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KNOWLEDGE ATTITUDE AND PRACTICE ON ARTICAINE AS LOCAL ANAESTHETIC AGENT FOR PEDODONTIC PATIENTS

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ABSTRACT

Local anesthesia will be one in every of the foremost difficult aspects with pedodontic patients. Dentists ought to bear in mind of correct dosage throughout administration of anesthesia to attenuate the prospect of toxicity and prolonged anesthesia which may cause accidental trauma to lip, tongue, or soft tissue should be aware of proper dosage during administration of local anesthesia to minimize the chance of toxicity and prolonged anesthesia which can lead to accidental trauma to lip, tongue, or soft tissue.Articaine was the largest local anesthetic agent developed during the early 70s. However, the majority of the practitioners prefer using lidocaine over articaine in children and although its safety and efficacy has been proven and reported to be comparable or superior to lidocaine.The aim of the study is to know about the knowledge, attitude, and practice of the articaine as local anaesthetic agent for pedodonic patients. A cross-sectional questionnaire study was conducted among the dental students of Chennai. The sample size of 200 students was selected. A close-ended questionnaire was used to assess the practitioner's perspective on tilted implants. Survey software was used to reduce sampling bias. Repeated answers or questioning were avoided. Chi-square tests are applied to find the association between the parameters and the level of significance. Out of 200 students, 62.5% were undergraduate students and only 37.% of the population were postgraduates. Most of the students (84%) used lidocaine as local anaesthesia followed by bupivacaine (11.5%) and articaine (4.5%). However 75.5% of the students were not aware that articaines are used for pedodontic patients because of its various advantages over other local anesthetics.77% of the students responded that they were not aware that articaine is 1.5 times more potent than lidocaine.65% were not aware that there is only minimal risk for systemic toxicity in articaine compared to other local anesthetic agents. Furthermore articaine can be used in patients with sulfa

allergies also. Only a handful (6%) of the population had knowledge about this.Within the limitation of the study, we can conclude that dental students in the Chennai population were not much aware of the articaine as local anaesthetic agent for children in dentistry.

INTRODUCTION

Local anesthesia is the loss of sensation in the circumscribed area of the body caused by depression of excitation of nerve endings or an inhibition of conduction process in peripheral nerves (Stanley F. Malamed, 2004).Local anesthetics act within the neural fibers to inhibit the influx of sodium ions for neuron impulse(Ogle and Mahjoubi, 2012). Inhibition of influx of sodium ions helps to prevent transmission of pain sensation during any procedures.

Local anesthesia will be one in every of the foremost difficult aspects with pedodontic patients. Dentists ought to bear in mind of correct dosage throughout administration of anesthesia to attenuate the prospect of toxicity and prolonged anesthesia which may cause accidental trauma to lip, tongue, or soft tissue should be aware of proper dosage during administration of local anesthesia to minimize the chance of toxicity and prolonged anesthesia which can lead to accidental trauma to lip, tongue, or soft tissue (S. F. Malamed, 2004).

Articaine hydrochloride is an amide type of local anesthetic agent derived from thiophene.Articaine is the only amide analgesia to contain an ester group which has a high affinity for plasma protein binding. This helps in rapid breakdown into its two inactive states: in the liver and the blood serum, thus reducing systemic toxicity. The biotransformation of articaine occurs in both the liver but most commonly in plasma, unlike the other amide local anesthetics that undergo biotransformation only in the liver. Articaine 4% solutions have the highest level of anesthetic potency and lowest systemic toxicity in all clinical situations.This is due to its high lipid solubility, high plasma protein binding rate, fast metabolism, fast elimination half life; and a low plasma level.(Leith, Lynch and O'Connell, 2012)

Articaine is available in two formulations; 1:100,000 and 1:200,000 epinephrine. Both formulations have been used with adults and children. In adults,it is recommended that it should not exceed 7 mg/kg body weight. In children between the ages of 4 and 12 years, it is suggested that doses should not exceed 5 mg/kg. Articaine was the largest local anesthetic agent developed during the early 70s. However, the majority of the practitioners prefer using lidocaine over articaine in children and although its safety and efficacy has been proven and reported to be comparable or superior to lidocaine.

