

Comparison of Distraction Technique Using Eye Massage Therapy Versus Tell-Show-Do Distraction Technique on Child's Anxiety And Pain During Administration of Inferior Alveolar Nerve Block: A Randomized Crossover Clinical Trial

Dr. Zohra Bodeliwala¹, Dr Preetam Shah², Dr Laxmi Lakade³, Dr Shweta Chaudhary⁴, Dr Shweta Jajoo⁵, Dr Krishna Patil⁶

¹Email: bodeliwalazohra@gmail.com, ORCID ID: <https://orcid.org/0009-0007-2774-9424>

²Email: preetamshah9009@gmail.com

³Email: laxmi.lakade@bharativedyapeeth.edu

⁴Email: shwetadixitchaudhary@gmail.com

⁵Email: shweta.jajoo11@gmail.com

⁶Email: krishnapatil1000@gmail.com

Abstract

Background:

Pain and anxiety associated with inferior alveolar nerve block (NB) administration represent significant barriers to effective pediatric dental care. In children, anticipatory fear and heightened emotional reactivity often amplify pain perception, compromise cooperation, and negatively influence future dental attitudes. Although conventional behavior guidance techniques such as Tell-Show-Do (TSD) remain widely practiced, their effectiveness during invasive procedures may be limited. Periorbital eye massage therapy has recently emerged as a novel passive distraction modality capable of promoting relaxation while eliminating visual exposure to the needle. The present randomized crossover clinical trial aimed to evaluate the effectiveness of eye massage therapy compared with the conventional TSD technique in reducing anxiety, pain perception, and physiological responses during IANB administration in children.

Methods:

Twenty-four children aged 7–12 years requiring bilateral dental treatment under IANB participated in a randomized crossover design. Each child received both interventions—eye massage therapy and TSD—across two visits separated by a 14-day washout period, thereby serving as their own control. Anxiety was assessed using the Facial Image Scale (FIS), and pain perception was measured using the Wong-Baker Pain Scale (WPS). Physiological parameters, including pulse rate and oxygen saturation (SpO₂), were recorded at baseline, during needle penetration, and immediately post-procedure. Within-subject comparisons were performed using paired statistical analyses with a significance threshold of $p < 0.05$.

Results:

Baseline anxiety scores demonstrated a modest but statistically significant difference between visits ($p = 0.0102$). Following IANB administration, children exhibited significantly lower anxiety levels under the eye massage condition compared with TSD (mean difference = 1.50 ± 1.31 ; $p < 0.0001$). Pain perception was likewise significantly reduced with eye massage therapy (mean difference = 1.25 ± 1.87 ; $p = 0.0033$). Although baseline pulse rate differed between visits ($p = 0.0251$), no significant differences were observed during needle penetration or post-procedure ($p > 0.05$). Oxygen saturation remained stable across all time points, with no statistically significant interventional differences.

Conclusion:

Periorbital eye massage therapy significantly reduced both anxiety and pain during inferior alveolar nerve block administration in children without inducing adverse physiological alterations. By combining sensory relaxation with visual occlusion of the needle, this technique offers a safe, non-pharmacological, and clinically feasible adjunct to conventional behavior management strategies in pediatric dentistry.

Keywords: Pediatric dentistry; dental anxiety; pain management; eye massage therapy; inferior alveolar nerve block; crossover clinical trial.

Introduction

The human tooth is a highly specialized biological structure, yet its natural regenerative capacity is limited. As a

result, loss of tooth structure due to dental caries, trauma, or other pathological processes requires timely intervention to restore function and maintain oral health.^[1,2] Historically, management of caries was based on extensive mechanical removal of diseased tissue, but contemporary dentistry has moved toward minimally invasive approaches that emphasize preservation of healthy tooth structure and biologically sound treatment planning.^[3]

Despite advances in restorative philosophy and treatment modalities, effective pain control remains central to successful dental care. Pain is currently defined as an unpleasant sensory and emotional experience associated with, or resembling that associated with, actual or potential tissue damage.^[4] In dentistry, pain may arise from caries progression, operative procedures, pulpal inflammation, or administration of local anesthesia. Because many restorative procedures, pulp therapies, and extractions involve manipulation of sensitive hard and soft tissues, local anesthesia is indispensable for ensuring patient comfort and allowing treatment to be carried out effectively.^[5]

