

TOPICAL APPLICATION OF LOCAL ANAESTHETIC GEL VS ICE IN PEDIATRIC PATIENTS FOR INFILTRATION ANAESTHESIAIqra Mohiuddin¹, Jyothsna V. Setty², Ila Srinivasan³, Junaid Ahmed Desai⁴**HOW TO CITE THIS ARTICLE:**

Iqra Mohiuddin, Jyothsna V. Setty, Ila Srinivasan, Junaid Ahmed Desai. "Topical Application of Local Anaesthetic Gel vs Ice in Pediatric Patients for Infiltration Anaesthesia". Journal of Evolution of Medical and Dental Sciences 2015; Vol. 4, Issue 74, September 14; Page: 12934-12940, DOI: 10.14260/jemds/2015/1866

ABSTRACT: BACKGROUND: Local anaesthetic injections are one of the most feared or anxiety-inducing stimuli in dental operatory. Due to the fear of pain attributed to injection of anaesthetic agents providing appropriate dental care in children is difficult. Various methods have been investigated to decrease pain perception during injection. Hence, the present study was directed towards reducing pain perception in pediatric patients by comparing the effect of cooling the injection site and use of local anaesthetic gel. **AIMS AND OBJECTIVES:** To compare the effect of topical cooling and the use of local anaesthetic gel before infiltration anesthesia in reducing pain in pediatric patients undergoing dental extractions in the maxillary anterior region. **MATERIALS AND METHODS:** A clinical trial was used to investigate pain perception in 100 healthy pediatric patients in the age group of 8 to 12 years who required infiltration anaesthesia for bilateral maxillary primary anterior teeth extraction. Before infiltration anaesthesia precooling was done on right side, whereas on the left side local anaesthetic gel was applied. The patients were asked to individually rate their pain experience on each side using the visual analogue scale. Scores were tabulated and subjected to statistical analysis using Student's t test. Statistical significance was defined at $P < 0.001$. **RESULTS:** The results of the present study, showed a statistically significant differences between the two groups ($P < 0.001$), with greater pain reduction in the ice group. **CONCLUSION:** Pre cooling injection site before infiltration anaesthesia significantly reduced the pain perception in pediatric patients when compared to local anaesthetic gel. Pre cooling of the injection site before infiltration anesthesia is an easy, reliable, and effective technique with no additional cost and can be beneficial to apply to all pediatric patients to reduce discomfort and facilitate clinical management.

KEYWORDS: Precooling, Local anaesthetic gel, Infiltration anaesthesia, Pain perception.

INTRODUCTION: Over the last decade there has been a steady rise in the number of procedures being performed under local anaesthesia that had conventionally been performed under general anaesthesia.¹ Injection of local anaesthetics is one of the most feared or anxiety-inducing stimuli in dental operatory. The fear of pain attributed to injection of anaesthetic agents is cited as an obstacle in providing appropriate dental care.

Successful treatment of pediatric patients, in terms of allaying their anxiety and their discomfort during restorative and surgical procedures, is facilitated by profound local anaesthesia.²

However, with any injection; there is an invasive procedure with regards to breaking the body's natural barriers; with a risk of soreness and discomfort.

Several methods have been used to reduce pain during injection of local anaesthetics which can be pharmacologic or non-pharmacologic such as application of topical anaesthetics, buffering the local anaesthetics, adjusting the rate of infiltration, distraction technique, application of heat and cold, acupuncture, hypnosis, vibrating the surrounding tissue while administering injection, and use of a mechanical delivery system, which have been tried to minimize the pain experienced during administration of local anaesthetic agents.

