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Preference of Dental Practitioners Toward the Use of Local and Topical Anesthetics for Pediatric Patients in Tamilnadu: A Cross-Sectional Survey

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Abstract: ***Background: Local anesthesia plays a vital role in the success of dental procedures by ensuring maximum comfort for pediatric patients. However, its administration can also be a source of fear and anxiety for children. Therefore, it is crucial to apply appropriate pre-anesthetic measures to reduce discomfort and anxiety associated with local anesthesia. Aim: This study aimed to investigate the perceptions and preferences of dental practitioners in Tamil Nadu regarding the use of local and topical anesthesia in pediatric patients. Methodology: A structured questionnaire was distributed to dental practitioners in Tamil Nadu through Google Forms. The questionnaire collected information on the practitioners' sociodemographic details and their perceptions and practices related to local and topical anesthesia in pediatric patients. Descriptive statistical analyses were performed using SPSS (version 24.0), with a p-value of 0.05 at a 95% confidence interval considered statistically significant. Results: A total of 101 responses were received from dental practitioners in Tamil Nadu. Among the respondents, 93.9% preferred lidocaine as the local anesthetic agent of choice. When selecting local anesthesia, 61% of practitioners considered the child's precise medical condition as the most important factor. For needle selection, 55% of practitioners preferred 27-gauge needles for both infiltrations and nerve blocks. Short needles were favored for infiltrations by 61% of practitioners, while 78% preferred long needles for nerve blocks. For topical anesthesia, 74% of practitioners preferred lidocaine, but 55.8% were unaware of the specific brand they used. The majority believed that topical anesthesia was effective prior to the administration of local anesthesia, yet 70.6% reported that patients often complained about its taste. Conclusion: The findings indicate that among dental practitioners in Tamil Nadu, lidocaine is the most commonly preferred agent for both local and topical anesthesia in pediatric patients. Precise medical condition was the primary factor influencing local anesthetic dosage decisions. Most practitioners preferred short needles for infiltration and long needles for nerve blocks, with the 27-gauge needle being the most commonly used for both techniques.***

Keywords: Topical anesthesia , local anesthesia, pediatric patients

1. Introduction

Anesthesia is an essential aspect of dental practice, as it helps alleviate pain and ensures patient comfort during procedures[1,2,3]. Painful treatments can provoke fear in patients, especially children, which in turn may heighten their perception of pain[2]. Managing paediatric patients during dental procedures remains one of the greatest challenges for dentists, since the administration of local anesthesia itself can evoke fear and anxiety, leading to further discomfort [1,2,3]. The injection method continues to be the most widely used approach for delivering local anesthesia in dentistry [4]. To minimize the pain and discomfort associated with needle insertion, various pre-anesthetic agents are available in different formulations for convenient application[5,6,7]. Although lidocaine remains the most commonly used local anesthetic, it poses a known risk of inducing methemoglobinemia [7]

Local anesthesia is a highly effective and widely used method for controlling dental pain. However, when administered to pediatric patients, it can sometimes provoke adverse reactions such as lack of cooperation, hysterical behavior, and other behavioral challenges, which may hinder the dentist's ability to perform procedures effectively[8]. The techniques used to deliver local anesthesia can vary among practitioners depending on their training and clinical experience, but managing young patients during its administration remains particularly demanding[3,9]. Regular assessment of dental practitioners' perceptions and practices regarding local and topical anesthetic use in children is crucial. In Tamil Nadu, there is a clear need to understand how dental practitioners perceive and utilize these anesthetics in paediatric dentistry, as limited research exists on this topic. Therefore, the present study aimed to investigate the preferences and practices of dental practitioners in Tamil Nadu regarding the use of topical and local anesthesia in children.

