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Comparative evaluation of ice and topical anesthetic gel in the reduction of pain perception during administration of local anesthesia: An In-Vivo Study

Niharika Sharma[1], Priyanka Raj S[2], Shivani Bais[3], Swetha S Nair[4], Milind Rajan[5*], Parikshit Shivajirao Kadam[6]

[1] Postgraduate Student, Department of Pediatric and Preventive Dentistry, Kothiwal Dental College and Research Centre, Moradabad, Uttar Pradesh, India

[2] Postgraduate Student, Department of Oral and Maxillofacial Surgery Rajarajeswari Dental College and Hospital, Bangalore, Karnataka, India

[3] Postgraduate Student, Department of Pedodontics and Preventive Dentistry, Maitri College of Dentistry and Research Center, Durg, Chhattisgarh, India

[4] Postgraduate Student, Department of Pediatric and Preventive Dentistry, KMCT Dental College, Calicut, Kerala, India

[5] Postgraduate Student Department of Pedodontics and Preventive Dentistry, Coorg Institute of Dental Sciences, Virajpet, Karnataka, India

[6] Post graduate Student, Department of Pedodontics and Preventive Dentistry, Saraswati Dhanwantari Dental College and Hospital, Parbhani, Maharashtra, India

Abstract

Aim: The aim of present study was to comparatively evaluate the effect of cooling the anesthetic site and topical anesthetic gel on pain perception of pediatric dental patient during administration of local anesthetic solution.

Material and methods: 40 children aged between 4 to 8 years were included. On a random basis, the subjects were allocated into two groups i.e. Application of topical anesthesia at the site of administration of local anesthesia, pre-cooling the anesthetic site using ice prior to the administration of local anesthesia. During the administration of inferior alveolar nerve block, the pain perception was assessed using VAS scale.

Result and Conclusion: Pre-cooling the injection site significantly reduced the pain perception in pediatric dental patients when compared to topical anesthetic gel application during administration of local anesthetic agent.

Keywords: pain, local anesthesia, local anesthetic gel, pre-cooling

Introduction

Fear related behaviours have long been recognized as the most difficult aspect of patient management and can be a barrier to good care. Administering local anesthesia by injection is still the most common method used in dentistry [1]. For children, the anticipation of pain or discomfort associated with dental care is a significant deterrent in seeking appropriate treatment. Local anesthetic injections are one of the most feared or anxiety-inducing stimuli in dental operatory. Due to the subjective fear of pain, attributed to injection of anesthetic agents, providing appropriate dental care in children is difficult [2].

Since achieving an appropriate anesthesia is critical in modern dentistry and the needle phobia has become an obstacle for pediatric patients, administrating various possible pharmacological and non-pharmacological desensitization techniques such as warming, buffering the local anesthesia, pre-cooling the site of injection, vibration or pressure, acupuncture, adjusting the rate of infiltration, hypnosis, applying topical anesthetics, computerized anesthesia delivery system (e.g., WAND), using modern devices like vibra ject, dental vibe, or accupal or jet injectors have been tried out recently [3]. Aminabadi et al. (2009) [4] found that the injection site pre-cooling before the local anesthesia administration reduced the perception of pain. Ice is believed to help control pain by inducing anesthetic effect around the treatment area. Investigators have also shown that it reduces edema, nerve conduction velocities, cellular metabolism, and local blood flow [4]. Hence present study was conducted to compare the effect of topical anesthetic gel and pre-cooling the anesthetic site before administration of local anesthesia in reducing pain among pediatric dental patients.

Material and Method

Source of data: This study was conducted in the Department of Pedodontics and Preventive Dentistry after obtaining the ethical clearance from institutional scientific committee. The target population was the subjects visiting to outpatient department requiring inferior alveolar nerve block for dental treatment. It was

performed on the 40 children aged between 4-8 years. The children visiting the outpatient department were examined and those who met to the inclusion and exclusion criteria were selected for the study.

Inclusion Criteria

- Healthy children with no systemic illness, allergies, etc.
- Children showing Frankel's Behavior Rating Scale score of 3 and 4.
- Cooperative child.
- Patient requiring inferior alveolar nerve block for dental treatment.
- Children with proper parental consent.
- Children with first dental visit

Exclusion Criteria

- Children with emergency treatment needs, such as abscess, cellulitis and space infection, and those who needed premedication for receiving dental treatment.
- Children showing Frankel's Behavior Rating Scale Score 1 or 2.
- Medically compromised patient
- Children with behavioural management problem
- Children allergic to local anesthetic agents.
- Children below 4 years of age.

Methodology

The selected children for the study were randomly divided into two groups which were as follows:

Group I: Topical anesthetic gel

Group 1: Ice Application: The ice fingers were prepared by filling water in the small finger of latex gloves and freezing it.

In Group I, the topical anesthetic gel was applied for 60 s before the injection. Prefabricated cotton rolls were used to apply anesthetic gel whereas in Group II, the pre-cooling was done using ice fingers for 60s over the injection site before the administration of local anesthesia. Participants from both the groups were instructed to rate their individual pain experience using a visual analog scale (VAS). (Figure no 1) Their individual scores were noted, tabulated, and statistically analyzed. Unpaired t-test was used for the statistical analysis.

