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# Compare the Efficacy of Lidocaine 5% and Benzocaine 5%, with Emla 5% Cream as the Standard Product

KEYWORDS

**Dr. Navubha Sodha**

Assistant Professor, Department of Anaesthesia, Gujarat Adani Institute of Medical Sciences, Bhuj, Gujarat.

**ABSTRACT** *Introduction: Pain management facilitates accomplishment of many medical procedures like blood sampling and injections particularly for children vaccination and laser hair re¬moval. Fixing intravenous catheters in patients causes anxiety and leads to some reactions like hypotension, vasovagal shock, syncope, and unconsciousness.*

*Material & Method: Total of 80 adult volunteers (50 women, 30 men) with a mean age of 35 years, participated in this study. Subjects with a history of allergy to amide or ester anesthetics, cardiac or respiratory disease, seizure disorders, or neuropathy were excluded. Exclusion criteria also included pregnancy and age less than 18 years. Informed consent was obtained.*

*Results & Conclusions: pain intensity after using EMLA 5% cream was significantly less than after using the two other products. No significant difference was observed between pain intensity between lidocaine 5% and benzocaine 5% creams (P = 0.66). In addition, there was no hypersensitivity reaction or any other side effects after using these products on the injection area. our results suggest that a reservoir of anesthetic is located and stored in the upper skin layers during application, providing additional anesthetic benefit 30 minutes after removal.*

**Introductions**

Pain management facilitates accomplishment of many medical procedures like blood sampling and injections particularly for children vaccination and laser hair removal. Fixing intravenous catheters in patients causes anxiety and leads to some reactions like hypotension, vasovagal shock, syncope, and unconsciousness. Patient anxiety and fear of injection lead to some problems for nurses; therefore, pain reduction is very important to them.[1]

With the emergence of new laser and surgical techniques, the need for more effective topical anesthesia continues to increase. There are now several topical preparations of local anesthetics that are being used prior to dermatologic procedures.[2]

However, the application of local anesthesia is often frightening because it is associated with the use of needles, punctures and pain. Together with cavity preparation by turbine, the application of anesthesia is one of the procedures which generate the greatest fear and anxiety in pediatric patients and dentists themselves.[3] Local anesthesia is, however, a basic technique in handling patient behavior because an effective anesthetic technique will provide a relaxed patient, quality, effective work and satisfied parents.[4]

The factors that influence the efficacy of topical anesthetics include the agent and its concentration, duration of application and site of application. The benefits of topical anesthetics may not be entirely pharmacological, a psychological advantage may also accrue. Topical anesthetics have a disadvantage of disagreeable taste; however with the introduction of various flavored preparations they have become more acceptable to children.[5]

Although techniques like general anesthesia and conscious sedation are being approached today, they always carry the risk of morbidity and, also, mortality. Also, general anesthesia is not very cost-effective for minor dental procedures except when the child is below the age of reason or is physically/ mentally handicapped.[6]

EMLA 5% cream (1:1 mixture of benzocaine and lidocaine) is a eutectic mixture; it means that melting point of the two agents reduces when mix with each other. Consequently, they will form a eutectic liquid at the temperatures higher than 16-17˚C. This makes a concentration gradient on the skin that facilitates the absorption. EMLA cream is widely used for painful processes like curettage, laser therapy of vascular lesions, skin biopsy, phimosis, shock wave lithotripsy (SWL), and cryotherapy of oral ulcers.[7]

Although other studies have attempted to prove or disprove the effectiveness of topical anesthesia in reducing pain from needle insertion, other variables such as injecting solution into the tissues confounded the results. There have been no published clinical trials to date regarding the safety or efficacy of these newer topical anesthetics, which were released in 1997–1998. The aim of this study was to compare the efficacy of these two topical anesthetic products, namely lidocaine 5% and benzocaine 5%, with EMLA 5% cream as the standard product in prevention of the pain during venous blood sampling.

**Materials & Method**

Total of 80 adult volunteers (50 women, 30 men) with a mean age of 35 years, participated in this study. Subjects with a history of allergy to amide or ester anesthetics, cardiac or respiratory disease, seizure disorders, or neuropathy were excluded. Exclusion criteria also included pregnancy and age less than 18 years. Informed consent was obtained.

The volar forearms of the volunteers were cleansed with isopropyl alcohol swabs and allowed to dry. The anesthetics cream A or B (EMLA Products) were placed on the right cubital fossa and C (Lidocaine) or D (Benzocaine) were applied on left cubital fossa. One centimeter of assigned cream was applied on the cubital fossa. In order to prevent

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differences and variations in the results, all the blood sampling were taken by one nurse from the cubital fossa veins with 10 cc syringe. The pain intensity was recorded by the patients using visual analogue scale (VAS) method. In this scale, the scores of zero and ten stand for painless state and the most painful feeling, respectively (1). Products encoding was done by the administrator and the person who took the samples and the volunteers were not aware of the type of applied products. Any local skin reaction like erythema, edema, or irritation were recorded. The data analysis was performed employing SPSS version 11 (SPSS Inc., Chicago, Illinois, USA) using student's t test and ANOVA. After decoding the study medications, it was revealed that A and B creams were EMLA cream while C and D were lidocaine and benzocaine creams, respectively.