Our department is passionate about child care, we have published numerous high quality articles in this domain over the past 3 years (Govindaraju, Jeevanandan and Subramanian, 2017a, 2017b; Panchal, Gurunathan and Shanmugaavel, 2017; Ravikumar, Jeevanandan and Subramanian, 2017; Jeevanandan and Govindaraju, 2018; Nair *et al.*, 2018; Ravikumar *et al.*, 2018, 2019; Ravindra *et al.*, 2018, 2019; Subramanyam *et al.*, 2018; Vishnu Prasad *et al.*, 2018; Jeevanandan, Ganesh and Arthilakshmi, 2019; Ramadurai *et al.*, 2019; Ramakrishnan, Dhanalakshmi and Subramanian, 2019; Veerale Panchal,

Jeevanandan and Subramanian, 2019; Vignesh *et al.*, 2019; V. Panchal, Jeevanandan and Subramanian, 2019; Samuel, Acharya and Rao, 2020). With this inspiration we planned to pursue research on knowledge, attitude, and practice on articaine as a local anaesthetic agent for pedodontic patients.

MATERIALS AND METHODS

Study design

Awareness based survey

Data collection

A survey was conducted in January 2020 among dental students. It was an online questionnaire-based study, conducted to assess the Knowledge, attitude, and practice on the articaine as local anaesthetic agents in pedodontic patients. 200 dental students participated in this study. The data collection was done via google forms.

Survey instrument

A pretested, self-administered, closed-ended questionnaire comprising the following sections formed the survey instrument. A structured questionnaire containing 10 questions was framed. The goal of developing this questionnaire was to know about the knowledge, attitude, and practice of articaine as local anaesthetic agents in pedodontic patients. The questions had to be answered with a Yes or No response.

Data analysis

The data collected was entered into an Excel sheet and subjected to statistical analysis using SPSS version 20. A Chi-square test was done. The level of significance was set at $p<0.05$.

A questionnaire given is as follows:

1. Year of Study: Undergraduate, Postgraduate
2. Which of the following Local anesthetics do you use for your patients?
3. Are you aware of articaine as local anesthetics used in pedodontic patients?
4. Are you aware that articaine is 1.5 times potent than lidocaine ?
5. Do you know that the diffusion rate in articaine is higher than other LA agents?
6. Do you know that articaine can be used to eliminate inferior alveolar nerve blocks in children?
7. Do you know that articaine is also be used in patients with sulfa allergies
8. Do you know articaine can have minimal risk for systemic toxicity than others?
9. Do you know that articaine elimination half life is only 20 minutes whereas lidocaine can take 90 minutes?
10. Which age groups do you think it ideal to administer articaine in children?

RESULTS AND DISCUSSION

200 dental students were selected as the study population for this survey. Out of 200 students, 62.5% were undergraduate students and only 37.% of the population were postgraduates (Figure 1). Most of the students (84%) used lidocaine as local anaesthesia followed by bupivacaine (11.5%) and articaine (4.5%) (Figure 2). However 75.5% of the students were not aware that articaines are used for pedodontic patients because of its various advantages over other local anesthetics (Figure 3). 77% of the students responded that they were not aware that articaine is 1.5 times more potent than lidocaine (Figure 4).Articaine contains a thiophene ring instead of benzene like lidocaine. This gives the molecule better diffusion properties compared with lidocaine (Casanovas and Am, 1982). Therefore the diffusion rate of articaine is known to be higher than other local anesthetic agents. This was known only by 23.4% of the population.Due to high diffusion rate, articaine can be used to eliminate the inferior alveolar nerve block in children. 30.5% of the students had knowledge about articaine can be used as an alternative for inferior alveolar nerve blocks (Figure 5). A study showed evaluation of buccal infiltration with articaine and IANB with lidocaine for pulp therapy in primary mandibular molars. Articaine infiltration has the potential to replace inferior alveolar nerve blocks for primary mandibular molars (Chopra *et al.*, 2016) . However 65% were not aware that there is only minimal risk for systemic toxicity in articaine compared to other local anesthetic agents (Figure 6). Furthermore articaine can be used in patients with sulfa allergies also. Only a handful (6%) of the population had knowledge about this. Furthermore 77.5% of the students responded that articaine can be given only for patients above 4 years old. However there are studies showing articaine is safe even for children under 4 year old without any adverse effects.(Wright *et al.*, 1989)