Pain perception in children differs from that in adults. Ongoing neurodevelopment, reduced cognitive maturity, limited coping skills, and stronger emotional reactivity influence how children interpret and respond to painful stimuli.^[6] Pediatric patients often perceive unfamiliar procedures as more threatening than adults do, and pain may be exaggerated in stressful clinical environments. The Wong–Baker work on pediatric pain assessment remains foundational in showing the need for child-appropriate self-report tools in this age group.^[7] Importantly, unpleasant dental experiences in childhood may have lasting consequences, predisposing children to dental fear, avoidance behavior, and poorer oral health later in life.^[8]

Pain and anxiety are closely linked in pediatric dental patients. Dental anxiety is an anticipatory emotional state marked by fear, apprehension, and increased autonomic arousal before or during dental treatment.^[8,9] Anxious children often exhibit lower pain thresholds and greater attention to threatening stimuli, which may intensify their perception of pain and reduce cooperation during treatment.^[9] This relationship becomes especially relevant during local anesthetic administration, which is often one of the most distressing parts of the dental appointment for children.^[10] Injection-related fear may be triggered by the sight of the syringe, expectation of needle penetration, unfamiliar sensation, or previous negative experiences. Such distress can be reflected in behavioral resistance and physiologic changes such as elevated heart rate.^[10,11]

Among mandibular anesthesia techniques, the inferior alveolar nerve block is one of the most frequently used and, in children, one of the more challenging procedures from a behavior guidance standpoint.^[5,12] Effective management of discomfort during such procedures is therefore essential. Although pharmacological methods such as sedation and general anesthesia may be useful in selected cases, their routine use is limited by cost, monitoring requirements, potential adverse effects, and parental preference.^[9,13] For this reason, non-pharmacological behavior guidance techniques remain fundamental in pediatric dentistry.^[14]

Tell–Show–Do is one of the most widely accepted conventional behavior guidance techniques. According to the American Academy of Pediatric Dentistry, Tell–Show–Do involves explaining the procedure in developmentally appropriate language, demonstrating its non-threatening sensory aspects, and then completing the procedure without deviation from the explanation.^[14] Its purpose is to familiarize the child with the dental environment and shape an appropriate response through desensitization and clear expectations.^[14] However, during invasive procedures such as inferior alveolar nerve block administration, Tell–Show–Do alone may not always be sufficient, particularly in children with heightened anticipatory anxiety.

Distraction techniques have therefore gained importance as adjuncts in the management of dental anxiety and pain. By diverting the child's attention away from the unpleasant stimulus, distraction decreases perceived unpleasantness and helps avert avoidance behavior.^[14] A systematic review of randomized controlled trials by Prado et al. concluded that distraction techniques can be useful for managing fear and anxiety in pediatric dental practice.^[15] Randomized clinical studies have also shown that active and passive distraction methods used during local anesthesia can reduce dental anxiety in children, although the degree of effect may vary with the modality used.^[16] More recent evidence also supports virtual reality as an effective tool for reducing anxiety and pain in pediatric dental patients, but limitations related to cost, technical setup, and equipment use may hinder routine

clinical implementation.^[17]

A newer sensory-based approach is the periorbital eye massager. This device provides a combination of gentle vibration, compression, and warmth around the eyes, thereby promoting relaxation while simultaneously blocking visual exposure to the syringe. The latter may be especially important because needle visibility is a major trigger for anxiety in many children. Recent clinical studies have reported favorable results with eye-massager-based approaches in reducing anxiety and pain during pediatric dental procedures.^[18,19] In addition, related sensory distraction methods such as eye movement distraction have also shown positive effects during local anesthetic administration in needle-phobic children.^[20]

In light of the close relationship between pain and anxiety, the limitations of conventional behavior guidance alone, and the growing interest in sensory distraction techniques, the present randomized crossover clinical trial was undertaken to evaluate and compare the effectiveness of periorbital eye massage therapy with the conventional Tell–Show–Do technique in reducing pain and anxiety among children aged 7–12 years undergoing inferior alveolar nerve block administration.