2. Materials and Methods

"This cross-sectional, questionnaire-based study was conducted in accordance with the STROBE guidelines and employed a questionnaire adapted from a previous study carried out among dental practitioners in Saudi Arabia[10]. The study was carried out among dental practitioners in Tamil Nadu to assess their perceptions and practices regarding the use of local and topical anesthesia in pediatric patients. Data collection was conducted over a period of two months, from July 1 to September 30, 2023. A structured survey was distributed to participants via Google Forms. The questionnaire comprised 22 items: thirteen questions

focused on local anesthesia and nine on topical anesthesia, exploring practitioners' preferences and approaches. The survey was disseminated through social media platforms and professional networks, targeting general dentists, specialists, and consultants. The questionnaire was adapted from previously published surveys by Alazani et al. and Kohli et al[10,11], originally conducted among dental practitioners in Saudi Arabia and the United States. The questions covered topics such as the most commonly used local and topical anesthetic agents, key factors influencing dosage decisions, preferred needle length and gauge for infiltrations and nerve blocks, reported adverse reactions, and the typical duration required to deliver a full anesthetic dose. In addition, items related to the commonly used type and form of topical anesthesia, its perceived effectiveness, and common patient complaints were also included.

3. Statistical Analysis:

The data were analysed using the statistical package IBM SPSS Statistics for Windows (Version 24.0)by computing the percentage response for each question. The comparisons were made in percentages using the chi-square test, with a *p*-value less than 0.05 considered significant

4. Results

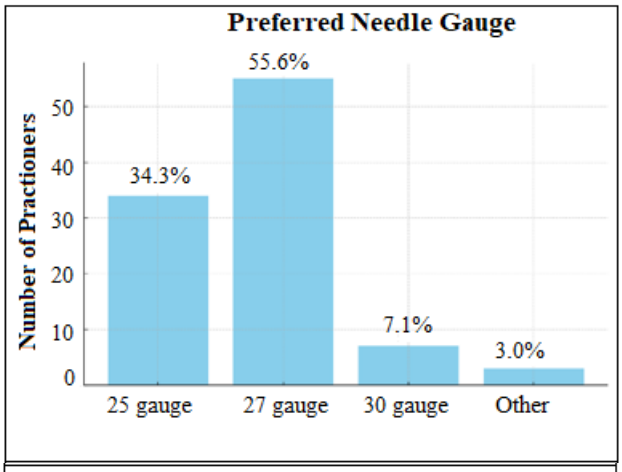
A total of 101 dental participants responded to the questionnaire in the study(table 1), The most commonly used local anesthetic drug was lignocaine (93.1%), The essential factor considered when deciding on the choice of the local anesthetic administration was medical condition (61%) and dosage of administration is based on body weight (45.3%)Most Tamilnadu dental practitioners preferred 27 gauge needles for infiltration and nerve blocks in children 55.6%and 34.3% preferred 25 gauge needle for both techniques in adult as well as prediatatric patients.62% of the total Tamilnadu dental practitioners preferred needle length differences in infiltration and block techniques. Among them short needles for infiltration to long (61.6%) and ultra-short needles (7%), while 72% of them preferred long needles for nerve blocks in children 48.5% of the Tamilnadu dental practitioners opined that 11–20 s was required for administration of a full injection of a local anesthesia solution.55% of the dental practioners donot prefer any gender preferences in their practice.

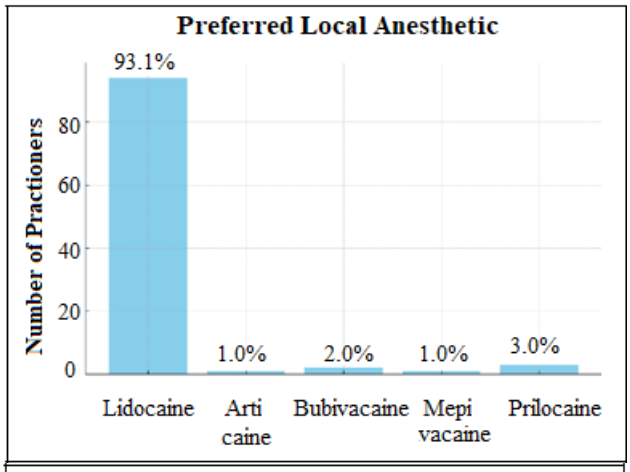
74.7% of practioners preferred lidocaine as a preferable topical anesthetic agent and 18.2% of practioners also use benzocaine.47.5% preferred gel form and 39.4% preferred spray form in their practice while treating the pediatric patients and 70% of the children complaint about the topical taste while using.only 40.8% of the dentist always use use topical prior to the treatment and 24.5 % used most of the times in their practice while treating children. Among them 64.6% told the effective of topical was very effective in children and it gain within 60 seconds-120 seconds after apply it on the region.37.8% practioners wants to change the mode of the application of topical but due the side effects they only prefer the traditional methods.

