



A COMPARATIVE EVALUATION OF THE EFFECTIVENESS OF THREE ANESTHETIC GELS IN REDUCING PAIN DURING ADMINISTRATION OF LOCAL ANESTHESIA. – A RANDOMIZED DOUBLE-BLIND CLINICAL TRIAL

Dental Science

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ABSTRACT

AIM: To assess and compare the efficacy of different topical anesthetic agents on needle insertion pain during administration of IANB.

MATERIALS AND METHOD: The study included 90 children of age 4 to 8 years which were divided into three groups: Group-A (20% benzocaine), Group-B (5% lidocaine) and Group-C (2% lignocaine). Topical anesthetic gel was applied prior to administration of IANB. After that 1.2ml of local anesthetic agent was administered. The response of child was constantly observed during administration of LA. Each participant was advised to choose emoticon that quantify the pain perception using modified Wong Beker pain rating scale. The ratings were subjected to statistical analysis.

RESULTS: Results showed highly significant difference between the topical anesthetic effectiveness of all the groups. The topical anesthetic effectiveness on needle insertion pain of 20% Benzocaine is highest followed by 5% Lidocaine and 2% Lignocaine.

KEYWORDS

Procaine, progel, topical anesthesia

INTRODUCTION

Anxiety is explained as a state of obnoxiousness with an associated fear of danger from within or a learned process of one's own environment. It mostly depends on the capability to imagine. Anxiety is the most common issue faced by pedodontists in the dentistry. Children have tendency to refuse dental treatment. As a consequence of which dental anxiety becomes the major source of challenge for pediatric dentists and dental anxiety is usually associated with earlier traumatic experiences, negative outlook of the family, fear of pain and trauma, and perceptions of an unsuccessful previous dental treatment.^[1,2] The word Pain is described as a multidimensional entity that involves nociception, afferents to the central nervous system, modulation, affective responses, endogenous analgesia, behavioral adjustments, and changes of social roles, by The International Association for the Study of Pain. While pain trigger factors persist, pain degenerates to an independent response, manifesting even when it is possible to extirpate the primary stimulus.^[3] Pain control is an essential part of modern dentistry. Success usually depends on alleviating the pain and administering treatment with least amount of trauma. In day-to-day clinical practice, the most common modality of pain control is needle injection of local anesthetic. The stimulation produced by the needle during insertion and injection of the anesthetic solution causes pain during the method of giving anesthesia. Thus, it is essential to have a pain-free method of administering local anesthesia for a comfortable dental treatment. Topical anesthetics are perk to dentists in their attempts for pain-free injections. Topical anesthetics reduces the pain reaction of an individual by controlling pain perception.^[4,5,6] The mediation as signals from the terminal fibers of the sensory nerves are blocked by topical anesthetics. Their effects are restricted to control the painful stimuli arising on or just beneath the mucosa.^[7,8] There are various topical anesthetic agents available varying from gels to sprays. Benzocaine is quickly absorbed on the mucosal membrane. So it is widely used by dentists. It is long acting, less soluble in water and has less systemic toxicity. It is accepted as safe and effectual external source for temporary pain relief due to minor trauma in mucosa or gingiva, minor dental procedures, teething etc. Lignocaine is antiarrhythmic drug and is widely used topical anesthetic agent (gold standard) followed by benzocaine. However, there are side effects such as allergic skin reactions, blisters and ulcers. Lidocaine acts by blocking the sodium channels. Topical application of lidocaine decelerates the peripheral nociceptor sensitization and central hyper excitability.^[1,9]

This research was conducted to evaluate the effectiveness of 20% benzocaine, 5% lidocaine and 2% lignocaine gel as a topical

anesthetic agent prior to administration of local anesthesia.

AIM OF THE STUDY

- To assess and compare the efficacy of different topical anesthetic agents on needle insertion pain during administration of Inferior alveolar nerve block.