AIMS AND OBJECTIVES

AIM:

To evaluate and compare the effectiveness of eye massage therapy and the Tell–Show–Do technique in reducing anxiety and pain in children during the administration of inferior alveolar nerve block.

OBJECTIVES:

- 1.To assess the level of anxiety in children undergoing inferior alveolar nerve block using the Facial Image Scale (FIS).
- 2.To evaluate pain perception during local anesthetic administration using the Wong–Baker Pain Rating Scale.
- 3.To record and compare physiological responses, including pulse rate and oxygen saturation (SpO₂), during the procedure.
- 4.To compare the effectiveness of eye massage therapy with the conventional Tell–Show–Do technique in managing anxiety and pain.

MATERIALS AND METHODS

Study Design

The present study was designed as a randomised crossover clinical trial that compared the effectiveness of the periorbital eye massager with the conventional Tell-Show-Do Technique in reducing pain and anxiety levels in children during the administration of Inferior Alveolar Nerve Block (IANB).

A crossover design was chosen to minimize the inter-individual variability in anxiety perception and physiological response, which are known to differ among pediatric patients. Each participant was exposed to both intervention and control conditions, thereby serving as their own control and improving the reliability of the results.

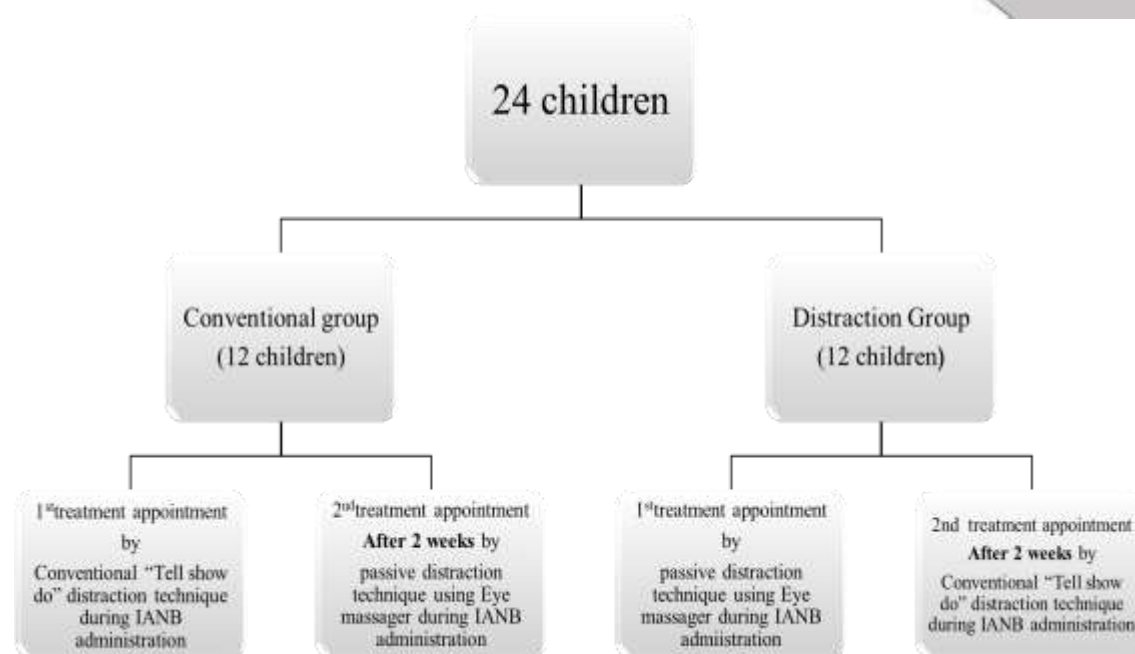


FIGURE 1 – Flowchart for study design

Study Setting and Participants

The study was carried out in the Department of Pediatric and Preventive Dentistry Bharati Vidyapeeth dental college and hospital, Pune. It was approved by Institutional Research (BVDU/DCH) and Ethical (EC/NEW/INST/2024/) committees. A total of 24 children aged 7–12 years who required bilateral dental treatment necessitating IANB administration were screened for eligibility. The study is registered in Central Trial Registry of India with Registration number CTRI/2024/08/072968