Figure 7 shows association of undergraduate and postgraduate students' awareness about the ideal age for articaine administration. Most of the undergraduates (54%) and postgraduates (23.5%) responded that articaine can be administered for patients who are only above 4 years of age. p-value- 0.000 (<0.05), hence statistically significant.

Figure 8 shows association undergraduate and postgraduate students' awareness about elimination of inferior alveolar nerve blocks by administration of articaine as local anaesthetic agents. 56% of the undergraduates did not have knowledge about inferior alveolar nerve blocks can be eliminated by using articaine whereas most postgraduate students were aware about the same.p-value- 0.000 (<0.05), hence statistically significant.

Articaine is considered to be a safe and effective local anesthetic agent for pedodontic patients. Time to onset and duration of anesthesia are appropriate for clinical use and are comparable to other local anesthetic agents. Articaine 4% with epinephrine 1:100,000 provides total pain relief during most dental procedures.

No significant literature opposing the consensus was found. The survey conducted within Chennai does not represent all ethnic groups and populations. Hence the study can not be

generalized. Also, subjective error bias may creep in. Hence a study including all dental students across the country in a similar study setup can provide better accurate results.

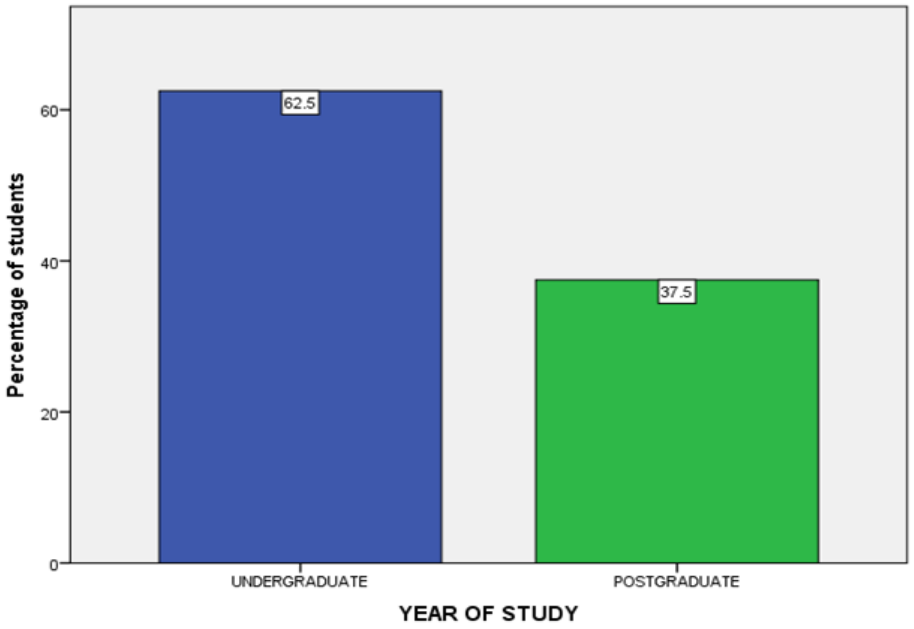

Figure 1: Bar graph shows the distribution of dental students based on their level of graduation. X-axis depicts the undergraduate and postgraduate students. Y axis represents the percentage of dental students.The undergraduate and postgraduate are colour coded as blue and green respectively. The graph shows that the majority of the dental students who participated in this study were undergraduates.