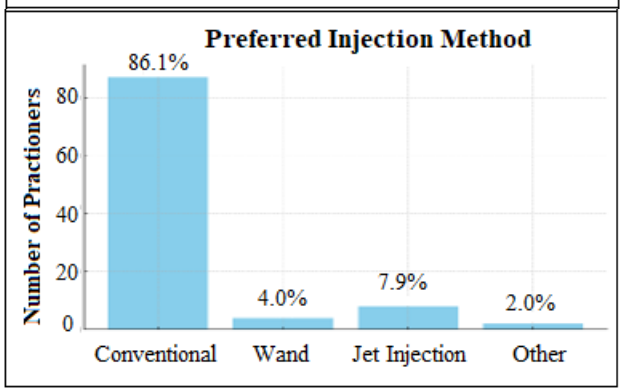
Table 1: Preferences and Practices of Tamil Nadu Dental Practitioners Regarding Local and Topical Anesthetic Use in Children

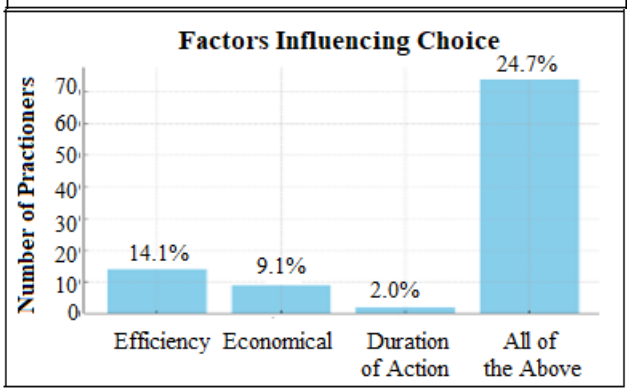
Variable	Category / Response	Frequency (%)
Total Participants	101	101
Most commonly used local anesthetic drug	Lignocaine/Lidicaine	93.1%
Essential factor for choosing local anesthetic	Medical condition	61%
	Dosage based on body weight	45.3%
Preferred needle gauge for infiltration & block in children	27 gauge	55.6%
Preferred needle gauge for infiltration & block in adults & pediatric	25 gauge	34.3%
Preference for needle length difference	Prefer different lengths	62%
	Short needles for infiltration	61.6%
	Ultra-short needles for infiltration	7%
	Long needles for nerve blocks	72%
Time required for full local anesthetic injection	11–20 seconds	48.5%
Gender preference in practice	No gender preference	55%
Preferred topical anesthetic agent	Lidocaine	74.7%
	Benzocaine	18.2%
Preferred topical anesthetic form	Gel	47.5%
	Spray	39.4%
Children's complaint about taste	Yes	70%
Frequency of topical anesthetic use before treatment	Always	40.8%
	Most of the time	24.5%
Perceived effectiveness of topical anesthetic	Very effective	64.6%
Onset time of topical anesthetic	60–120 seconds	64.6%
Willingness to change mode of topical application	Yes, but stick to traditional method due to side effects	37.8%

