

# Use of Anesthesia in Pediatric Dentistry: A Cross-sectional Survey

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## Abstract

**Aim:** The aim of this study is to access the knowledge and use of dental anesthesia in pediatric dentistry. **Objective:** The purpose of this study is to evaluate the use of dental anesthesia among pediatric dentists. **Materials and Methods:** The survey was conducted among pediatric dentists who were practicing in Chennai, South India. A questionnaire was distributed which include questions relating to the use of local and topical anesthetics. **Background:** Anesthetic injection is the dental procedure that produces the greatest negative response in children. Pain and anxiety can reduce the efficacy of anesthesia in pediatric patients. This fear of anesthesia is often manifested as a behavior management problem, with a few pediatric patients lacking good coping skills and displaying hysterical behavior in anticipation of discomfort. Anxiety is the most disturbing experience for children, a response that sometimes can only be controlled with techniques beyond anesthesia. There are several factors that can predispose a patient to this overdose of anesthetic. The patient factors include age, weight, other medications, sex, presence of other systemic disorders, genetics, and mental attitude, and environment. There is a lack of studies accessing the usage and status of anesthesia in pediatric dentistry. **Results:** Eighty-eight percent used exact body weight to determine local anesthetic dosage. Only 11% of the respondents were using <10 s to inject a full cartridge. Topical anesthetics were used by most of the dentists. Most patients (98%) disliked the taste of topical anesthetics, and adverse drug reactions were rarely seen. **Conclusion:** The findings of this study demonstrate that pediatric dentists are most commonly used local anesthetics as the preferred type and shorter needle for infiltrations and blocks. Most were taking anywhere from 31 to 60 s to inject a cartridge. Topical anesthetics were used by most and also the preferred one. However, their perception of the effectiveness of topical anesthetics varied. There also appears to be a need to develop newer and better mode of topical anesthetic delivery system in the pediatric dental population.

**Key words:** Drug dosage, local anesthesia, topical anesthesia

## INTRODUCTION

The administration of local anesthesia, sedation, and general anesthesia is an integral part of dental practice. Local anesthesia is the temporary loss of sensation including pain in one part of the body produced by a topically applied or injected agent without depressing the level of consciousness. Local anesthetics act within the neural fibers to inhibit the ionic influx of sodium for neuron impulse. This helps to prevent transmission of pain sensation during procedures which can serve to build trust and foster the relationship of the patient and dentist, allay fear and anxiety, and promote a positive dental attitude.<sup>[1]</sup> Local anesthetics are frequently administered in dentistry and thus can be expected to be a major source of drug-related complications in the dental office. The most frequently observed complications (dizziness, tachycardia, agitation, nausea, and tremor) were transient in nature and did not require treatment.<sup>[2]</sup> Local anesthesia avoids

some of the risks and unpleasantness associated with other forms of anesthesia, such as nausea and vomiting. The anesthetic action extends for longer than required and therefore provides pain relief for several hours after the operation. Local anesthesia is associated with reduced blood loss.<sup>[3]</sup> Topical anesthetics can be applied painlessly without needles and can reduce the need for physical and chemical restraints.<sup>[4]</sup> They also avoid the tissue distortion that occurs with infiltrated anesthetics.<sup>[5]</sup> Topical anesthetic agents are available in gel, liquid, ointment, patch, and aerosol forms.<sup>[6]</sup> Thus, the main purpose of this study is to evaluate the current status of dental anesthesia among dentists.

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## MATERIALS AND METHODS

A survey was conducted among fifty pediatric dentists from South India. The survey included consists of a questionnaire including questions relating to the use of local and topical anesthetics utilized among pediatric patients, length of time used to inject a cartridge, factors deterring the dosage of anesthetics, form of systemic anesthetics used most commonly in children, length of the needle used often, effectiveness of topical anesthetics over local anesthetics, and what is his/her patients' most disliking factor about the topical anesthetic. Finally, the data were analyzed by calculating the percentage response for each question.

