

on to the standard dental syringe. It delivers a high - frequency vibration to the needle that is strong enough for the patient to feel [12]. Researchers evaluating the effectiveness of Vibrajjet, have shown mixed results [13, 14]. Dental vibe is a cordless, rechargeable, hand held device that delivers soothing, pulsed, percussive micro - oscillations to the site where an injection is being administered. Accupal is a cordless device that uses both vibration and pressure to precondition the oral mucosa. Accupal provides pressure and vibrates the injection site 360° proximal to the needle penetration, which shuts the “pain gate, ” according to the manufacturer. The local anesthetic delivery systems that incorporate computer technology to control the rate of flow of the anesthetic solution through the needle is known as computer - controlled local anesthetic delivery (CCLAD).

Jet - injection technology is based on the principle of using a mechanical energy source to create a release of pressure sufficient to push a dose of liquid medication through a very small orifice, creating a thin column of fluid with enough force that it can penetrate soft tissue into the subcutaneous tissue without a needle. Jet injectors are believed to offer advantages over traditional needle injectors by being fast and easy to use, with little or no pain, less tissue damage, and faster drug absorption at the injection site. With a rich case bank established over 3 decades we have been able to publish extensively in our domain n [15–25]. Based on this inspiration we aim to

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## 2. Materials and Methods

The study was carried out in a university setting and ethical approval was granted from the scientific review boards. A total of three reviewers were included. The inclusion criteria for the study chosen were the students who have started attending the clinical rotations, which included third and fourth years and interns of few dental colleges. The exclusion criteria were the students who were attending their first and second year.

A questionnaire including 10 questions (Table 1) were circulated among the participants through various social media platforms. The questionnaire started by asking the students, in which year of the course they were currently studying in. The questionnaire further dwelled into the awareness of newer modes of LA administration other than conventional needle and syringe. The knowledge of electronic dental anesthesia, accupal, CCLAD, Iontophoresis, vibrajel were reviewed. Further on the questionnaire proceeded by analysing the cognizance of the students about virtual painless effect provided by dentipatch, dental vibe, vibrajel, accupal, CCLAD etc. It was assessed whether they knew that in electronic dental anesthesia electrode patches are used to block the nerves in the area to be treated. Familiarity of jet injectors were analysed. It was also asked if they were aware that the dental patches can be used to numb pain caused by mouth ulcers and denture irritations. The interest of the students in incorporating the newer methods into their regular practise was also surveyed at the end of the questionnaire.

Tabulation of the data was done with the help of Microsoft Excel software. Statistical Product and Service Limited (SPSS) software was then used for carrying out statistical analysis on the data obtained. The method of analysis used was correlation and analysis.

## 3. Results and Discussion

A total of 149 students participated in the study. Out of the total respondents 69 participants were in their third year of university, 30 were found to be in the fourth year and the remaining 50 respondents were in their internship. While assessing the general awareness of students it was seen that 69% of the total population were aware of newer techniques for administering local anesthesia. In this 69% of the population, which represents 103 respondents of the total population, 43 participants were from third year, 21 respondents were from 4th year and 39 respondents interns. Here we can see a higher awareness among the third years and a possible reason for this can be that the maximum number of participants were from third year and the possibility of having attended updated classes on local anesthesia, which is mostly taught in that curriculum year.

Dentipatch is an intraoral lignocaine patch that contains 10 - 20% lidocaine, which is placed on dried mucosa for 15 minutes. The efficacy of this patch has been studied in the past and it has been recommended for use in achieving topical anesthesia for injections in both maxilla and mandible [26]. Mangalampally shilpa priya et al has suggested that dental vibe is a useful accessory device prior

to the use of dental injection syringe and conventional intramuscular injections to alleviate pain and stress of injection [27]. In the study when asked if the respondents were aware that the newer techniques like dentipatch, dental vibe, vibrajel render the procedure virtually painless, 57 respondents of the total population showcased a positive response, whereas 92 gave a result that suggested that they weren't aware of it.