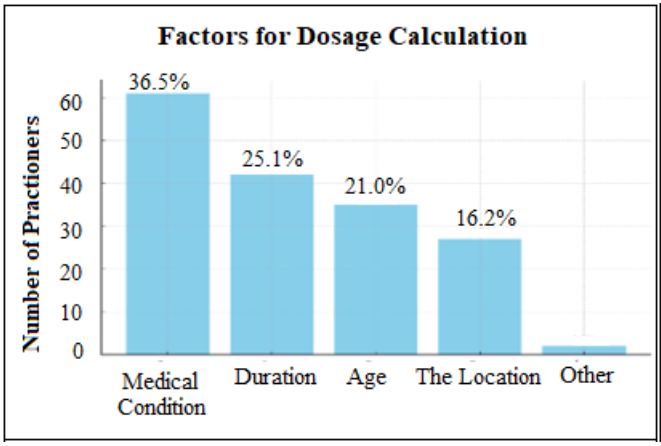
Results Through Graph: Preferences and Practices of Tamil Nadu Dental Practitioners Regarding Local and Topical Anesthetic Use in Children

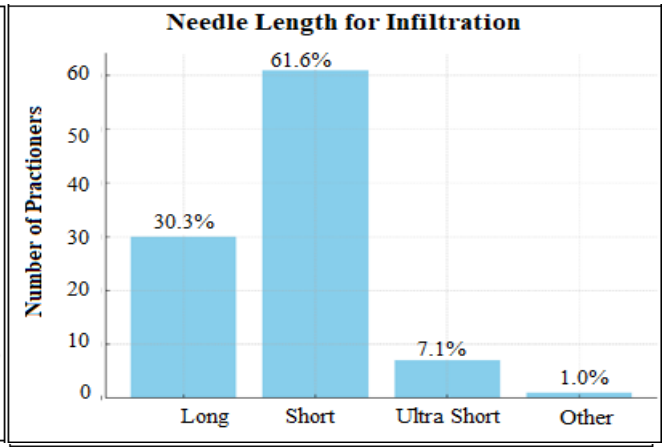

Preferred Needle Gauge
Number of Practioners
34.3%
55.6%
7.1%
3.0%
25 gauge
27 gauge
30 gauge
Other

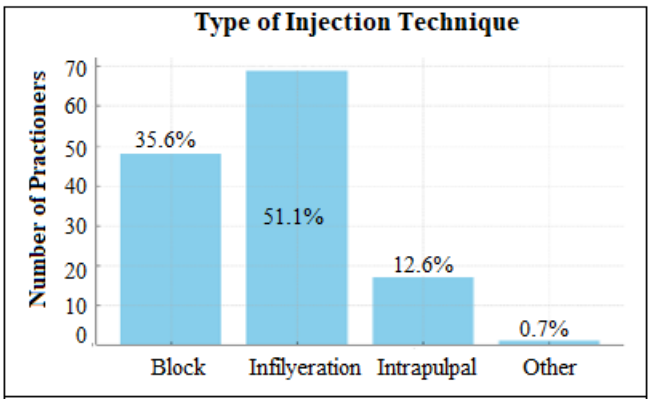

Preferred Local Anesthetic
Number of Practioners
93.1%
1.0%
2.0%
1.0%
3.0%
Lidocaine
Arti caine
Bubivacaine
Mepi vacaine
Prilocaine

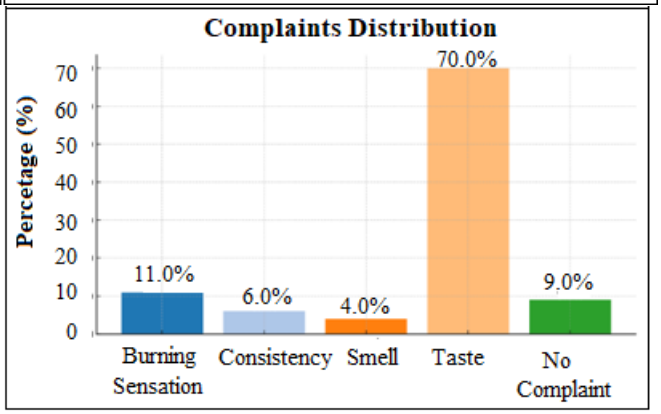

Preferred Injection Method
Number of Practioners
86.1%
4.0%
7.9%
2.0%
Conventional
Wand
Jet Injection
Other