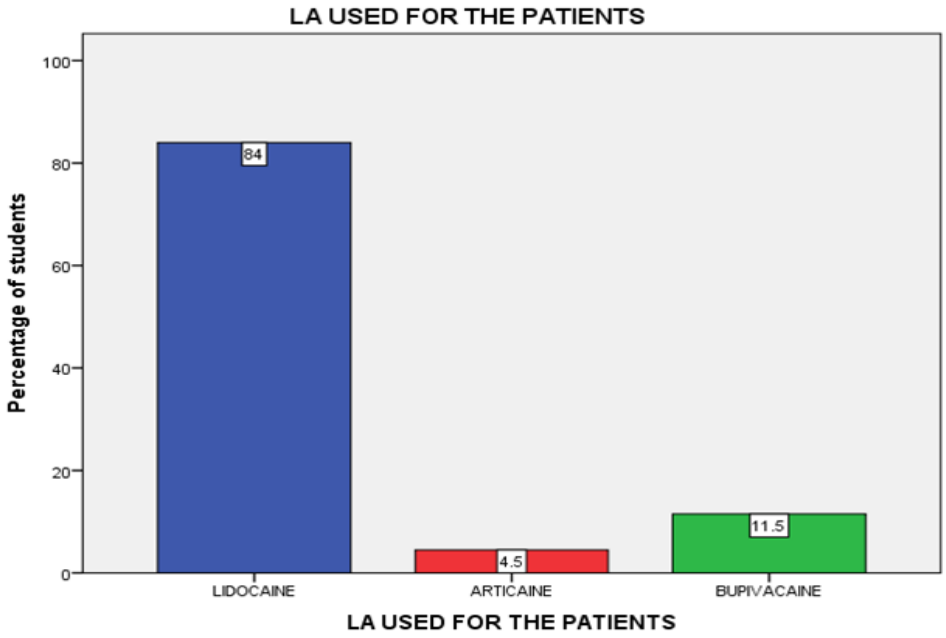

Figure 2: Bar graph representing the responses for the question, which local anesthetic agent do they use for pedodontic patients. X-axis represents the

response options (Lidocaine-Blue) (Articaine-Red) (Bupivacaine- Green), Y-axis represents the percentage of students.The graph shows that the majority of them use lidocaine as local anesthetic agents.