MATERIALS & METHOD

The study was a double-blind, randomized, controlled clinical trial. This randomized controlled trial compared the effectiveness of three topical anesthetic agents, i.e., 20% benzocaine gel, 5% lidocaine and 2% lignocaine. **90 patients** in the age group **4 to 8 years** was included in the study from the department of Pediatric & Preventive Dentistry. The parents had been briefed regarding the study and prior written consent from patient's parents had been taken.

The patients were divided into three equal groups as follows:

Group A : 20% benzocaine (Septodont, Benzocaine gel USP 20%, Progel B) applied in 30 patients

Group B : 5% lidocaine (Septodont, lidocaine ointment USP 5%, Lignospan-o) applied in 30 patients

Group C : 2% lignocaine (Xylocaine 2% Jelly, Lignocaine Hydrochloride Gel IP) applied in 30 patients

The selected participants had normal healthy gingiva, were free from any systemic diseases, and did not report allergy to any of the components of the drugs to be used in the study.

Randomization was done for the included participants using computer-generated sequence. The mandibular posterior areas such as retromandibular raphe and the buccal vestibule were chosen for application of the respective topical anesthetic agent. The site of application of the topical anesthetic agent and the needle were dried with 2 × 2 inch gauze. Additionally, the tongue and buccal surfaces of lips were isolated using cotton rolls to prevent the topical agent from anesthetizing these tissues.

The topical anesthetic gel was applied to the test area using cotton swab applicator that was completely dipped in the gel by investigator A. Following this, 1.2 ml of local anesthetic agent was administered preceded by aspiration through inferior alveolar nerve block onto the areas that were surface anesthetized. All efforts were taken to avoid the usage of fear/anxiety provoking statements or portrayal of fear

promoting situation in the child as that will alter the pain perception.

During the administration of local anesthesia, the response of the child was constantly observed by investigator B, who was blinded of the topical anesthetic agent used. 1.2 ml of local anesthesia was administered using 2 ml syringe. Following this, each participant was advised to quantify the pain perception using four point pain intensity scale. The child was advised to choose the emoticon that best described the amount of pain he/she had experienced at the time of needle insertion, and his/her response was recorded by the investigator B. The clinical trial for each child was accomplished in a single visit. All the data acquired were analyzed using SPSS software.

RESULT

A total of 90 children with 30 in each group were included in the study. Mean and standard deviation of pain scores in Group A was found to be 0.34 ± 0.075 , Group B 2.03 ± 0.182 And Group C 3.05 ± 0.216 was found to be. In Group A, 50 % ($N=15$) showed no pain, 33.3 % ($N=10$) showed slight pain and 16.6 % ($N=5$) showed moderate pain. In Group B, 20 % ($N=6$) showed no pain, 43.3 % ($N=13$) showed slight pain, 26.6 % ($N=8$) showed moderate pain, and 10 % ($N=3$) showed moderate pain. In Group C, 16.6 % ($N=5$) showed slight pain, 46.6 % ($N=14$) showed moderate pain, and 36.6 % ($N=11$) showed moderate pain on needle insertion. [Table 1]. The P value was found to be 0.000, which shows highly significant difference between the three groups. The graph shows comparison of pain scores between both the groups [Figure 1].

Table 1: Level of pain perception in each group

Pain Score % Within group	GROUP -A	GROUP -B	GROUP -C	TOTAL
No Pain Count %	15 (50 %)	06 (20 %)	00 (00 %)	2 (23.3 %)
Slight Count % within group	10 (33.3 %)	13 (43.3 %)	05 (16.6 %)	28 (31.1 %)
Moderate Count % within group	05 (16.6 %)	08 (26.6 %)	14 (46.6 %)	27 (30 %)
Severe Count % within group	00	03 (10 %)	11 (36.6 %)	14 (15.5 %)
Total Count % within group	30 (100 %)	30 (100 %)	30 (100 %)	90 (100 %)