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Ice is a therapeutic agent used in medicine as an integral part of injury treatment and rehabilitation. The use of ice pack is widespread because of their effectiveness, convenience, low cost, and ease of transportation. Ice is believed to help control pain by inducing local anaesthesia around the treatment area. Investigators have also shown that it decreases oedema, nerve conduction velocities, cellular metabolism, and local blood flow.³

There have been numerous studies done in medicine where precooling has been used to relieve pain from a local anaesthetic injection, and prevent oedema. Chan et al, investigated the effect of cooling the skin prior to laser treatments.⁴ Raymond et al in their study found that ice decreases the discomfort associated with needle injection, it is a good topical anaesthetic.⁵

There have been few studies conducted in the field of dentistry to analyse the effect of topical cooling. The first study in this issue was done in the year 1989, by Harbert et al.⁶ He found cooling of palatal area before injection relieved pain perception. Ghaderi et al found in their study that cooling the injection site before infiltration of local anaesthetics for 1 min, reduces the pain perceived by pediatric patients.² Aminabadi et al, in their study found that precooling the injection site prior to administration of local anaesthesia significantly reduced the pain perceived by pediatric patients.⁷

Hence this study was aimed to compare the effect of topical cooling and the use of local anaesthetic gel before infiltration anesthesia in reducing pain in pediatric patients undergoing dental extractions in the maxillary anterior region.

MATERIALS AND METHODS:

- The study was conducted on a sample size of 100 children (Both males and females) aged 8-12 years attending The Department of Pedodontics and Preventive Dentistry, M R Ambedkar Dental College and Hospital Bangalore.
- Ethical clearance was obtained and a prior written informed consent was taken from the parents before the start of the study.
- During the first visit, an intraoral screening was performed. Patients requiring infiltration anesthesia for bilateral extraction of the maxillary primary anterior teeth were chosen for the study.

CRITERIA FOR SELECTION OF SAMPLE:

Inclusion Criteria:

- Patients requiring infiltration anesthesia for bilateral extraction of primary maxillary anterior teeth.
- Patients who are between the age group of 8-12years
- Patients who are willing to participate in the study
- Patients who are available during study period
- Patients who are able to follow instruction

Exclusion Criteria:

- Patient with a history of systemic diseases, psychiatric disorders, insensitive skin and dental abscesses in the procedure site
- Patients unable to follow instructions
- Uncooperative patients

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METHODOLOGY: The procedure was explained both to the parents and the child. The mucosa was dried using cotton. All the 100 children received both pre cooling and local anesthetic gel application before infiltration anesthesia. Among them in 50 children, precooling was done in the first appointment, whereas in the second appointment local anaesthetic gel was applied, and vice versa for the other 50 children, in order to prevent any bias.

On the right side precooling using ice cubes was done for 60 seconds before infiltration anesthesia. On the left side topical lidocaine hydrochloride gel 2% (WOCAINE 2%) was applied for 1 minute before infiltration anaesthesia in each patient. The ice cubes were made by filling water in the small finger of latex gloves, knotting it and then freezing it.

Whereas for application of local anesthetic gel, cotton buds were used. Infiltration anesthesia was given using lignocaine with adrenaline 1:80,000 (LIGNOX 2% A). After infiltration anaesthesia the patients were asked to individually rate their pain experience on each side using a visual analogue scale. The scores were calculated and tabulated. Statistical analysis was done using student's t test.

RESULTS:

Analysis of Vas Scores: The mean VAS scores were: 2.12 ± 1.17 for ICE group; 4.26 ± 1.86 for LA group. (Figure 1)

The mean VAS scores showed a statistically significant difference between the two groups, with greater pain reduction in the ice group. When comparing the VAS scores in males and females it was found that the means of VAS values for the ice group were $1.85(1.19)$ for males and $2.45(1.04)$ for females and local anaesthetic gel groups were $4.0(1.70)$ for males $4.59(2.0)$ for females, with statistically significant lower VAS scores in males. (Figure 2).

No adverse events were observed during the course of study.