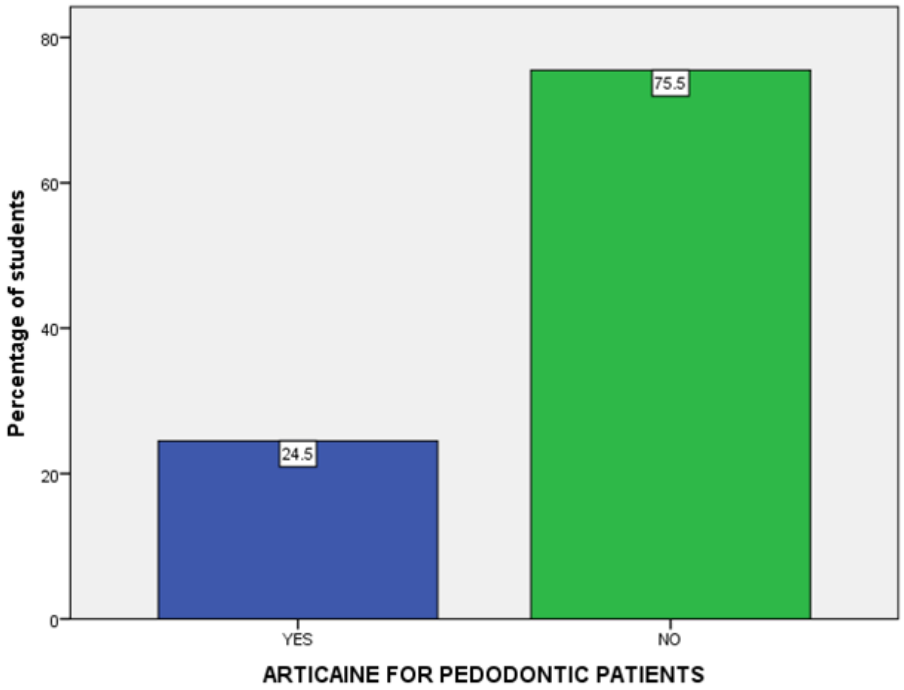

Figure 3:Bar graph representing the responses for the question, whether the dental students are aware that articaine can be used as a local anesthetic agent for pedodontic patients. The X-axis represents the response options (No - Green) (Yes-Blue), Y-axis represents the percentage of responses. The graph shows that the majority of them were not aware of articaine as local anesthetic agent for pedodontic patients

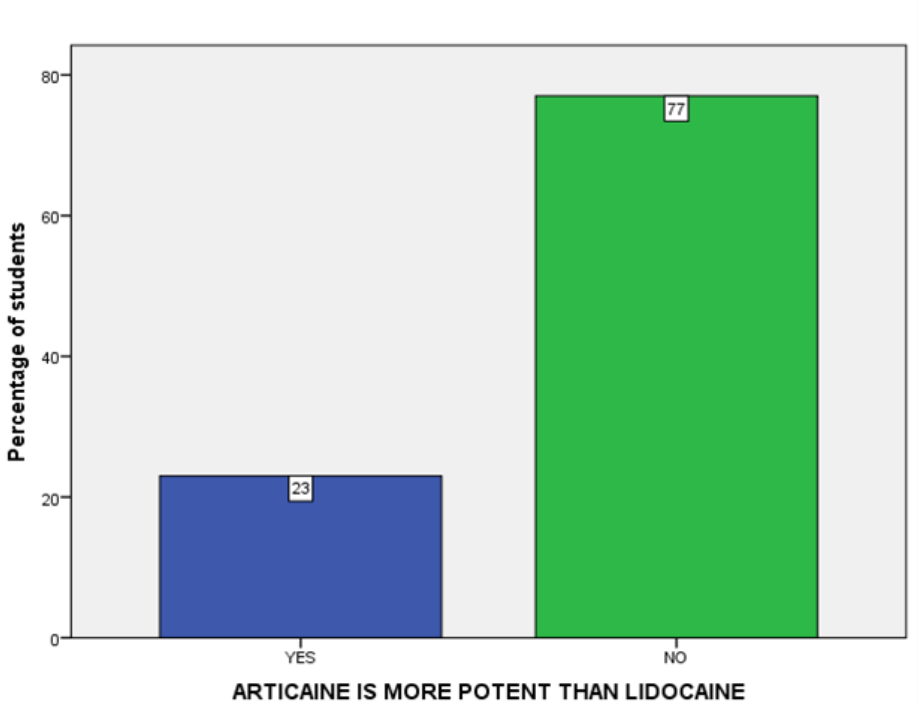

Figure 4: Bar graph representing the responses for the question, whether the dental students are aware that articaine is more potent than lidocaine. The X-axis represents the response options (No -Green) (Yes-Blue), Y-axis represents the percentage of responses. The graph shows that the majority of them were not aware that articaine is more potent than lidocaine.