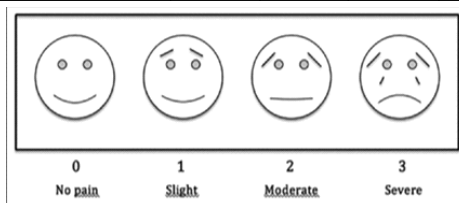


Figure 1: Four-point pain scale

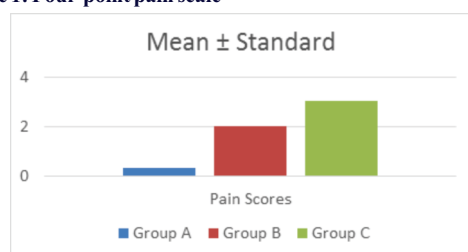


Figure 2: Graph depicting pain scores between both the groups

DISCUSSION

Local anesthesia is a combination of two Greek words “an” (without) and “aesthesia” (sensation). Based on their effects, local anesthesia is classified as (a) Conduction anesthesia, (b) Infiltration anesthesia, and (c) Topical anesthesia. The local anesthetics in routine clinical use today can be divided into two broad groups: – agents containing an ester linkage such as benzocaine and agents containing an amide linkage such as lidocaine.^[1,10,11] Topical anesthetics manifest pharmacological as well as psychological benefits. Data regarding the efficacy of topical anesthetics are limited, and results are contradictory.^[4]

There are various alternatives to topical anesthesia, but they are much

technique sensitive, for example computer-controlled local anesthetic delivery (CCLAD) and TENS. CCLAD works on the idea of slow delivery of local anesthesia. The speed of the delivery of solution is under computer control. In a clinical trial, comparing CCLAD with conventional method in pediatric patients showed that CCLAD gave better results than the traditional technique. TENS device stimulates the neurons that in turn activates the descending inhibitory system, and hence, hyperalgesia is reduced.^[1]

The study included 90 children of age 4 to 8 years which were divided into three groups: Group-A (20% benzocaine), Group-B (5% lidocaine) and Group-C (2% lignocaine). Topical anesthetic gel was applied prior to administration of IANB. After that 1.2ml of local anesthetic agent was administered. The response of child was constantly observed during administration of L.A. Each participant was advised to choose emoticon that quantify the pain perception using modified Wong Beker pain rating scale. The ratings were subjected to statistical analysis. Results showed highly significant difference between the topical anesthetic effectiveness of all the groups. The topical anesthetic effectiveness on needle insertion pain of 20% Benzocaine is highest followed by 5% Lidocaine and 2% Lignocaine.

Nair M and Gurunathan D (2019) concluded that there is a highly significant difference between the topical anesthetic effectiveness of 2% lignocaine and 20% benzocaine on needle insertion pain in inferior alveolar nerve block. Twenty percent benzocaine manifested better results than 2% lignocaine in reducing the needle insertion pain which is in accordance with this study.^[1]

Bhushan N.V.V.S and Nayak R.N (2010) concluded that 5% lignocaine hydrochloride gel is better than 5% bupivacaine hydrochloride gel as a topical anesthetic for extraction of grade II and grade III mobile teeth. Our study revealed 2% lignocaine was less effective as compared to other anesthetics.^[12]

Rosivack R.G, Koenigsberg S.R and Maxwell K.C (1990) reported that benzocaine 20% and lidocaine 5% significantly reduce the pain during needle insertion pain whereas in our study benzocaine showed more efficacy as compared to lidocaine and lignocaine.^[13]

Cho S.Y et al. (2016) concluded that the topical anesthetic was highly effective for both insertion and injection pain during infiltration anesthesia in the maxillary central incisors. Highly anxious patients reported higher pain scores; however, topical anesthetics reduced the effect of anxiety on increasing pain.^[14]

In the present study, we evaluated the efficacy of different topical anesthetic agents on needle insertion pain during administration of IANB and demonstrated that there is a high significant difference between the topical anesthetic effectiveness of benzocaine 20%, 5% lidocaine and lignocaine 2% and 20% Benzocaine being the most effective for alleviating pain.

CONCLUSION

The effectiveness of 20% Benzocaine is highest for topical anesthetics followed by 5% Lidocaine and 2% Lignocaine.

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