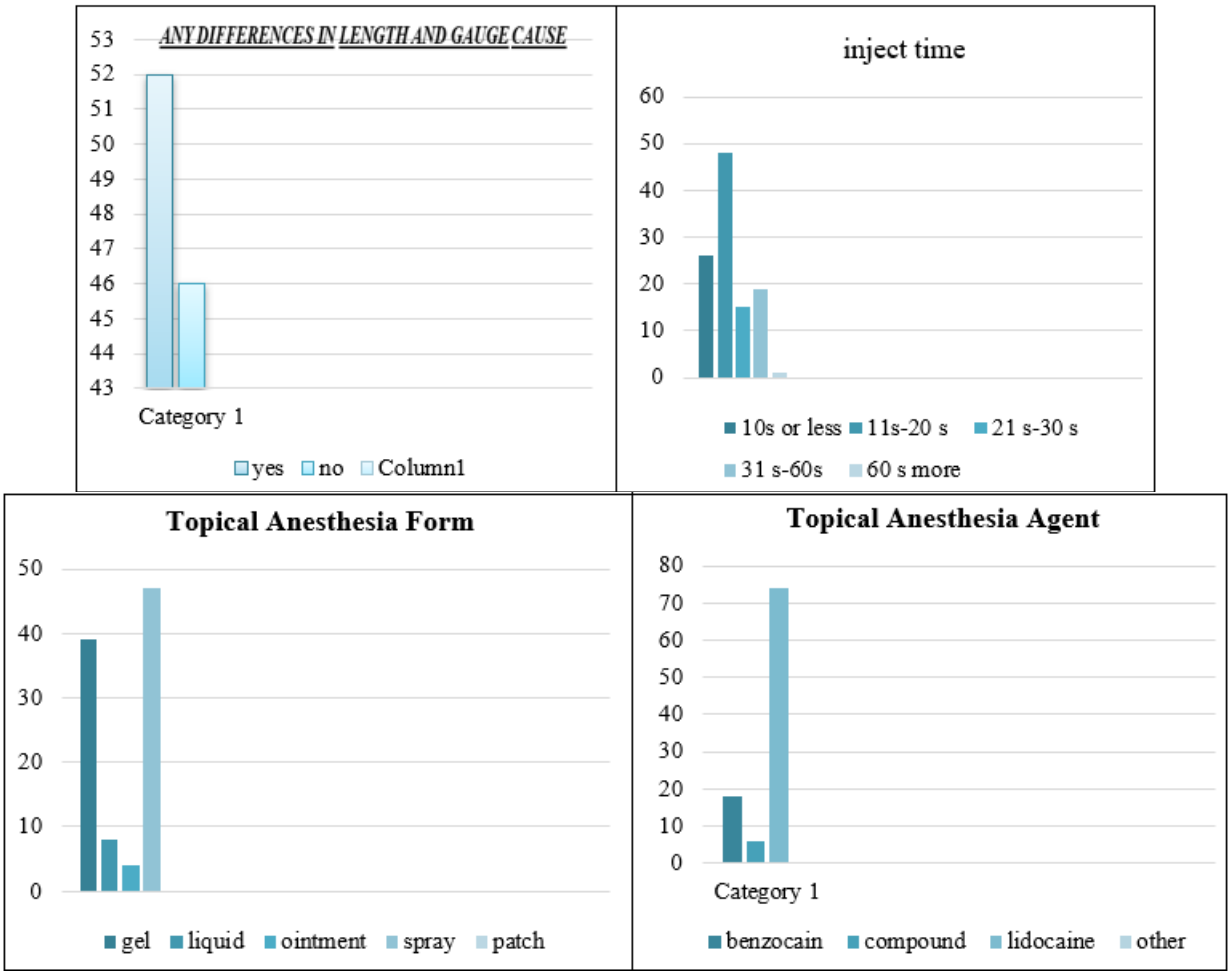

Factors Influencing Choice
Number of Practioners
14.1%
9.1%
2.0%
24.7%
Efficiency
Economical
Duration of Action
All of the Above


