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ORIGINAL ARTICLE

Effect of pre-cooling injection site along with topical 20% Benzocaine on pain perception in pediatric dentistry: "A randomized clinical trial".

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ABSTRACT… Objective: To evaluate the effect of pre-cooling the soft tissue of injection sites along with topical 20 Benzocaine on the pain perception of pediatric patients. **Study Design:** Randomized Clinical Trial. **Setting:** Department of Pediatric, Ibn-e-Sina Hospital. **Period:** September 2021 to January 2022. **Material & Methods:** The study participants were divided into two groups by using lottery method, each group consisting of 40 participants. The first group was given local anesthetic gel and ice applied at site for two minutes before infiltration at the site of injection and the second group was given plain 20% benzocaine at site of injection before giving injection (control group). Pain response assessed by SEM (sound, eye, motor). **Results:** The present study group (topical anesthesia gel with ice + infiltration) had 40 children 23 boys and 17 girls with mean age 6.3 years and control group (plain topical anesthesia + infiltration) 40 children 21 boys and 19 girls with mean age 6.6 years. No statistically significant difference was found between the two groups in univariate analysis and multivariate analysis showed significant difference between two groups. No adverse events were reported in both groups. **Conclusion:** Topical anesthetic gel along with ice is more effective in reducing pain experience during local anesthetic injection administration during dental procedures.

Kew words: Benzocaine 20%, Dental Procedure, Pediatrics, SEM.

INTRODUCTION

Pain relief is an essential step during any invasive dental procedure like pulpotomies, root canal therapy, tooth extraction and drainage of abscess. It is done by giving local anesthesia which is the most agonizing part of the dental procedure and treatment.[1] Bleno phobia is a term used to describe pain and stress provoked by needle insertion and seeing the needle by the children.[2] Several methods are used to reduce the pain of needle insertion while giving local anesthesia. Both pharmacological and nonpharmacological approaches are used for this purpose.[3] some of the techniques to reduce pain are distraction, hypnosis, transcutaneous electric nerve stimulation, laser, acupuncture, pre-warming of local anesthesia, adjusting rate of infiltration, vibrating surrounding tissue during infiltration of local anesthesia and modified application techniques.[4,5,6]

From ancient times cooling tissue (cryotherapy) has been used for treatment of sprains, burns, fractures, insect bites and sports injuries.[3] studies have shown that cooling of skin after surgery reduces both tissue swelling and pain.8. literature has shown encouraging results of cooling tissue before procedure.[7]

Some dental studies also used this cooling technique to evaluate its efficacy in reducing the pain of local anesthesia injection administration. Harbert et al in 1989 evaluated that precooling of palatal area before injection reduced pain perception… Kosaraju et al compared refrigerant and two minutes application of topical anesthesia gel (20% benzocaine gel) in the posterior palatal area before injection. They reported that refrigerant application pre-injection was more effective in reducing pain than topical anesthetic gel.[8] In another study Aminabadi et al benzocaine

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alone and benzocaine followed by application of ice for two minutes before administration of injection of anesthetic agent. They used sound, eye and motor (SEM) to evaluate pain perception in children. They found statistically significant difference between two groups.[9]

The aim of the present study was to compare the effect of topical cooling by cold topical anesthetic prior to infiltration technique versus plain topical anesthesia before infiltration, in reducing pain perception of local anesthetic agent injection in children undergoing invasive procedure.

MATERIAL & METHODS

It was randomized controlled trial that was carried out in the Pedodontics department of Ibn-e-Sina hospital, Multan. The study was approved by the hospital ethical committee (Publi/02/22). Informed consent was taken from the patients or parents where the child could not understand it.

The study was conducted between September 2021 to January 2022. 80 children of both genders who presented during this period who fulfilled the inclusion criteria were included in the study. Children between the age of 5 to 12 years with Frankl's behavior rating III or IV who required buccal anesthesia for dental procedure were included in the study. The study participants were divided into two groups by using lottery method, each group consisting of 40 participants. The first group was given local anesthetic gel and ice applied at site for two minutes before infiltration at the site of injection and the second group was given plain 20% benzocaine at site of injection before giving injection (control group). Pain intensity was measured by using SEM (sound, eye, motor). SEM has three variables; sound (verbal response), eye sign and last one is the body movement.[10] Data was collected on predesigned questionnaire. Data was entered and analyzed using SPSS22. Descriptive variables were presented by frequency percentage. Groups mean was compared by using Wilcoxon and Mann- Whitney U test was used to compare means and p value of ≤ 0.05 was taken as significant.

RESULTS

The present study group (topical anesthesia gel with ice + infiltration) had 40 children 23 boys and 17 girls with mean age 6.3 years and control group (plain topical anesthesia + infiltration) 40 children 21 boys and 19 girls with mean age 6.6 years. No statistically significant difference was found between two groups with respect to age (student T test p 0.21) and sex (Fisher exact test, p 0.51. No adverse events were reported in both groups.