**Results**

Sex distribution and mean age indicated that 30 males and 50 females with the mean age of 35.7 ± 17.2 years old participated in this study. In this study, EMLA 5% cream was applied on right cubital fossa of 80 volunteers and lidocaine 5% and benzocaine 5% creams each were applied on the left cubital fossa of 80 participants before blood sampling. The comparison of pain intensity differences in the three groups was based on the 10-unit observational pain scale. It indicated that pain intensity after using EMLA 5% cream was significantly less than after using the two other products. No significant difference was observed between pain intensity between lidocaine 5% and benzocaine 5% creams (P = 0.66). In addition, there was no hypersensitivity reaction or any other side effects after using these products on the injection area.

| | Number of Patients | Pain Intensity | 95% Confidence Interval | P value |
|---|---|---|---|---|
| EMLA 5% | 80 | 2.0 ± 1.80 | 1.18-2.06 | < 0.05 |
| Lidocaine 5% | 40 | 2.35 ± 1.90 | 1.18-2.06 | |
| Benzocaine 5% | 40 | 2.55 ± 1.95 | 1.18-2.06 | |

**Table 1: Comparison of Pain Intensity in the Three Treatment Groups**

**Discussion**

Topical anesthetics are commonly used by dermatologists to decrease the pain associated with laser pulses or surgical procedures. EMLA is the most commonly used agent prior to dermatologic procedures, however, there has been a recent release of newer topical anesthetics claiming increased efficacy and faster onset of action.[2]

In general, common topical anesthetics like Lignocaine and Benzocaine are effective only on surface tissue (2-3mm) and tissues deep to the area of application are poorly anaesthetized. E R Vickers and A. P Moorthy suggested that Lignocaine and Prilocaine bases have melting points of 69°C and 37°C respectively.[8] However when these agents are combined in eutectic form, the melting point of mixture is lowered to 17°C. This new physical property allows the anaesthetic agents to form oil at mouth temperature (37°C) and thus facilitates increased absorption of local anaesthetic agents.[9] Hence, the present study was undertaken to comparatively evaluate the effectiveness of Eutectic Mixture of Local anesthetics (EMLA) cream with the commonly available other topical anesthetics in reducing the pain associated with intra-oral needle insertion.

The fear and stress caused by injection particularly intralesional injection, which is an effective treatment method in most skin diseases, is still one of the challenges of this method. In this research, applying topical EMLA 5% cream before injection resulted in significantly more pain reduction in comparison to lidocaine 5% and benzocaine 5% creams. There was no difference between pain intensity after applying topical lidocaine 5% and benzocaine 5% creams.[7]

In the present study, the evaluation of pain was done using the following three scales, Visual Analogue Scale. According to these three scales, highly significant reduction in pain scores was found (P<0.000001) when EMLA was compared with Lignocaine and Benzocaine. Topical anesthetics such as Lignocaine and Benzocaine have the same mechanism of action. These local anesthetic agents when applied to the mucous membrane pass through the epidermis and anaesthetize the superficial nerve-endings. Thus, their effects are thought to be limited to the control of painful stimulation occurring in or just beneath the mucosa. These topical surface anesthetics are effective only on surface tissue (2-3mm) and tissues deep to the area of application are poorly anaesthetized.

EMLA cream had more, less, or equal effects on the pain relief in comparison with lidocaine cream; in cases in which topical liposomal lidocaine was applied, lidocaine showed more analgesic effects than EMLA cream.[10] It seems that particle size has a determinant role in effectiveness of this topical cream. EMLA cream showed significant effects in pain reduction before dentistry interventions. EMLA cream had also made a significant reduction in the intensity of prostate biopsy pain in comparison with lidocaine cream. Using EMLA cream to reduce the pain caused by intralesional injection for alopecia areata (30, 45, and 60 min before injection) showed a significant effect in 85% of the cases in comparison with injection in lesions without using EMLA.[7]

**Conclusion:**

There are now several topical preparations of local anesthetics that are being used prior to various dermatologic procedures. We report the first prospective study comparing the efficacy of several new topical anesthetic agents and demonstrate their efficacy by comparison with a control. Our study indicates that liposomal encapsulation provides increased efficacy in the delivery of anesthetic into the dermis. In addition, our results suggest that a reservoir of anesthetic is located and stored in the upper skin layers during application, providing additional anesthetic benefit 30 minutes after removal.

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