Factors for Dosage Calculation
Number of Practioners
36.5%
25.1%
21.0%
16.2%
Medical Condition
Duration
Age
The Location
Other


Needle Length for Infiltration
Number of Practioners
30.3%
61.6%
7.1%
1.0%
Long
Short
Ultra Short
Other


Type of Injection Technique
Number of Practioners
35.6%
51.1%
12.6%
0.7%
Block
Infilyeration
Intrapulpal
Other


Complaints Distribution
Percetage (%)
11.0%
6.0%
4.0%
70.0%
9.0%
Burning Sensation
Consistency
Smell
Taste
No Complaint



5. Discussion

The management of pain and anxiety in paediatric dental patients remains a significant challenge, as children's reactions may arise not only from pain but also from fear, distress, or a combination of social, parental, and developmental factors [12]. The experience of receiving local anesthesia can strongly influence a child's behavior and the likelihood of returning for future dental visits, shaping parents' perceptions of the dental practice as well[13]. In the present cross-sectional survey conducted among 101 dental practitioners across Tamil Nadu, India, the perceptions and practices regarding the administration of local and topical anesthesia in children were assessed, building upon prior work by Kohli et al [11] and fazani et al[10] and related surveys conducted internationally [14,15].

Among the surveyed practitioners, lignocaine emerged as the most widely used local anesthetic agent, with 93.1% preferring it for paediatric patients. This preference aligns with earlier findings from the United States[11], Canada[14], and Saudi Arabia [10,15], reflecting lignocaine's long-established safety, efficacy, and predictable pharmacological profile. In selecting local anesthetics, 61% of respondents indicated that the child's medical condition was the most important factor guiding their choice, and 45.3% reported that dosage calculations were primarily based on body weight, which is consistent with standard paediatric dosing protocols.

Regarding the selection of needles, 55.6% of Tamil Nadu practitioners preferred using 27 gauge needles for infiltration and nerve blocks in children, while 34.3% opted for 25 gauge needles for both adult and paediatric patients. The choice of appropriate needle gauge and length is crucial for safe and comfortable anesthesia delivery, minimizing complications such as needle deflection or breakage. In this survey, 62% of practitioners favored using different needle lengths for infiltration and block techniques, with 61.6% preferring short needles for infiltration and 72% using long needles for nerve blocks in children. These findings align with established recommendations that longer needles are required for deeper soft tissue penetration, whereas shorter needles are suitable for superficial infiltrations [16,17].

Nearly half of the respondents (48.5%) indicated that administering a full injection of local anesthesia typically takes between 11 and 20 seconds, demonstrating an effort to inject slowly to reduce discomfort. A majority (55%) of practitioners reported no preference related to the patient's gender, suggesting that the focus remains on clinical factors and patient comfort rather than non-clinical considerations.

Topical anesthesia remains an important adjunct for minimizing pain associated with needle insertion. In this study, 74.7% of the respondents preferred lidocaine as their topical anesthetic agent, while 18.2% used benzocaine. This is consistent with previous literature supporting the efficacy of both lidocaine and benzocaine for topical use in pediatric patients [10,11,12]. Gel form (47.5%) was the most common

preparation used, followed by spray (39.4%), which reflects considerations of ease of application and patient acceptance.

One challenge highlighted in this study is taste of the topical anesthesia. Seventy percent of practitioners reported that children complained about the taste of topical anesthetics, consistent with previous findings that taste is a critical factor affecting children's acceptance of these agents [18,19]. Despite this, only 40.8% of dentists reported always using a topical anesthetic prior to local anesthesia administration, while 24.5% reported using it most of the time. Practitioners who used topical anesthesia largely agreed on its effectiveness, with 64.6% considering it very effective, noting an onset time of 60 to 120 seconds after application, which aligns with established clinical timelines.