Inclusion criteria:

- Children aged between 7 and 12 years
- Positive or definitely positive behavior according to Frankl’s Behavior Rating Scale
- First dental visit
- Requirement of bilateral dental procedures under IANB

Exclusion Criteria:

- Children with systemic illness
- Children with cognitive or visual impairment
- Children exhibiting negative or definitely negative behavior
- Medically compromised patients

Ethical Considerations:

Written informed consent was obtained from parents or legal guardians, and verbal consent was obtained from all the participating children. The procedure was explained to both – the legal guardians and the children and the side effects were explicitly stated. The research was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki. Participation was voluntary, and confidentiality of participant information was maintained throughout the study.

Randomization and Crossover Protocol

Participants were randomly allocated into one of two treatment sequences using a simple randomization method. In the first visit, children received IANB administration either with eye massage therapy (intervention) or with the conventional Tell–Show–Do technique (control). After a washout period of 14 days, the alternate behavior management technique was employed during the second visit.

The washout interval was incorporated to minimize potential carryover effects associated with prior procedural experience or anxiety modulation. The crossover structure ensured that both conditions were evaluated under comparable clinical circumstances.

Armamentarium

The materials and equipment used in the study were arranged clinically prior to the procedure.



Figure 2: Armamentarium used for eye massage therapy group (including eye massager, local anesthetic syringe, pulse oximeter, topical anesthetic, and other clinical instruments)



FIGURE 3: Armamentarium used for conventional treatment (without eye massager)

Study Procedure

The study was carried out over two visits for each participant.

Visit 1

- Baseline anxiety and physiological parameters were recorded
- The assigned intervention (eye massage therapy or TSD) was performed
- Inferior alveolar nerve block was administered
- Pain perception and anxiety levels were assessed immediately after the procedure



Figure 4: Administration of inferior alveolar nerve block during first visit using assigned intervention



Figure 5: Assessment of pain by showing the Wong Baker pain scale

Visit 2

- Conducted after a washout period of 14 days
- The alternate intervention was performed
- The same procedure was repeated under identical clinical conditions



Figure 6: Administration of inferior alveolar nerve block without eye massage therapy



Figure 6: Using Facial Image scale to determine anxiety levels

Intervention Protocols

- **Eye Massage Therapy (Intervention)**

The eye massage device was introduced using a tell–play–do approach to promote familiarity and acceptance. The device was positioned over the periorbital region immediately prior to IANB administration and remained activated throughout the injection procedure. The device delivered controlled vibration and compression designed to induce relaxation and reduce visual and sensory awareness of the needle.

- **Tell–Show–Do Technique (Control)**

In the control condition, IANB administration was performed using the conventional Tell–Show–Do technique. The procedure was explained in age-appropriate language, demonstrated in a non-threatening manner, and subsequently carried out according to standard pediatric dental protocols.

Outcome Measures

Both subjective and objective parameters were assessed to evaluate anxiety and pain.

- **Subjective Measures**

- Facial Image Scale (FIS) for anxiety assessment
- Wong–Baker Pain Scale (WPS) for pain perception
- **Physiological Measures**
- Pulse rate (beats per minute)
- Oxygen saturation (SpO₂, percentage)

Physiological parameters were selected as objective indicators of autonomic arousal associated with procedural anxiety.

All measurements were recorded at three standardized time points:

- Baseline: Prior to administration of local anesthesia
- Needle penetration: During insertion of the needle
- Post-procedure: Immediately after completion of injection

Pulse rate and oxygen saturation were recorded using a calibrated pulse oximeter by an independent observer who was not involved in administering the intervention, thereby minimizing observer bias.

STATISTICAL ANALYSIS

Statistical analysis was performed using SAS software (Version 9.4; SAS Institute Inc., Cary, NC, USA).

