



KNOWLEDGE AND AWARENESS AMONGST DENTAL PRACTITIONERS TOWARDS THE USE OF LOCAL AND TOPICAL ANESTHETICS IN CHILDREN

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KEYWORDS :

Introduction

Anesthesia is considered a vital part and the backbone of pain control in clinical Dentistry. It offers painless care and helps a dentist operate correctly within optimum comfort. Painful dental treatments tend to induce fear, while fear and anxiety increases the pain sensed.¹ In pediatric dentistry, it is important to acknowledge that the pain sensation is not necessarily dependant on tissue damage; it may also be generated by condition stimuli such as sound of the drill or of the touch of the needle during local anesthetic injections.² Injection administration of local anesthesia is still the most common approach used in Dentistry.¹ "Needle-phobia" or "Blenophobia" results in fear and anxiety³ towards the dentist and dental treatment which are both significant characteristics that contribute to avoidance of dental care as they tend to evoke physical, cognitive, emotional, and behavioral responses in an individual.⁴ A pain-free environment for the child typically can be created by using psychological tactics and topical anesthetic agents prior to administration of injection.

Topical anesthetic agents which are effective on surface tissues (2-3 mm in depth) when applied prior to the administration of injection can help reduce the discomfort of needle insertion and anesthetic agent injection.⁵ They are commonly available as a gel, liquid, spray, ointment, and patch. The most widely used topical anesthesia is benzocaine which has a rapid onset of action and very few documented systemic complications.¹

Anesthetic overdose reactions are related to the blood levels being above the overdose threshold levels in the injected site hence, a slow rate of injection taking 60 or more seconds to inject a full cartridge of anesthetic helps to prevent drug overdose.⁶

There are several recommendations made by Malamed when using local and topical anesthesia in the pediatric population which are not known by many practicing pediatric dentists. There is a need to regularly assess the current practices in order to inform and educate the practitioners to prevent fatal anesthetic overdoses in children, create overall comfort and well-being during the entire dental experience and promote a positive behavioral attitude.⁵ Hence, this study aims at assessing the preference and knowledge of dentists and dental practitioners towards the use of local and topical anesthetics amongst children across Northern India.

Materials and Methods

Ethical aspect

This research has been approved by the Institutional Ethical Committee and Research Centre, Sardar Patel Postgraduate Institute of Dental and Medical Sciences, Lucknow.

Design

This study used a questionnaire-based cross-sectional approach that emphasizes the measurement time of only one observation at a time. This research was conducted in Sardar Patel Postgraduate Institute of Dental and Medical sciences, Lucknow and carried out in January 2022.

Population and Sample

The population of this study involved 150 dental practitioners

comprising of specialists and general practitioners working in hospitals and private clinic setups in Lucknow district. The sampling technique used was Chi square test and Goodness of fit tests: Contingency tables.

Data collecting

Firstly, the researcher conducted a preliminary study, then carried out the research licensing process which was compiled using questionnaires about demographic data and respondent's knowledge and awareness about different characteristics of local and topical anesthetics. Data collection was done by using questionnaires prepared in the form of google forms that had been tested for validity and reliability and distributed through social media, general dentists, specialists, and consultants. The questionnaire was adopted from Kohli *et al.* (2000) from a survey performed among dental practitioners in the United States of America. The survey included questions related to the most commonly used local and topical anesthetics drugs, as well as the most critical factor in deciding the dosage of local anesthesia. The questionnaire also had the most frequently used needle length and gauge for infiltrations and blocks, the adverse drug reaction to anesthetics, and the length of time to infuse a complete cartridge. The commonly used type and form of topical anesthesia, the effectiveness, and a common complaint from the patient regarding topical anesthetics were included in the questionnaire. Demographic data including gender and education were collected. The comparisons were made on the basis of gender (male and female) and occupation (consultants, general practitioners, and specialists).

Data analysis

The data were analyzed using the statistical package IBM SPSS Statistics for Windows (Version 24.0. Armonk, NY, USA: IBM Corp; 2016) 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.

Results

A total of 168 dental practitioners practicing in Lucknow responded to the questionnaire in this study. The participants were distributed based on gender and occupation. The proportion of females (68.4%) among respondents was found to be higher as compared to males (31.6%). The majority of the study population (66.1%) comprised of general dental practitioners while the remaining (25.1%) were specialists and 6.4% were consultants. No significant statistical findings were found ($p > 0.05$) Regarding type of local anesthesia most commonly used, majority among all types of participants responded as Lidocaine amongst which 100% were consultants, 96.5% were general practitioners and 95.3% were pedodontists, This was followed by 2.3% of the pedodontists preferring Articaine. This subsequently was then followed by 2.7% of general practitioners and 2.3% of the pedodontists preferring Bupivacaine. No statistically significant difference was found among occupation wise categories regarding most commonly used anaesthetic agent.