## USE OF ANESTHESIA IN PEDIATRIC DENTISTRY: A SURVEY

### Name: Year of study

- How often do you use anesthesia for treating pediatric patients?
  - Very often
  - Often
  - Rare
- What is the common age group of pediatric patients requiring anesthesia?
- Which do you use commonly?
  - Local or topical anesthetic
- What form of systemic anesthetic do you use the most?
  - Nerve block
  - Infiltration
  - Gas
- Do you use any topical anesthetic gel?
  - Always
  - Sometimes
  - Rarely
  - Never
- What is the most important factor that you consider commonly when you decide on dosage of local anesthesia that you will inject?
  - Exact age in years
  - Exact body weight
  - Others
- What length of needle do you use most often?
  - Long
  - Short
  - Others
- How much time do you take to inject a full cartridge?
  - <10 s
  - 11–20 s
  - 31–60 s
- Do you prefer topical anesthetics are effective than local anesthetics?
  - Very effective
  - Effective
  - Poor
- What is the disliking factor about topical anesthetic?
  - Taste
  - Color
  - Small
  - Consistency.

## RESULTS

All the questions in the questionnaire were answered by dental students. The data collected are represented as a bar graph.

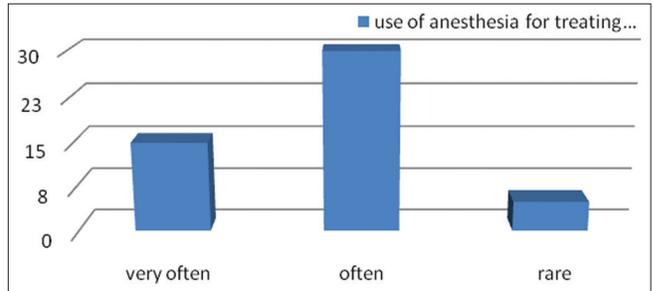
Sixty percent of dental students use anesthesia often for treating pediatric patients while 30% use anesthesia very often and 10% use it rarely [Table 1].

About 70% of dental students prefer local anesthesia whereas 30% prefer topical anesthesia [Table 2].

The response for the form of systemic anesthetic used is about 66% in case of infiltration and 36% in case of infiltration [Table 3].

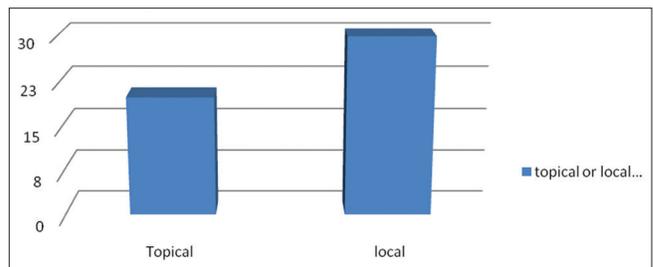
**Table 1: The prevalence of usage of anesthesia for treating pediatric patients**

Variables and percentage	
Very often	30
Often	60
Rare	10



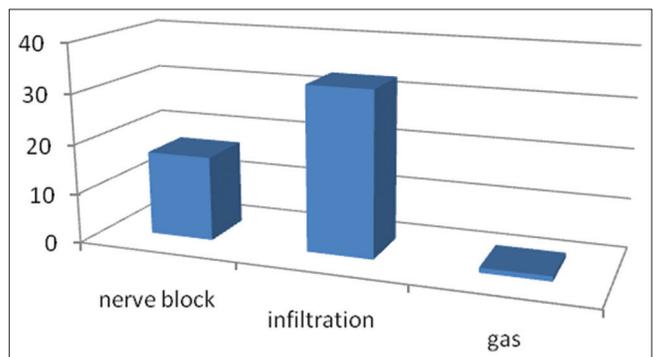
**Table 2: Commonly used anesthetic in pediatric dentistry**

Variables and percentage	
Topical anesthesia	30
Local anesthesia	70



**Table 3: Form of systemic anesthetic used**

Variables and percentage	
Nerve block	34
Infiltration	66
Gas	0



The responses for the topical anesthetics are tabulated in Table 4. The respondents' responses to the question

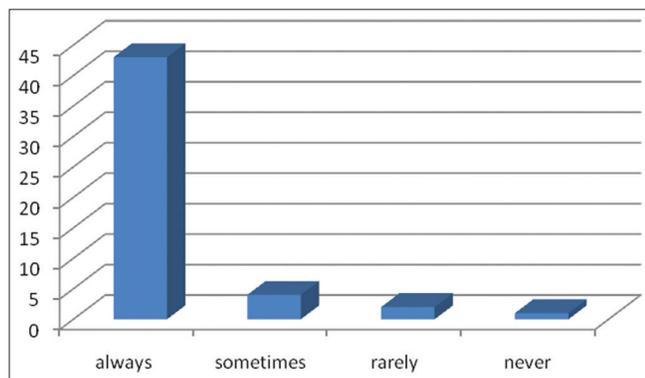
regarding the use of topical anesthetics, a majority of the respondents (86%) always used a topical anesthetic while 8% sometimes used a topical anesthetic. Only 4% reported that they rarely used topical anesthetic, with 2% reporting that they never used a topical anesthetic.