Although nearly 38% of respondents expressed interest in changing the mode of topical anesthetic application, concerns about potential side effects and lack of newer delivery systems contribute to continued reliance on traditional methods[21]. Reported adverse effects of topical anesthetics remain infrequent, which is consistent with the existing literature [20,22,23]. Practitioners also acknowledged common complications associated with local anesthesia, such as injection site pain and minor tissue trauma[22,23].

While this study provides valuable insights into the preferences and practices of Tamil Nadu dental practitioners, certain limitations should be noted. The survey was based on voluntary participation and did not stratify respondents by district or practice type, which may limit generalizability. Additionally, the response rate could not be determined, which is a common limitation in online cross-sectional surveys. Nevertheless, these findings serve as a useful reference for understanding current trends and may inform future guidelines and training in paediatric dental anesthesia.

Overall, the results of this study indicate that lignocaine remains the local anesthetic of choice among Tamil Nadu practitioners, with appropriate attention to needle gauge, length, and injection technique. While topical anesthesia is widely used, its application is sometimes limited by taste concerns and delivery methods. Continuous professional education, patient-friendly formulations, and innovations in anesthetic delivery could further enhance pain management and contribute to positive dental experiences for children, promoting better oral health outcomes in the long term.

6. Conclusion

This study highlights the current perceptions and practices of dental practitioners in Tamil Nadu regarding the use of local and topical anesthetics for pediatric patients. Lignocaine emerged as the most commonly preferred local anesthetic agent, while lidocaine in gel form was the predominant choice for topical anesthesia, with benzocaine also frequently used. Practitioners primarily considered the patient's medical condition and precise body weight when determining the appropriate dosage of local anesthetics. Most respondents preferred using 27-gauge needles for both infiltrations and nerve blocks in children, with a clear tendency to select short needles for infiltrations and long needles for blocks. Although general trends were observed, varied opinions were noted concerning the use, delivery methods, and patient acceptability of topical anesthetics, particularly due to issues related to taste. These findings emphasize the need for ongoing professional education and highlight the potential for developing more child-friendly anesthetic delivery systems to enhance pain management in pediatric dental care.

7. Highlights of the Study

- This cross-sectional study assessed the preferences and perceptions of dental practitioners in Tamil Nadu regarding the use of local and topical anesthesia in paediatric patients.
- Lidocaine was the most commonly preferred agent for both local and topical anesthesia among participating dental practitioners.
- The primary factor considered while selecting local anesthesia was the child's precise medical condition.
- Short needles were mostly preferred for infiltrations, while long needles were favored for nerve blocks.
- The majority of practitioners used 27-gauge needles for both infiltrations and nerve blocks.
- Many dental practitioners reported limited awareness about the brand of topical anesthetic used and highlighted children's complaints regarding its taste

References

[1] Van Wijk, A.J.; Makkes, P.C. Highly anxious dental patients report more pain during dental injections. Br. Dent. J. 2008, 205, E7. [CrossRef]
[2] Appukuttan, D. Strategies to manage patients with dental anxiety and dental phobia: Literature review. Clin. Cosmet. Investig. Dent. 2016, 8, 35–50. [CrossRef] [PubMed]
[3] Pedikayil, F.; Vijayan, A. An update on local anesthesia for pediatric dental patients. Anesth. Essays Res. 2013, 7, 4. [CrossRef]
[4] Becker, D.E.; Reed, K.L. Local Anesthetics: Review of pharmacological considerations. Anesth. Prog. 2012, 59, 90–102. [CrossRef] [PubMed]
[5] Mallineni, S.K.; Yiu, C. A Retrospective audit of dental treatment provided to special needs patients under general anesthesia during a ten-year period. J. Clin. Pediatr. Denty 2018, 42, 155–160. [CrossRef]
[6] Aminabadi, N.A.; Farahani, R.M.Z.; Oskouei, S.G. Site-specificity of pain sensitivity to intraoral anesthetic injections in children. J. Oral Sci. 2009, 51, 239–243. [CrossRef]
[7] Lee, J.; Lee, J.Y.; Kim, H.J.; Seo, K.S. Dental anesthesia for patients with allergic reactions to lidocaine: Two case reports. J. Dent. Anesth. Pain Med. 2016, 16, 209–212. [CrossRef]
[8] Revision, L. Use of local anesthesia for pediatric dental patients. Pediatr. Dent. 2018, 40, 274–280.
[9] Malamed, S.F. Local anesthetics: Dentistry's most important drugs, clinical update 2006. J. Calif. Dent. Assoc. 2006, 34, 971–976
[10] Alanazi, F.S.; Alhazzaa, M.F.; Alosaimi, Y.M.; Alajaji, F.A.; Alanazi, A.S.; Alassaf, A.; Almulhim, B.; Alghamdi, S.A.; Mallineni, S.K. Preference of