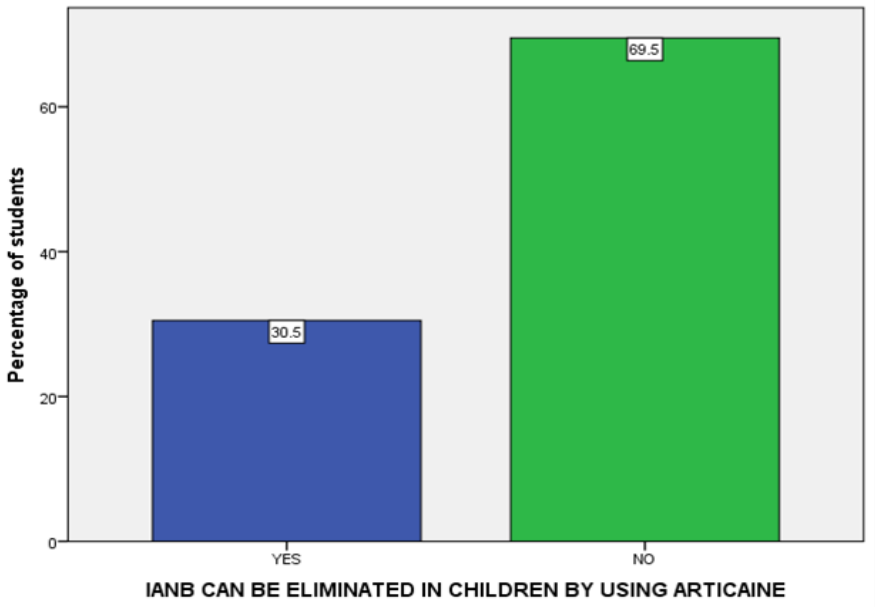

Figure 5:Bar graph representing the responses for the question, whether the dental students are aware that articaine infiltrations can be used to eliminate inferior alveolar nerve blocks. The X-axis represents the response options (No -Green) (Yes-Blue), Y-axis represents the percentage of responses. The graph shows that the majority of them were not aware of articaine infiltrations can be used to eliminate inferior alveolar nerve blocks

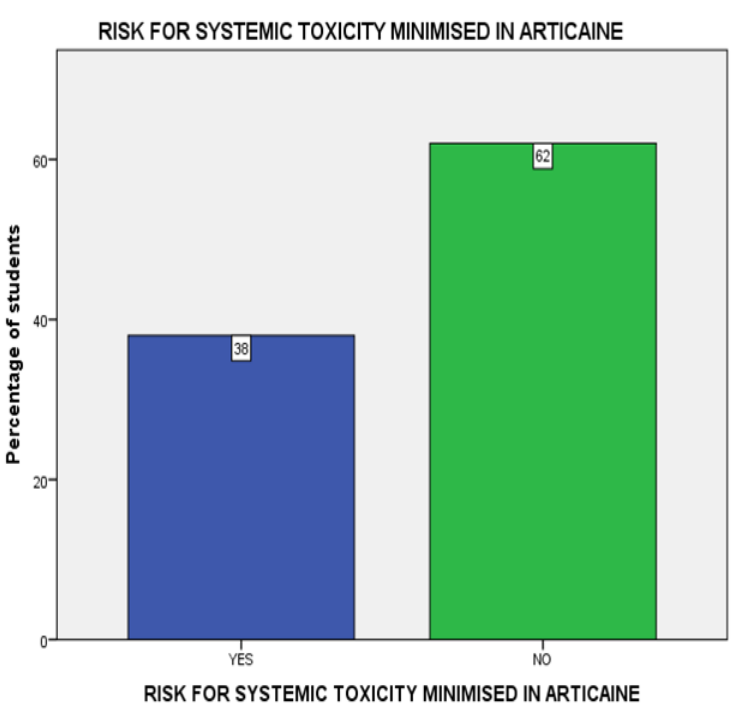

Figure 6:Bar graph representing the responses for the question, whether the dental students are aware that articaine has minimal risk for systemic toxicity compared to other local anaesthetic agents. The X-axis represents the response options (No -Green) (Yes-Blue), Y-axis represents the percentage of responses. The graph shows that the majority of them were not aware that articaine has minimal risk for systemic toxicity compared to other local anaesthetics.