Continuous variables were summarized as mean and standard deviation. Data normality was assessed using the Shapiro–Wilk test.

Given the randomized crossover design, within-subject comparisons between the intervention and control conditions were performed using:

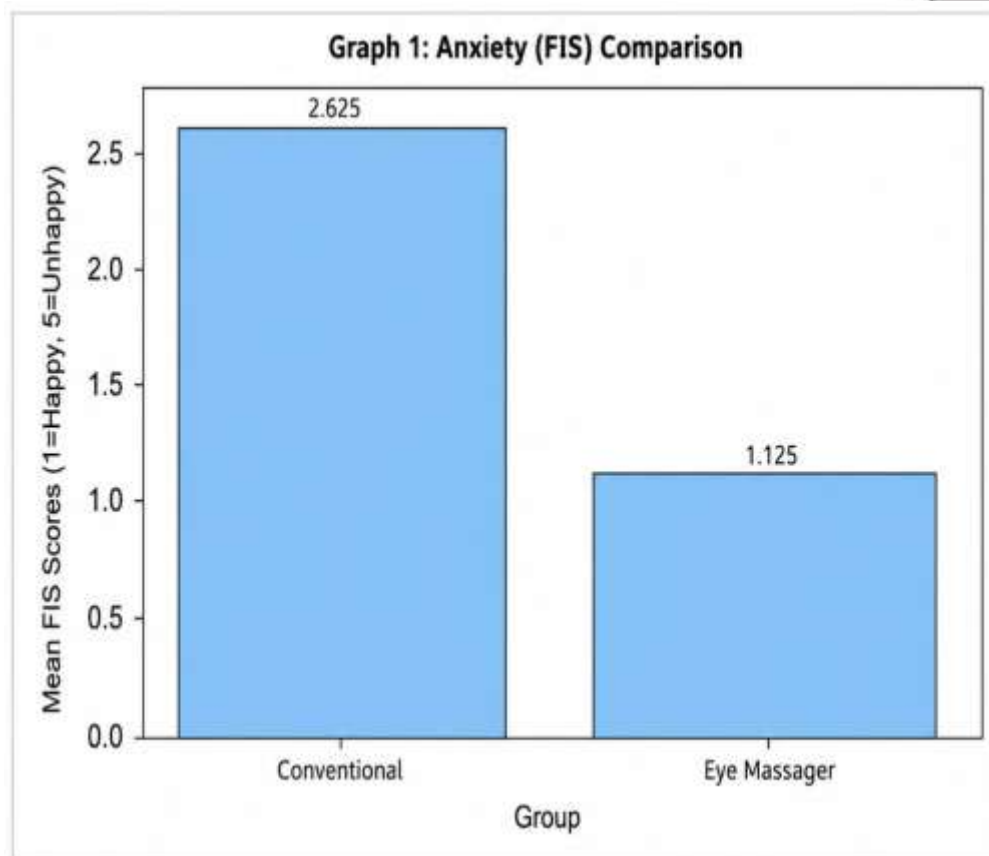
Paired t-test for normally distributed variables

Wilcoxon signed-rank test for non-normally distributed variables

Comparisons were conducted at each time point (baseline, needle penetration, and post-procedure). A p-value < 0.05 was considered statistically significant.

TABLE 1:

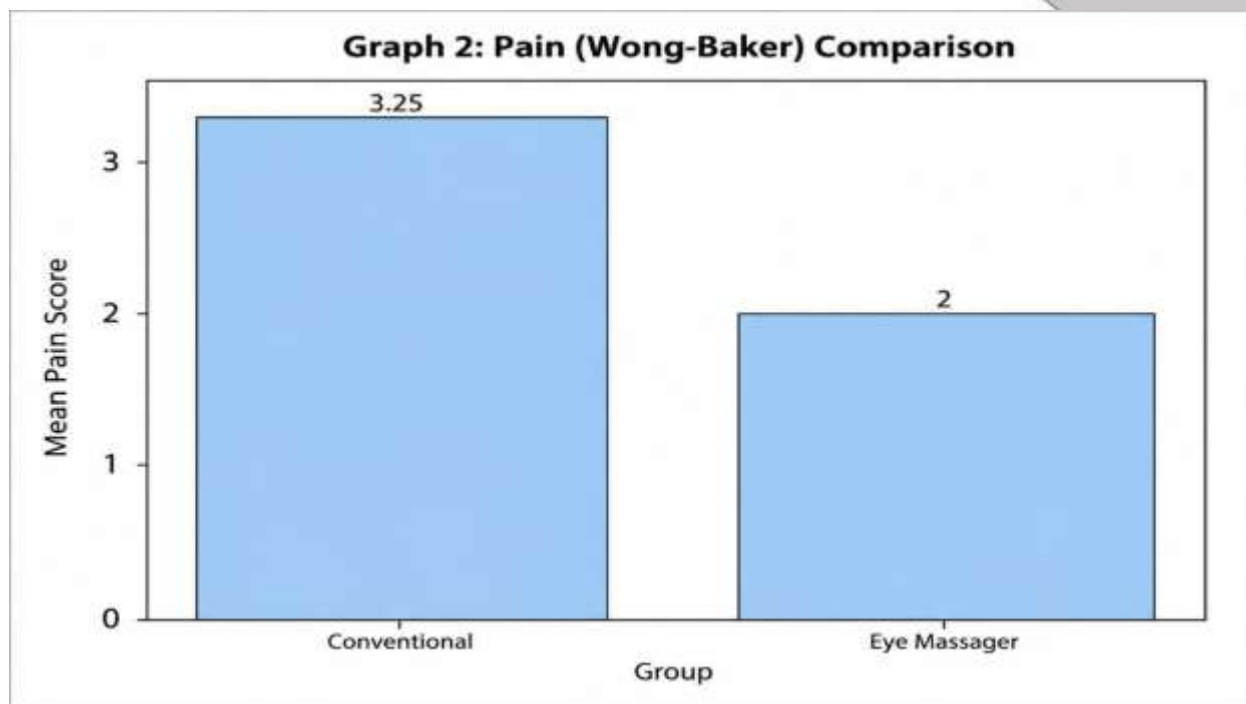
Time Point	Conventional (Mean ± SD)	Eye Massager (Mean ± SD)	Mean Difference ± SD	t value	p-value	Interpretation
Baseline	2.29 ± 1.04	1.63 ± 0.71	0.67 ± 1.17	2.80	0.0102	Significant
Final	2.63 ± 1.28	1.13 ± 0.34	1.50 ± 1.31	5.57	<0.0001	Highly Significant



GRAPH 1: Comparison of Anxiety level using Facial Image Scale

TABLE 2

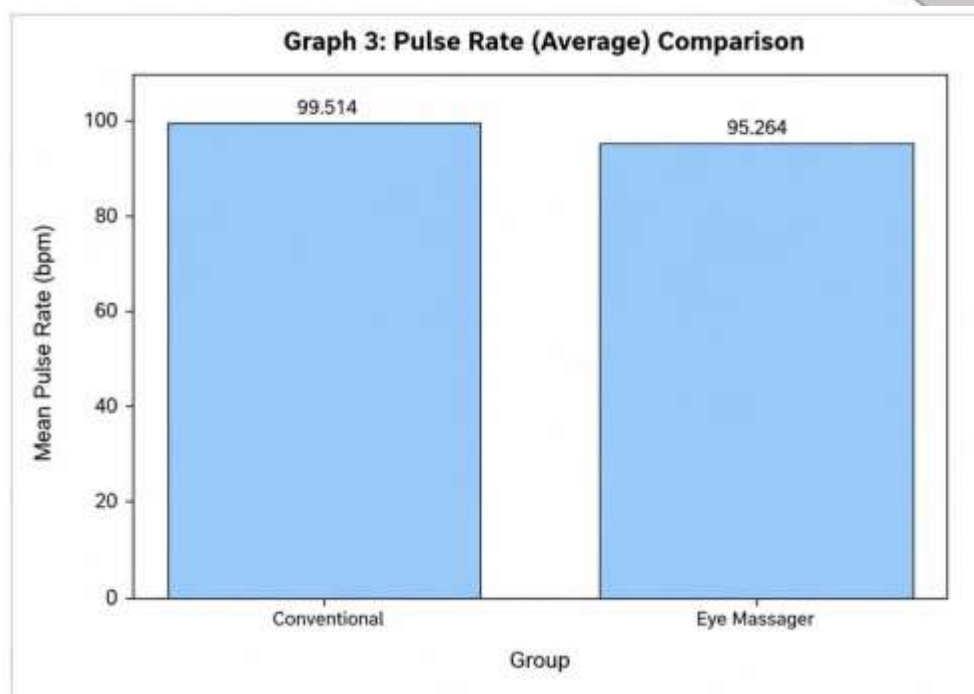
Parameter	Conventional (Mean ± SD)	Eye Massager (Mean ± SD)	Mean Difference ± SD	t value	p- value	Interpretation
Final WPS	3.25 ± 2.33	2.00 ± 1.53	1.25 ± 1.87	3.27	0.0033	Significant