When questioned which criteria practitioners used to determine the local anesthetic dosage, almost half of the respondents (88%) reported using exact body weight when determining the dosage of local anesthetic for each pediatric patient while 8% used the patients' age and 4% used other methods such as number of teeth needing to be treated, length of treatment, and degree of carious involvement [Table 5].

Most of the respondents (88%) used a short needle, whereas 16% used a long needle for infiltration/nerve block [Table 6].

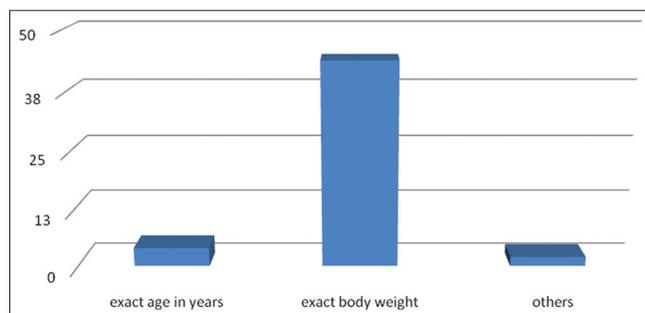
**Table 4: Prevalence of topical anesthetic gel**

Variables and percentage	
Always	86
Sometimes	8
Rarely	4
Never	2



**Table 5: The most important factor that you decide on dosage of the local anesthetic that you will inject**

Variables and percentage	
Age in years	8
Body weight	88
Others	4



When questioned regarding the amount of time taken to inject a full cartridge of local anesthetic, 10% took < 10 s, 24% took 11–20 s, and 66% took 31–60 s [Table 7].

When asked about the effectiveness of topical anesthetics, 32% perceived them as effective, 36% as very effective, and 8% as poor [Table 8].

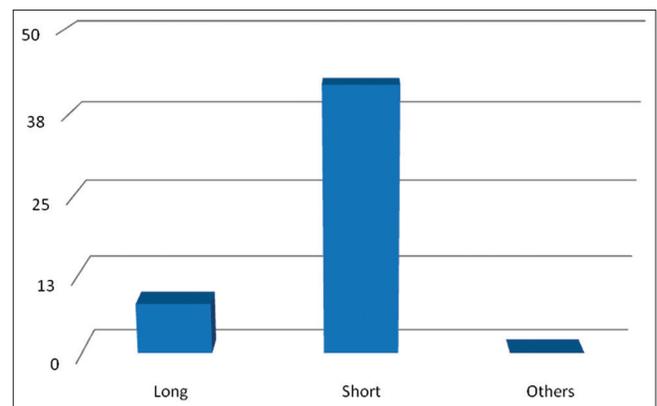
When questioned concerning the different properties of topical anesthetic, most patients did not like the taste (98%) and consistency was not favored by 2%, with 6% reporting complaints by patients including burning, numbness of the entire mouth, and inability to swallow [Table 9].

## DISCUSSION

One of the most important and challenging aspects of child behavior management is the control of pain. Therefore, it

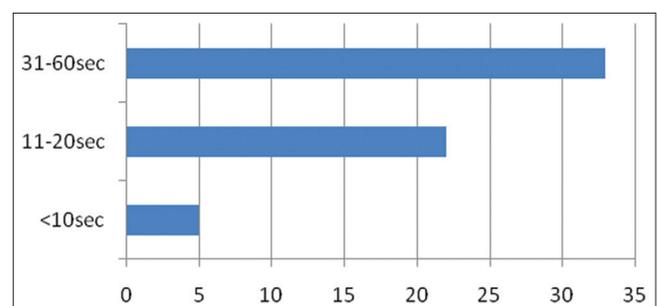
**Table 6: Length of the needle used often**

Variables and percentage	
Long	16
Short	88
Others	0



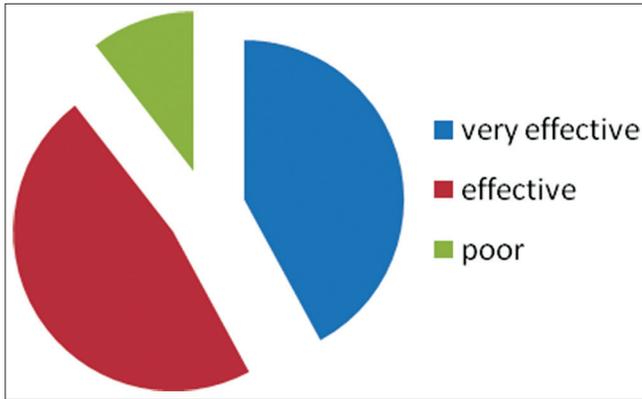
**Table 7: Time taken to inject a full cartridge**