Many studies have shown that conventional syringes do not allow precise control of flow rate, and injections into dense tissues like palate needs adequate pressure which is difficult with conventional syringes, and as a solution to this problem CCLAD (computer - controlled local anesthetic delivery system) was introduced in 1997 [28]. Though it was introduced almost 20 years back the only 21% of the total respondents were aware about their existence in the study. Though iontophoresis has a huge role in physical therapy it has been reported that a much higher use of iontophoresis was seen in dentistry [29]. The knowledge about iontophoresis was also found to be less when compared to electronic dental anesthesia and jet injectors. 75% of the total population were not aware of iontophoresis. But 54% of the total respondents had heard of electronic dental anesthesia patches and 63% of the respondents knew about jet injectors.

We found that the awareness of electronic dental anesthesia was statistically significant. One study has favoured its use as its efficacy in pain control has been described as comparable to local anaesthesia while at the same time avoiding the possible side effects associated with commonly used local anaesthetic agents and the inconvenience of post-operative anaesthetic effect [30]. Another study suggested electronic dental anesthesia could be indicated for needle-phobic patients [31]. Results of clinical studies regarding electronic dental anesthesia are currently limited and widely varied. 58% of the total population were aware that dental patches are used to numb pain caused by mouth ulcers and the pain caused by denture irritations. The data obtained in the survey regarding this was found to be statistically significant. Few studies have found that the symptomatic relief of pain due to superficial mucosal lesions such as ulcers or even relieve toothache and post extraction pain was provided by topical anesthesia given in the form of dental patches [32].

Even though a recent review reported that CCLAD resulted in less pain and was found to be more effective, a relative disadvantage of CCLAD included higher cost and speed of injection at the slowest pump rate, and this caused impatience and stress amongst patients [33, 34]. And also dental patches and electronic dental anesthesia are more seen by students because of their practical use in clinics by post graduates for their academic research purposes or even as needed by few terminally ill cancer patients. Hence we can hypothesize that these are the possible reasons why dental patches were more popular among the students when compared to CCLAD.

## 4. Conclusion

Commencement of most treatments in dental practice is with the administration of local anesthesia. Though the

conventional syringe and needle is popularly used, there are many ways suggested to alleviate the pain of local anesthesia administration. However, due to various reasons these methods are still not widely practised. This survey was done to assess the knowledge and awareness of newer local anesthesia delivery techniques among the dental undergraduate students. 69% students had an overall awareness of the newer techniques. However, 89% of the total population were willing to study about the newer trends in local anesthesia administration techniques and were interested in incorporating them into their future dental practices.

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#### Conflict of Interest

There are no conflicts of interest to declare.

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**Table 1:** Shows the survey questions and responses

Survey questions	Response	
	Yes	No
1. Are you aware of any newer modes of LA administration other than conventional needle and syringe?	103	46
2. Knew newer mode of LA are you aware of?	92	57
3. Did you know that using dentipatch dental vibe vibrajel and accupal renders the procedure virtually painless?	57	92
4. Do you know what CCLAD stands for?	32	117
5. Do you know what is meant by iontophoresis?	37	112
6. Did you know that in electronic dental anaesthesia electrode patches are used to block the nerves in the area to be treated (no needles are used).	81	68
7. Did you know that jet injectors deliver LA needle less?	95	54
8. Did you know that dental patches can be used to numb the pain caused mouth ulcers and denture irritation?	87	62
9. Will you study upon the newer LA techniques mentioned and try to bring it into practice?	133	16
10. Year of Study	III YEAR - 69 / IV YEAR - 30 / INTERN - 50	