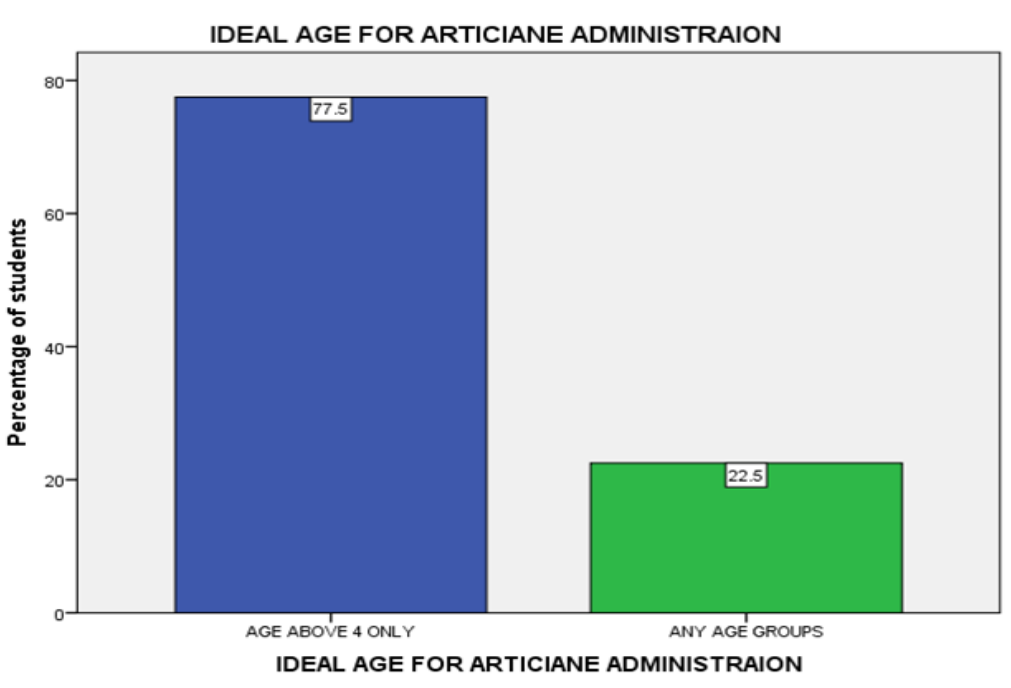

Figure 7: Bar graph representing the responses for the question, whether the dental students are aware about the ideal age for articaine administration. The X-axis represents the response options (No - Any age groups) (Yes- Age above 4 only), Y-axis represents the percentage of responses. The graph shows

that the majority of them responded that articaine can be administered for children above 4 years of age only.