The most important factor considered when deciding on the dose of the local anesthetic administration was age and weight, preferred by 86% of pedodontists, 81.8% of consultants and 71.7% of general

practitioners, and the findings were not statistically significant ($p > 0.05$). Furthermore, 17.7% of general practitioners preferred medical history as an important deciding factor for dose calculation followed by 9.30% of pedodontists and 9.10% of consultants. The findings were not statistically significant ($p > 0.05$).

Most dental practitioners in Lucknow preferred 27 gauge needles for infiltration and nerve blocks in children followed by 25 gauge. In the case of infiltration, the majority of the general practitioners (59.30%) preferred using 27 gauge needles for infiltration followed by 46.50% of pedodontists and 54.50% of consultants while 45.50% of consultants, 25.70% of general practitioners and 25.60% of pedodontists preferred using 25 gauge needles for infiltration. The findings were not statistically significant ($p > 0.05$).

Likewise, in the case of nerve blocks, the majority of the consultants (54.50%) preferred using 27 gauge needles for nerve blocks while 51.20% of pedodontists and 47.80% of general practitioners preferred the same. Another majority of pedodontists (44.20%) and general practitioners (40.70%) preferred using 25 gauge needles for nerve blocks in children. The findings were not found to be statistically significant ($p > 0.05$). (Table 1)

Table 1. Needle gauge used commonly for infiltration and nerve block

			What needle gauge do you use mostly for infiltration?				Total
			25 gauge	27 gauge	31 gauge	others	
Occupation	1	n	29	67	10	7	113
		%	25.7%	59.3%	8.8%	6.2%	100.0%
	2	n	11	20	10	2	43
		%	25.6%	46.5%	23.3%	4.7%	100.0%
	3	n	5	6	0	0	11
		%	45.5%	54.5%	0.0%	0.0%	100.0%
Total		n	45	93	20	9	167
		%	26.9%	55.7%	12.0%	5.4%	100.0%
			0.125, NS				
			What needle gauge do you use mostly for blocks?				Total
			25 gauge	27 gauge	31 gauge	others	
Occupation	1	n	46	54	8	5	113
		%	40.7%	47.8%	7.1%	4.4%	100.0%
	2	n	19	22	1	1	43
		%	44.2%	51.2%	2.3%	2.3%	100.0%
	3	n	4	6	0	1	11
		%	36.4%	54.5%	0.0%	9.1%	100.0%
Total		n	69	82	9	7	167
		%	41.3%	49.1%	5.4%	4.2%	100.0%
P value			0.777, NS				

In the case of length of needles, majority of the dental practitioners in Lucknow district preferred short needles over long for administering infiltration. Amongst them, 88.4% of the pedodontists, 83.20% of general practitioners and 81.80% of consultants preferred using short needles for infiltration. The findings were not found to be statistically significant ($p > 0.05$).

While in the case of length of needles used for nerve blocks, the majority of the practitioners preferred using long needles as opposed to short. Amongst them, 74.40% of the pedodontists, 72.70% of consultants and 71.70% of general practitioners preferred using long needles over short for administering nerve blocks. There was no statistical significance found ($p > 0.05$) in the findings. (Table 2)

Table 2. Needle length used commonly for infiltration and nerve block

		What needle length do you use most commonly for infiltration?			Total
		Long	Short	Ultrash ort	

Occupat ion	1	n	12	94	5	2	113
		%	10.6%	83.2%	4.4%	1.8%	100.0%
	2	n	0	38	4	1	43
		%	0.0%	88.4%	9.3%	2.3%	100.0%
	3	n	2	9	0	0	11
		%	18.2%	81.8%	0.0%	0.0%	100.0%
Total	n	14	141	9	3	167	
	%	8.4%	84.4%	5.4%	1.8%	100.0 %	
P value	0.24 4,						
			What needle length do you most commonly for blocks				Total
			Long	Short	Ultrash ort	Others	
Occupat ion	1	n	81	27	3	2	113
		%	71.7%	23.9%	2.7%	1.8%	100.0%
	2	n	32	11	0	0	43
		%	74.4%	25.6%	0.0%	0.0%	100.0%
	3	n	8	3	0	0	11
		%	72.7%	27.3%	0.0%	0.0%	100.0%
Total	n	121	41	3	2	167	
	%	72.5%	24.6%	1.8%	1.2%	100.0 %	
P value		0.869. NS					