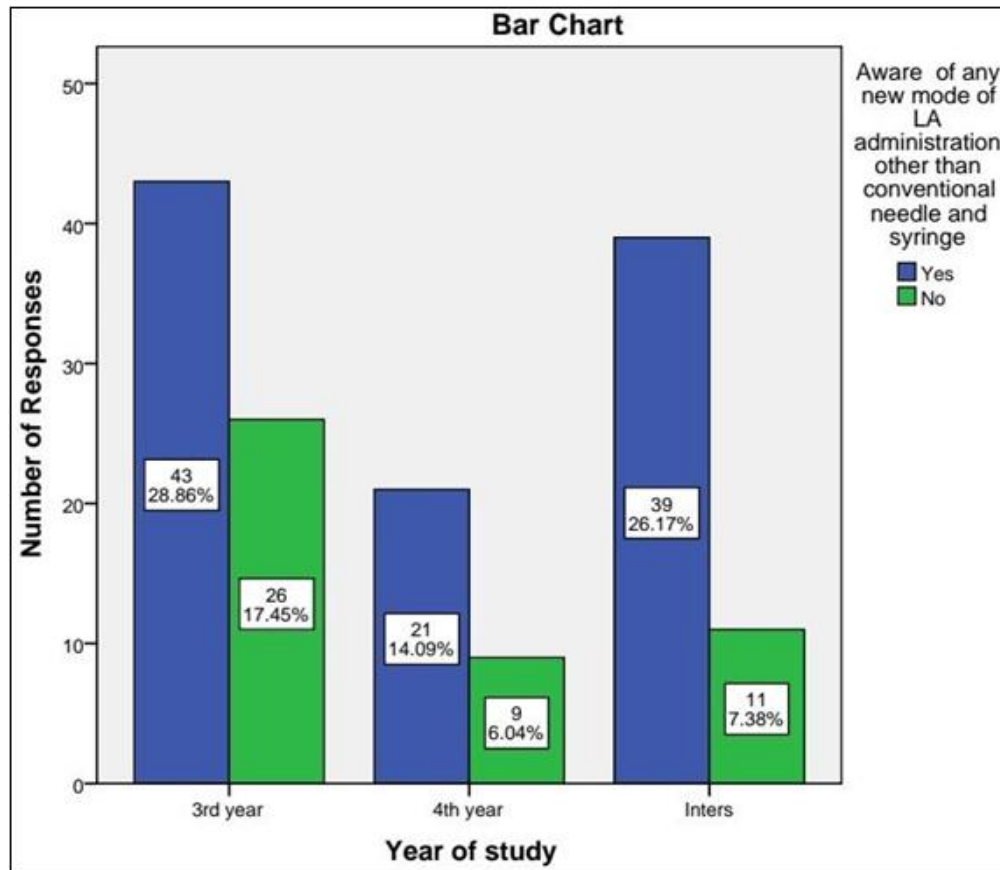


Figure 1 this is a bar chart showing the association between year of study and awareness of newer LA techniques; where X axis shows the year of study, Y axis shows the number of respondents, blue colour represents yes, green represents no. Chi square test was done, Pearson Chi square value: 3.54, DF: 2, p value = 0.187,  $p > 0.005$  found to be statistically not significant.