Univariate Analysis of SEM

The findings of the SEM are shown in Table-II and univariate analysis for pain reaction for SEM done. In the study group no severe pain reaction was observed while reaction for all sound, eye and movement was observed in plain topical anesthetic (20% benzocaine) group. The univariate analysis showed no significant difference within group for sound, eye, and motor component for both cold topical anesthetic gel and plain topical anesthetic gel (20 % benzocaine) with p value of >0.05.

Parameter	Comfort	Mild Discomfort	Moderate Discomfort	Severe Discomfort
Sound	No Sound	Non-specific Sound (probable pain)	Verbal Complaint, Louder Sound	Verbal Complaint, Shouting, Crying
Eye	No Sign	Dilated eyes without tears (anxiety sign)	Tears, Sudden eye movement	Crying, covering the face
Motor	Relaxed Body & Hand Status	Muscular Contraction, Contraction Of Hands	Sudden Body & Hand Movements	Hand Movements For Defense, Turning The Head To The Opposite Side

Table-I. SEM SCALE for the assessment of children's behavior

Multivariate analysis of the SEM

There was a significant difference between the two groups with a p value of 0.003. all values in cold benzocaine for sound, eye and motor were lower than plain benzocaine group. The SEM value of plain benzocaine group was higher than with cold benzocaine with p value of <0.05.

Group	Sound	Eye	Motor	Sum
Study Group (Cryotherapy)	1.15	1.50	1.76	4.41
Control Group (without Cryotherapy)	2.54	3.25	2.78	8.57

Table-II. SEM Values fort the study and control groups.

DISCUSSION

The aim of the study was to see the effect of cooling on pain perception during the administration of local anesthetic injection for invasive dental procedures. The result of the present study was that cooling of the site after application of local anesthetic gel before injection significantly reduced the pain perceived by the patient during routine dental procedures. The study findings agree with the previous studies which showed that cooling skin during laser therapy and inguinal hernial repair reduced the pain.[8] (25 2009). Another study by Ghaderi et al also showed that cooling of the site along with use of topical anesthetic gel reduces the pain perceived by pediatrics patients during administration of anesthetic injection. Another study also compared the cooling of site of injection for two minutes after topical gel before giving injection reduces the pain perceived by the children during dental procedures. These findings are in agreement with our study.[9]

Studies by Leff et al, Goel et al and Kuwahara and skinner all showed that cooling of the injection site reduces the pain perception. Harbert also reported that application of ice before palatal injection reduces the pain perception. Kosaraju et al results are similar to the present study but they used visual analogue scale and it was not a randomized study.[8] Anantharaj et al compared different topical anesthetics and cooling before injection and showed that ice group have least SEM scale followed by benzocaine then clove-papaya group though difference was not statistically significant.[11] One study showed that lignocaine has more pain reduction than ice which is statistically significant and it is in contrast to the most of the previous studies.[12]

Another study by Bhadauria et al also evaluated that pre-cooling injection site reduces pain perception, they used Heft-Parker visual analog scale and SEM and reported a significant difference between groups.[13] A study compared precooling, laser bio stimulation and topical local anesthetic gel and showed that score of zero for pain was given most for ice group, followed by local anesthetic gel and laser biosstimulation.[14] Another study by Lakshimi also reported similar results.[15]

In pediatric dentistry the most frequent problem encountered is fear and anxiety especially associated with needles. The needle phobia in children undergoing some invasive procedure makes things difficult. To overcome these different techniques are used as discussed above. Cooling the injection site is said to be very effective in reducing the pain. It is found that cooling along with topical anesthetic is more effective than topical anesthetic gel alone.[16,17,18,19,20]

It can be concluded from the present study that pre-cooling the injection site along with topical local anesthesia is more effective in reducing the pain perception of injection administration compared to topical anesthetic alone. Using ice is effective, cheap and without side effects. So, it should be encourage to use this technique in the routine dental procedures requiring anesthetic injection administration.

LIMITATION

First blinding of patient and clinician was not possible because of the temperature difference. Second physiological parameters as blood pressure and heart rate was not recorded.

CONCLUSION

Topical anesthetic gel along with ice is more effective in reducing pain experience during local anesthetic injection administration during dental procedures.

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AUTHORSHIP AND CONTRIBUTION DECLARATION

No.	Author(s) Full Name	Contribution to the paper	Author(s) Signature
1	Rabia Zafar	Study design, data collection, writing the manuscirpt, formulation of tables reviewed and approved.	
2	M. Athar Khan	Statistical analysis, result interpretation, manuscript writing and revising it critically for important intellectual content.	
3	Basil Khalid	Statistical analysis, interpretation of results, Reviewed and approved the manuscript.	
4	Shamsher Ali	Data collection, Writing the manuscirpt, formulation of tables reviewed and approved.