Dental Practitioners toward the Use of Local and Topical Anesthetics for Pediatric Patients in Saudi Arabia: A Cross-Sectional Survey. Children 2021, 8, 978. https://doi.org/10.3390/ children8110978

[11] Kohli, K.; Ngan, P.; Crout, R.; Linscott, C.C. A survey of local and topical anesthesia use by pediatric dentists in the United States. Pediatr. Dent. 2001, 23, 265–269.

[12] Versloot, J.; Veerkamp, J.S.J.; Hoogstraten, J. Assessment of pain by the child, dentist, and independent observers. Pediatr. Dent. 2004, 26, 445–449. [PubMed]

[13] Noel, M.; Chambers, C.T.; McGrath, P.J.; Klein, R.M.; Stewart, S.H. The Role of State Anxiety in Children's Memories for Pain. J. Pediatr. Psychol. 2012, 37, 567–579. [CrossRef] [PubMed]

[14] Gaffen, A.S.; Haas, D.A. Survey of local anesthetic use by Ontario dentists. J. Can. Dent. Assoc. 2009, 75, 649. [PubMed]

[15] Khalil, H. Local anesthetics dosage still a problem for most dentists: A survey of current knowledge and awareness. Saudi. J. Dent. Res. 2014, 5, 49–53. [CrossRef]

[16] Malamed, S. F.; DeLuke, D.M.; Cannon, D.; Carrico, C.; Byrne, B.E.; Laskin, D.M. Maximum recommended doses of dental local anesthetics. J. Dent. Educ. 2018, 82, 1017–1019. [CrossRef] [PubMed]

[17] Ram, D.; Hermida, B.L.; Amir, E. Reaction of children to dental injection with 27- or 30-gauge needles. Int. J. Paediatr. Dent. 2007, 17, 383–387. [CrossRef]

[18] Reed, K.L.; Malamed, S.F.; Fonner, A.M. Local anesthesia part 2: Technical considerations. Anesth. Prog. 2012, 59, 127–137. [CrossRef]

[19] Brand, H.S.; Kuin, D.; Baart, J.A. A survey of local anaesthesia education in European dental schools. Eur. J. Dent. Educ. 2008, 12, 85–88. [CrossRef]

[20] Mundiya, J.; Woodbine, E. Updates on topical and local anesthesia agents. Oral Maxillofac. Surg. Clin. N. Am. 2021. [CrossRef]

[21] Rasmussen, J.K.; Frederiksen, J.A.; Hallonsten, A.-L.; Poulsen, S. Danish dentists' knowledge, attitudes and management of procedural dental pain in children: Association with demographic characteristics, structural factors, perceived stress during the administration of local analgesia and their tolerance towards pain. Int. J. Paediatr. Dent. 2005, 15, 159–168. [CrossRef] [PubMed]

[22] Finder, R.L.; Moore, P.A. Adverse drug reactions to local anesthesia. Dent. Clin. N. Am. 2002, 46, 747–757. [CrossRef]

[23] Kaewjiaranai, T.; Srisatjaluk, R.L.; Sakdajeyont, W.; Pairuchvej, V.; Wongsirichat, N. The efficiency of topical anesthetics as antimicrobial agents: A review of use in dentistry. J. Dent. Anesth. Pain Med. 2018, 18, 223–233. [CrossRef] [PubMed