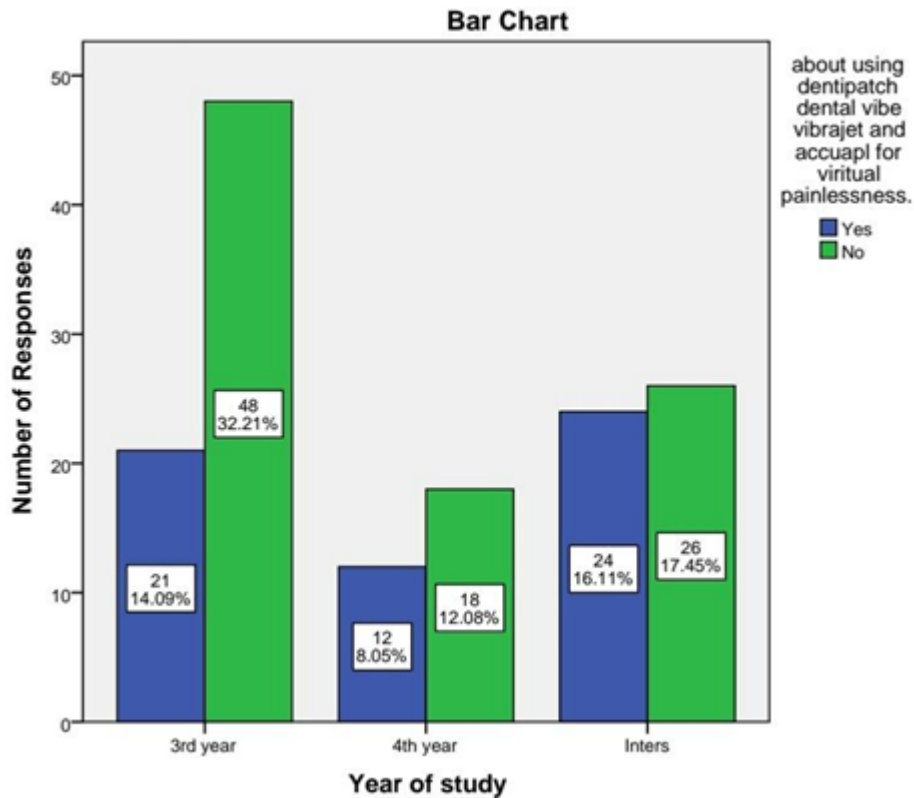


Figure 2 This is a bar chart showing the association between year of study and awareness about using dentipatch, dentalvibe, vibrajel, accupl for virtual painlessness; where X axis shows the year of study (3rd year, 4th year and interns) Y axis shows the number of responses, blue colour represents yes, green represents no. Chi square test was done, Pearson Chi square value: 3.835, DF: 2, p value = 0.147,  $p > 0.005$  found to be statistically not significant.