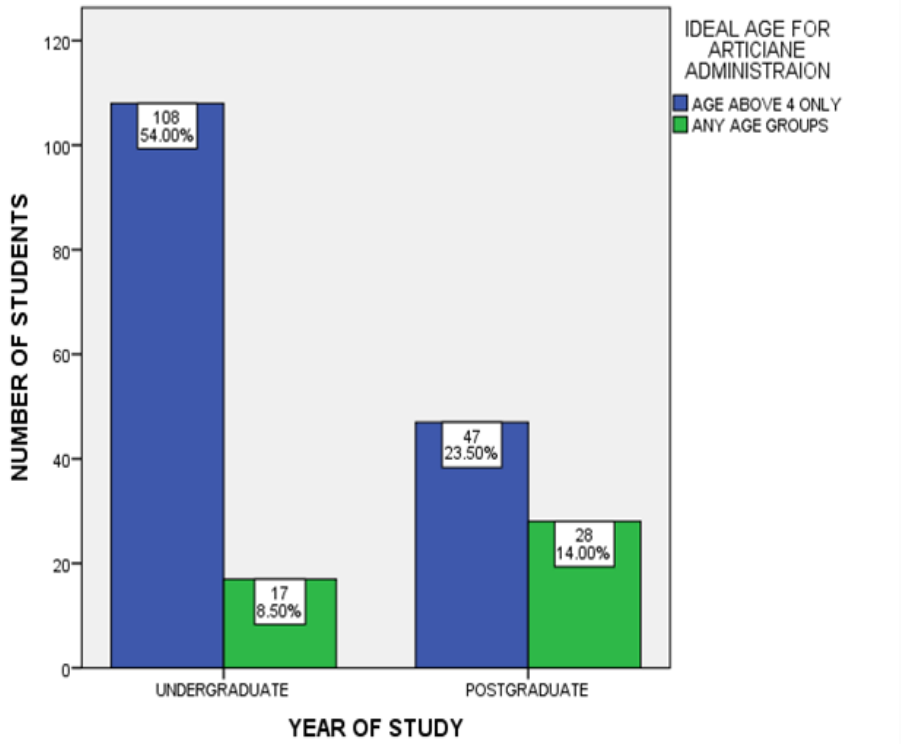

Figure 8: Bar graph shows the association between the dental students and their awareness about ideal age for articaine administration.The X-axis depicts the year of study. Y-axis represents the number of dental students. The graph shows that most of the undergraduate students responded that articaine can be given to children above 4 years old (Green-Any age groups),(Blue-Age above 4 only). A Chi-square test was done. p-value- 0.000 (<0.05), hence statistically significant.

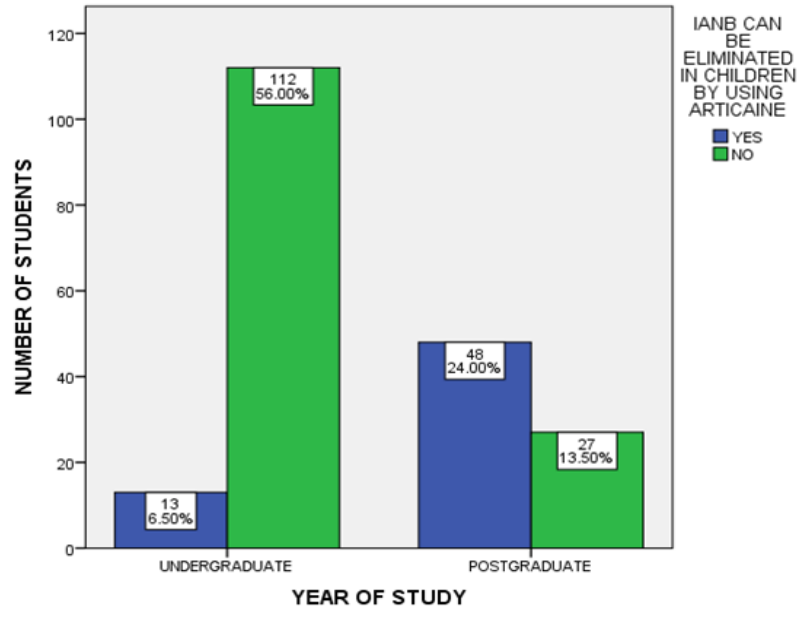

Figure 9:Bar graph shows the association between the dental students and their awareness about articaine infiltrations can be used to eliminate inferior alveolar nerve blocks.The X-axis depicts the year of study. Y-axis represents the number of dental students. The graph shows that most of the undergraduate students were not aware that articaine infiltrations can be used to eliminate inferior alveolar nerve blocks (Green-No),(Blue -Yes). A Chi-square test was done. p-value- 0.000 (<0.05), hence statistically significant.

CONCLUSION

Within the limitations of the study, we can conclude that dental students in the Chennai population were not much aware of the articaine as local anaesthetic agent for children in dentistry. More continuing dental education and workshop programs can be conducted to educate dental students.

AUTHOR CONTRIBUTIONS

First **author**, Vaishnavi Sivakali Subramanian performed the data collection by reviewing patient details, filtering required data, analyzing and interpreting statistics, and contributed to manuscript writing. The second author, Dr. Mebin contributed to the conception of study title, study design, analyzed the collected data, statistics, and interpretation and also critically revised the manuscript.

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CONFLICT OF INTEREST

There were no potential conflicts of interest as declared by authors.

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