Regarding the questions asked for topical anesthesia, the most common complaint of pediatric patients in dental operations regarding topical anesthesia was taste as stated by 93% of the pedodontists. In addition, 81.80% of the consultants and 77% of the general practitioners reported taste as the most common complaint regarding topical anesthesia. Only a mere 10.6% of general practitioners and 9.10% of consultants felt burning sensation as another common complaint amongst children. The findings were not statistically significant ($p > 0.05$). (Table 3)

Table 3. Most common complaint regarding the topical anesthetic available in the market

			What do your patients most complain about regarding the topical anesthetic available on the market today?							Total
			Burning sensation	Colour	Consistency	Taste	Smell	Never complain		
Occupation	1	n	12	1	1	87	0	12	113	
		%	10.6%	0.9%	0.9%	77.0%	0.0%	10.6%	100.0%	
	2	n	1	0	1	40	1	0	43	
		%	2.3%	0.0%	2.3%	93.0%	2.3%	0.0%	100.0%	
	3	n	1	0	0	9	1	0	11	
		%	9.1%	0.0%	0.0%	81.8%	9.1%	0.0%	100.0%	
Total	n	14	2	136	2	12	167			
	%	8.4%	0.6%	1.2%	81.4%	1.2%	7.2%	100.0%		
P value			0.055, NS							

Discussion

In Pediatric dentistry, it becomes a big challenge to markedly identify behavior and differentiate pain from its actual occurrence to pain associated with fear and distress from the environment and surroundings. A treatment can be rightly considered successful when a positive dentist-patient relationship is built along with a positive behaviour modification for subsequent dental visits. This present cross-sectional survey was accomplished to evaluate the perceptions and knowledge amongst dental practitioners practicing in Lucknow about the various attributes of local and topical anesthesia use in children.

The results in the present study showed that 68.1% of general practitioners and 25.3% of pediatric dentists and specialists preferred Lidocaine over Articaine and Bupivacaine as the most commonly used drug for local anesthesia which was in accordance to the findings by

Kohli *et al.* (2000). Another survey done by Gafen *et al.* (2009) had also reported the frequent use of 2% lidocaine with epinephrine 1:100,000 for administration of local anesthesia.⁸ Khalil⁹ (2014) also revealed that lidocaine is a commonly used local anesthetic drug in children. Since Malamed recommended the use of exact body weight to prevent anesthetic overdose¹⁰, in this survey it was found that 76% of the practitioners considered age and weight as the most important deciding factor for the dose of local anesthesia while 15% considered medical history and the remaining 6% considered duration of treatment to be the deciding factor.

The survey was conducted through social media hence the response rate was not sought. Also the comparisons were made amongst a very number of dental practitioners in Lucknow district which might be a limitation of this study. Furthermore, a prospective study with a larger sample size with an equal distribution of dentists and practitioners from all over Northern India might be imperative. Memories of pain are rooted very early in life and these early pain memories persist into adulthood and influence the level of fear and avoidance of medical care later in life.¹⁶ Since constant efforts in building good rapport with patients must be taken care of so as to ensure maximum support and cooperation by the patient and their parents. Hence, this study will help to cast upon light over the use of 31 gauge needles amongst pediatric patients for achieving a less painful and traumatic dental experience.

Conclusion

Evident mixed opinion is observed among genders and various occupations of dental practitioners in Lucknow regarding the use of various topical and local anesthetics use in children. The most commonly preferred local anesthetic drug for use was lidocaine, and the most preferred topical anesthetic amongst dental practitioners was lidocaine followed by benzocaine in spray form. The most widely used factor in deciding the dosage of local anesthesia was age and precise body weight among dentists in Lucknow. The 27 gauge needle was chosen by the majority of participants for both infiltration and nerve blocks. The majority of participants preferred short needles for infiltrations and long needles for nerve blocks. There was seen a lack of awareness amongst dental practitioners towards the use of 31 gauge needles in children for effective pain control and a positive overall dental attitude.