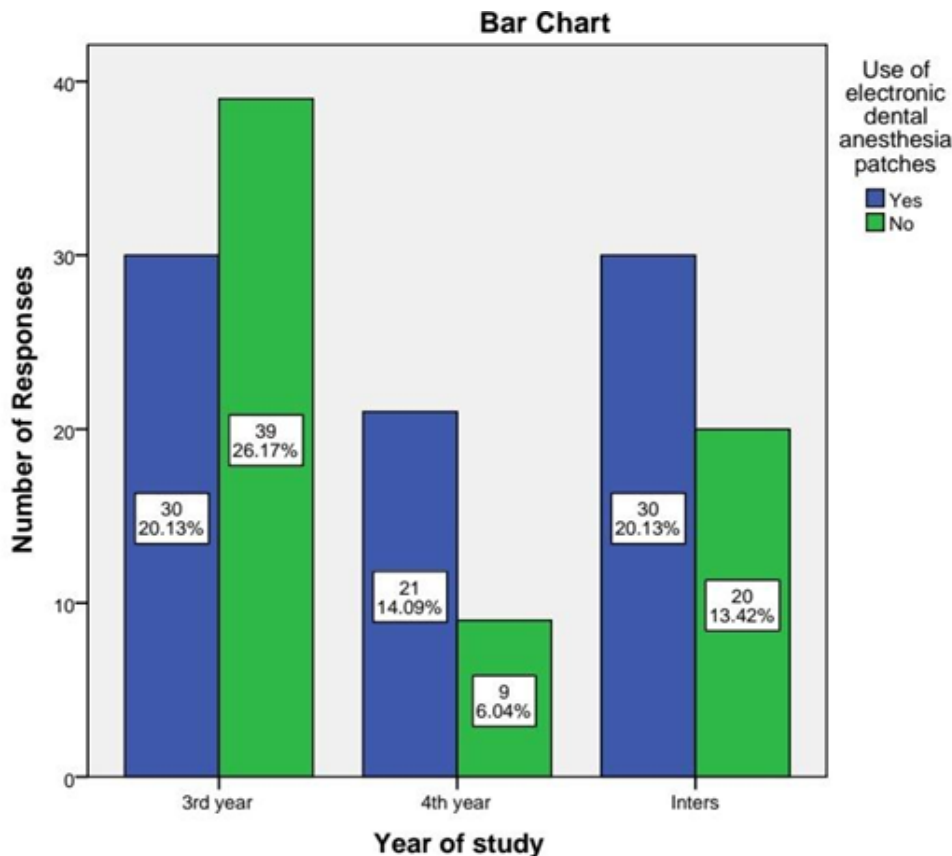


Figure 3 This is a bar chart showing the association between year of study and knowledge about the use of dental anesthesia patches; where X axis shows the year of study (3rd year, 4th year and interns) Y axis shows the number of responses, blue colour represents yes, green represents no. Chi square test was done, Pearson Chi square value: 6.892, DF: 2, p value = 0.032,  $p < 0.005$  found to be statistically significant showing that there was an overall awareness about electronic dental anesthesia.

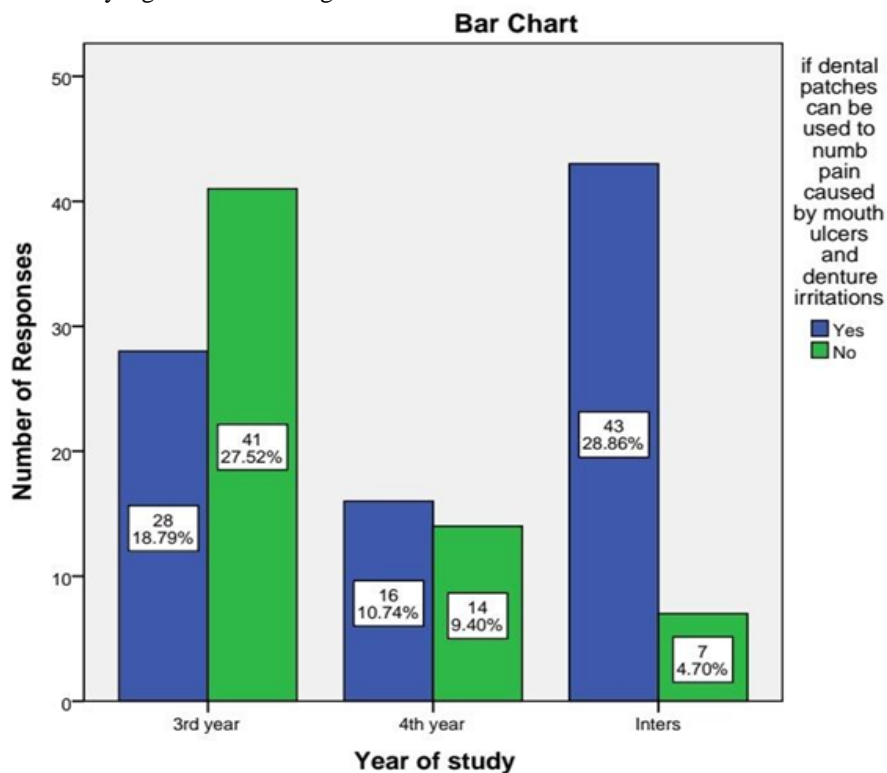


Figure 4 This is a bar chart showing the association between year of study and knowledge about the use of dental patches for numbing pain; where X axis shows the year of study (3rd year, 4th year and interns) Y axis shows the number of responses, blue colour represents yes, green represents no. Chi square test was done, Pearson Chi square value: 25.012, DF: 2, p value = 0.000,  $p < 0.005$  found to be statistically significant, showing that most students were aware about the use of dental patches for numbing pain.