Variables and percentage	
<10 s	10
11-20 s	24
31-60 s	66



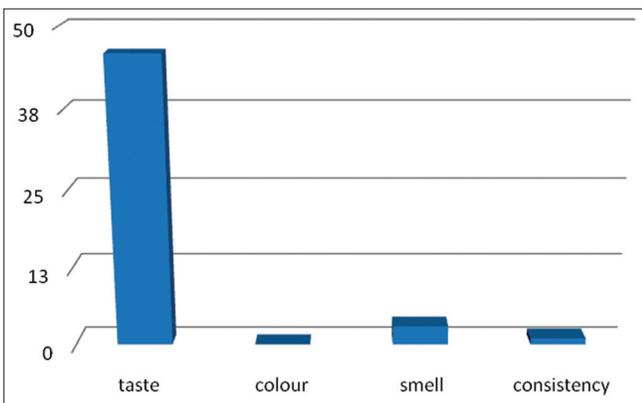
**Table 8: Do you prefer topical anesthetics are effective than local anesthetics**

Response	Percentage
Very effective	52
Effective	43
Poor	5



**Table 9: Disliking factor about topical anesthetic**

Response	Percentage
Taste	89
Color	1
Small	6
Consistency	4



is important that clinicians make every effort to minimize pain and discomfort during dental treatment. Because of the likelihood of the pediatric dental patient experiencing discomfort during restorative and surgical procedures, dentists turn to the use of local anesthetics and/or analgesics to control pain. The simplest and most effective method of reducing pain during dental procedures is via an injection of local anesthetic.<sup>[7]</sup> Unfortunately, the anticipation of receiving a “shot” tends to increase anxiety in the pediatric and adult patients.<sup>[8]</sup> Younger children do not have the ability to do this and thus may exhibit negative behavior before, during, and after the injection process. Local anesthesia can prevent

discomfort associated with tooth preparation, pulp therapy, and extraction. There are very few contraindications for the use of local anesthesia in children during dental procedures. However, when administering a local anesthetic to a child, the clinician should be aware of the possibilities of anesthetic overdose, self-induced traumatic injuries related to prolonged duration of soft tissue anesthesia and technique variations related to the smaller skull and different anatomies in pediatric patients.<sup>[9]</sup>

The length of the needle should be long for all techniques requiring penetration of significant thickness of soft tissue.<sup>[10]</sup> Short needles may be used for injections that do not require the penetration of significant depths of soft tissue.<sup>[11]</sup>

As for the time taken to inject a full cartridge of anesthetic, a slow injection is important for two reasons: (1) For the safety of the patient and (2) to prevent the solution from tearing the soft tissue into which it is being injected. Rapid injection causes an immediate discomfort that lasts for a few seconds, followed by a prolonged soreness after the numbing effect of the local anesthetic has subsided.<sup>[12]</sup> It was recommended at least 60 s for a full 1.8 ml of cartridge as this rate of deposition will neither produce tissue damage either during or after anesthesia nor cause a serious reaction in an event of accidental intravascular injection.<sup>[13]</sup>

Topical anesthetics are effective to a depth of 2–3 mm and are effective in reducing the discomfort of the initial penetration of the needle into the mucosa.<sup>[12]</sup> Its disadvantages are the taste may be disagreeable to patient and the length of application time may increase apprehension of approaching procedure in the pediatric patient.

Most practitioners responded that the current topical anesthetics they were using in their offices were very effective (36%). The fact that 2% of them perceived topical anesthetics to be ineffective. Most practitioners responded that their patients disliked taste, consistency, and warm/burning sensation of the topical anesthetic.

## CONCLUSION

The findings of this study demonstrate that pediatric dentists are most commonly using local anesthetic as the preferred type of using short needle for infiltrations and blocks. Most were taking anywhere from 31 to 60 s to inject a cartridge. Topical anesthetic was used by most and also the preferred one. However, their perception of the effectiveness of topical anesthetics varied. There also appears to be a need to develop newer and better mode of topical anesthetic delivery system in the pediatric dental population.

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Nil.

## Conflicts of interest

There are no conflicts of interest.

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