REFERENCES

- 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. (2021). Preference of Dental Practitioners toward the Use of Local and Topical Anesthetics for Pediatric Patients in Saudi Arabia: A Cross-Sectional Survey. *Children* (Basel, Switzerland), 8(11), 978. <https://doi.org/10.3390/children8110978>
- Shehab, L. A., Basheer, B., & Baroudi, K. (2015). Effectiveness of lidocaine Denti patch® system versus lidocaine gel as topical anesthetic agent in children. *Journal of the Indian Society of Pedodontics and Preventive Dentistry*, 33(4), 285–290. <https://doi.org/10.4103/0970-4388.165664>
- Munshi, A. K., Hegde, A., & Bashir, N. (2001). Clinical evaluation of the efficacy of anesthesia and patient preference using the needle-less jet syringe in pediatric dental practice. *The Journal of clinical pediatric dentistry*, 25(2), 131–136. <https://doi.org/10.17796/jcpd.25.2.q6426p853266q575>
- Appukuttan, D. P. (2016). Strategies to manage patients with dental anxiety and dental phobia: literature review. *Clinical, cosmetic and investigational dentistry*, 8, 35–50. <https://doi.org/10.2147/CCIDE.S63626>
- Dasaraju, R. K., & Svsg, N. (2020). Comparative efficacy of three topical anesthetics on 7-11-year-old children: a randomized clinical study. *Journal of dental anesthesia and pain medicine*, 20(1), 29–37. <https://doi.org/10.17245/jdapm.2020.20.1.29>
- Kohli, K., Ngan, P., Crout, R., & Linscott, C. C. (2001). A survey of local and topical anesthesia use by pediatric dentists in the United States. *Pediatric dentistry*, 23(3), 265–269.
- Malamed, S.F. (1997). Basic Injection Technique. In *Handbook of Local Anesthesia*, 4, 134–140. Elsevier.
- Gaffen, A. S., & Haas, D. A. (2009). Survey of local anesthetic use by Ontario dentists. *Journal (Canadian Dental Association)*, 75(9), 649.
- Khalil, H. (2014). Local anesthetics dosage still a problem for most dentists: A survey of current knowledge and awareness. *The Saudi Journal for Dental Research*, 5, 49–53.
- Malamed, S.F. (1997). The Needle. In *Handbook of Local Anesthesia*, 4, 85–88. Elsevier.
- Ghanei, M., Amrup, K., & Robertson, A. (2018). Procedural pain in routine dental care for children: a part of the Swedish BITA study. *European archives of paediatric dentistry : official journal of the European Academy of Paediatric Dentistry*, 19(5), 365–372. <https://doi.org/10.1007/s40368-018-0368-2>
- Dean J. A. (2021). McDonald's and avery's dentistry for the child and adolescent (11th ed.). Mosby/Elsevier.
- Malamed, S.F. (1997). Systemic Complications. In *Handbook of Local Anesthesia*, 4, 265. Elsevier.
- Rosa, A. L., Sverzut, C. E., Xavier, S. P., & Lavrador, M. A. (1999). Clinical effectiveness of lidocaine and benzocaine for topical anesthesia. *Anesthesia progress*, 46(3), 97–99.
- Mundiya, J., & Woodbine, E. (2022). Updates on Topical and Local Anesthesia Agents. *Oral and maxillofacial surgery clinics of North America*, 34(1), 147–155. <https://doi.org/10.1016/j.coms.2021.08.003>
- Rasmussen, J. K., Frederiksen, J. A., Hallonsten, A. L., & Poulsen, S. (2005). 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. *International journal of paediatric dentistry*, 15(3), 159–168. <https://doi.org/10.1111/j.1365->

263X.2005.00635.x

- Finder, R. L., & Moore, P. A. (2002). Adverse drug reactions to local anesthesia. *Dental clinics of North America*, 46(4), 747–x. [https://doi.org/10.1016/s0011-8532\(02\)00018-6](https://doi.org/10.1016/s0011-8532(02)00018-6)
- Kaewjaranai, T., Srisatjaluk, R. L., Sakdajeyont, W., Pairuchvej, V., & Wongsirichat, N. (2018). The efficiency of topical anesthetics as antimicrobial agents: A review of use in dentistry. *Journal of dental anesthesia and pain medicine*, 18(4), 223–233. <https://doi.org/10.17245/jdapm.2018.18.4.223>
- Versloot, J., Veerkamp, J. S., & Hoogstraten, J. (2004). Assessment of pain by the child, dentist, and independent observers. *Pediatric dentistry*, 26(5), 445–449.
- Rosa, A. L., Sverzut, C. E., Xavier, S. P., & Lavrador, M. A. (1999). Clinical effectiveness of lidocaine and benzocaine for topical anesthesia. *Anesthesia progress*, 46(3), 97–99.
- Noel, M., Chambers, C. T., McGrath, P. J., Klein, R. M., & Stewart, S. H. (2012). The role of state anxiety in children's memories for pain. *Journal of pediatric psychology*, 37(5), 567–579. <https://doi.org/10.1093/jpepsy/jss006>