Result

The present study was conducted in department of pedodontics and preventive dentistry to evaluate the effectiveness of Ice application and Local anesthetic gel in alleviation of pain perception during administration of local anesthetic solution. A total number of 40 children, 22 boys and 18 girls aged between 4-8 years were participated in the study and were randomly allocated in the study between Group I- Topical anesthetic gel and Group II- Ice group

Greatest pain reduction was observed in the pre-cooling group with VAS mean pain score 2.01 ± 0.51 as compared to local anesthesia gel group with mean pain score of 5.05 ± 0.35. T-Test showed that pre-cooling was statistical significance compared with topical anesthesia gel with *P*< 0.001 (Table 1).

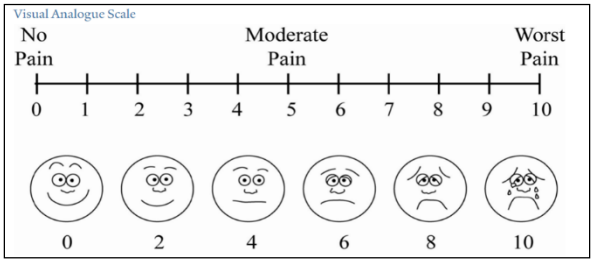

Fig 1: Visual Analog Scale

Table 1: Mean VAS Pain Score

Group	Mean Pain Score	P value
Group I Local anesthetic gel	5.05 ± 0.35.	P < 0.001
Group II Ice application	2.01 ± 0.51	

Discussion

"Although operative dentistry may be perfect, the appointment is a failure if a child departs in tears."

Successful dental treatment of children, in regards to relieving their fear, anxiety and discomfort during restorative and surgical procedures, is promoted by profound local anesthesia [5]. Dental anxiety and fear of needle is one of the most common problem encountered by pedodontists. Several methods are suggested to lower the discomfort of local anesthesia injection for dental procedures among which desensitizing the injection site such as warming, buffering the local anesthesia, pre-cooling the site of injection, vibration or pressure, acupuncture, adjusting the rate of infiltration, hypnosis, applying topical anesthetics, computerized anesthesia delivery system (e.g., WAND), using modern devices like vibra ject, dental vibe, or accupal or jet injectors have been tried out recently [3]. Pre-cooling is also called as cryoanesthesia, which is defined as the cold application to a localized portion of the individual's body to block the local nerve conduction for impulses of pain. Cryoanesthesia can be given either by refrigerant spray or by ice. In this study, the ice was used to precool the site of injection [6]. Topical cold application is believed to stimulate myelinated A fibers, activating inhibitory pain pathways, which in turn raises the pain threshold. It slows the nerve conduction, causing temporary vasoconstriction. This study showed that pre-cooling the site of injection effectively reduced the perception of pain, fear, and anxiety of the patient when compared to the conventional topical anesthetics, which is in accordance with the previous studies conducted by Hameed N et al (2018) [7], Kuwahara RT et al (2001) [8], Kosaraju A et al. (2009) [9] and Aminabadi NA et al (2009) [4]. Further studies with more number of samples, using other materials and techniques to compare their effectiveness with that of ice application, have to be conducted for painless anesthesia.

Conclusion

Pre-cooling the injection site significantly reduced the pain perception in pediatric dental patients when compared to topical anesthetic gel application during administration of local

anesthetic agent.

References

1. Peedikayil FC, Vijayan A. An update on local anesthesia for pediatric dental patients. Anesth Essays Res,2013:7:4-9.
2. Mohiuddin I. “Topical Application of Local Anaesthetic Gel vs Ice in Pediatric Patients for Infiltration Anaesthesia”. Journal of Evolution of Medical and Dental Sciences,2015:4(74):12934-12940.
3. Aminah M, Priya Nagar, Parul Singh, Monali Bharti. Comparison of topical anesthetic gel, pre-cooling, vibration and buffered local anesthesia on the pain perception of pediatric patients during the administration of local anesthesia in routine dental procedures. International Journal of Contemporary Medical Research,2017:4(2):400-403.
4. Aminabadi NA, Farahani RM. The effect of pre-cooling the injection site on pediatric pain perception during the administration of local anesthesia. J Contemp Dent Pract,2009:10:43-50.
5. Harleen Kaur Soni. “The Effectiveness of Pre-Cooling the Injection Site in Alleviating the Pain of Oral Injections in Pediatric Subjects”. Acta Scientific Dental Sciences,2020:4(2):51-55.
6. Bansal D, Mahajan M, Mathur S. A comparative evaluation of ice and topical anesthetic gel in the reduction of pain before the injection: A clinical trial. SRM J Res Dent Sci,2020:11:6-10.
7. Hameed NN Sargod SS, Bhat SS, Hegde SK, Bava MM. Effectivness of precooling the injection site using tetraflurorethane on pain perception in children. J Indian Soc Pedod Prev Dent,2018:36:296-300.
8. Kuwahara RT, Skinner RB. Emla versus ice as a topical anesthetic. Dermatol Surg,2001:27:495-6.
9. Kosaraju A, Vandewalle KS. A comparison of a refrigerant and a topical anesthetic gel as preinjection anesthetics: A clinical evaluation. J Am Dent Assoc,2009:140:68-72.