DISCUSSION:

- Ice is a therapeutic agent used in medicine as an integral part of injury treatment and rehabilitation. A number of theories have been put forward to explain the mechanism of action of topical cooling to reduce pain. 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, causes temporary vasoconstriction of superficial blood vessels, decreases metabolic rate, and thus required blood flow of the cells which were not originally involved in the injury; and thereby controls the extent of the inflammatory reaction and oedema.⁸ Ice packs can be made with any form of ice; however, 2 commonly used forms are cubed ice and crushed ice. In the present study cubed ice was used.
- The results of the present study showed that pre cooling of the injection site significantly reduced the anxiety and pain perceived by the pediatric patients. The results of the present study are supported by other studies conducted previously by Harbert et al,⁶ Aminabadi et al,⁸ Kuwahara and Skinner,⁵ Kosaraju et al,⁹ who also found similar results from their studies. The present study showed a statistically significant difference between the pain perception in males and females. Females showed higher VAS scores perceiving more pain. This could be attributed to the increased level of anxiety and fear in females compared to males, this is in accordance with the study conducted by Hosseini et al, they concluded from their study that females have a higher level of anxiety when compared to males.¹⁰

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- Several faces rating scales exist and were developed primarily for use with young children. The Wong-Baker Faces Pain Rating Scale is easy to use, repeatable and has showed significantly positive correlation. It has been used for assessment of pain in children & adults in various studies.¹¹ hence in the present study Wong-Baker Faces Pain Rating Scale was used.
- Effect of topical anaesthetic gel was found to be uncertain in the present study. Mixed results were seen, moreover the displeasing taste of local anesthetic gel made some patients anxious. This is in accordance with the study conducted by Adriani et al who reviewed the use of topical anesthetics in medicine and concluded that their effectiveness was uncertain.¹²
- Another important finding of this study was the use of euphemism like ice candy for ice cubes which made the patients less anxious. The patients presumed the ice cubes to be some form of new ice candy which made them excited and to some extent reduced the anxiety levels.
- The results of the present study supports the idea that precooling amplifies the pain threshold to stimuli such as a needle prick during local anesthetic injection and helps better patient management during routine dental procedures for pediatric patients.
- A few limitations of this study were that blinding of the patients and the examiner was not possible due to the cold sensation felt on precooling. Negative controls such as placebo gel and sprays could not be used, since a bilateral cross-over design was used.

CONCLUSION: Pre cooling injection site before infiltration anaesthesia significantly reduces the pain perception in pediatric patients when compared to local anaesthetic gel. Pre cooling of the injection site before infiltration anesthesia is an easy, reliable, and effective technique with no additional cost and can be beneficial to apply to all pediatric patients to reduce the discomfort and facilitate clinical management.

Groups	Mean±SD	p - value
ICE	2.12±1.17	<0.001**
LA	4.26±1.86	

Table 1: Comparison Between Ice and Local Anaesthetic Group

**P <0.001- highly significant using student 't' test

VAS	Gender	N	Mean (SD)	p value
ICE	Male	56	1.85 (1.19)	0.01*
	Female	44	2.45 (1.04)	
LA	Male	56	4.0 (1.70)	0.11
	Female	44	4.59 (2.0)	

Table 2: Comparison Between Scores of Males and Females

*p<0.05 – significant using student 't' test

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Figure 1: Ice Cubes and Local Anesthetic Gel

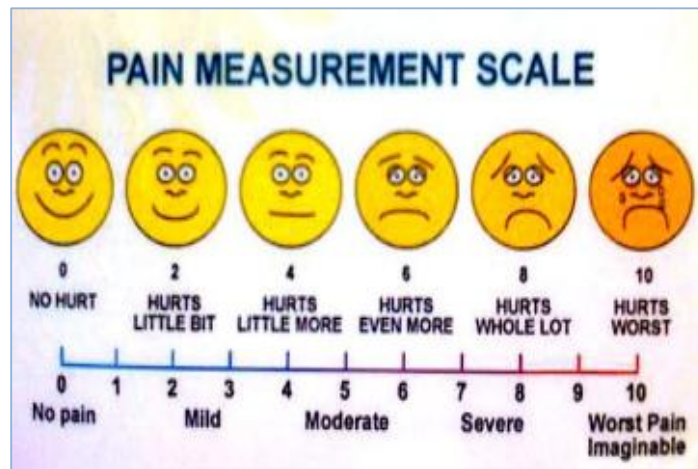


Figure 2: Visual Analogue Scale

Figure 3: A 8year old girl Showing her Pain Experience on Visual Analogue Scale.



Figure 3: Visual Analogue Scale

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