GRAPH 2: Comparison of Pain using Wong Baker Pain Scale

TABLE 3

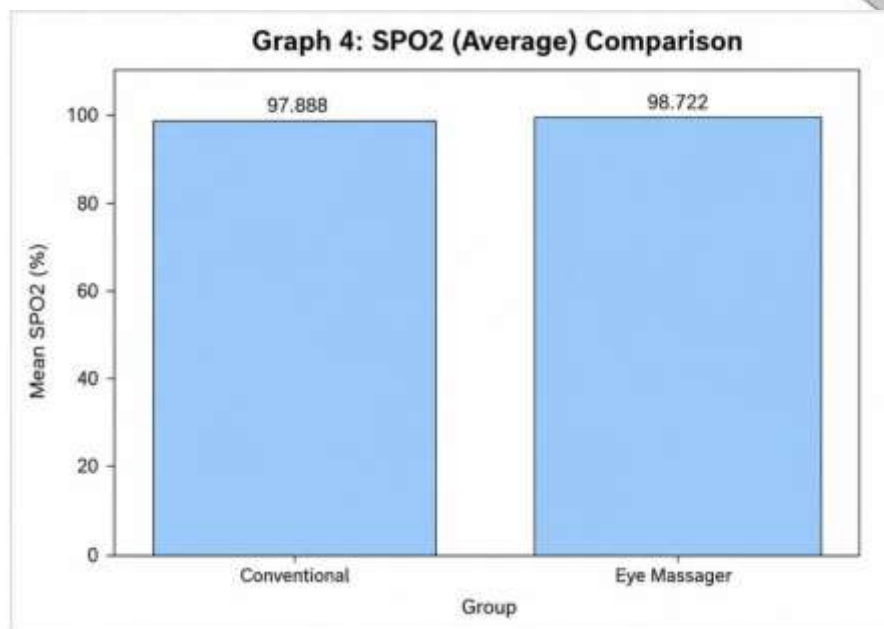
Time Point	Conventional (Mean ± SD)	Eye Massager (Mean ± SD)	Mean Difference ± SD	t value	p-value	Interpretation
Baseline	99.42 ± 12.33	89.92 ± 21.49	9.50 ± 19.42	2.40	0.0251	Significant
During LA	102.08 ± 14.71	98.83 ± 16.66	3.25 ± 16.37	0.97	0.3408	Not Significant
Final	97.04 ± 12.45	97.04 ± 15.10	0.00 ± 13.80	0.00	1.000	Not Significant



GRAPH 3: Comparison of Average Pulse rate on use of Conventional Technique vs Eye Massager

TABLE 4

Time Point	Conventional (Mean ± SD)	Eye Massager (Mean ± SD)	Mean Difference ± SD	t value	p-value	Interpretation
Baseline	98.33 ± 1.58	98.71 ± 0.86	-0.38 ± 1.74	-1.06	0.3020	Not Significant
During LA	98.00 ± 1.84	98.67 ± 0.92	-0.67 ± 1.81	-1.80	0.0842	Not Significant
Final	97.33 ± 5.93	98.79 ± 0.59	-1.46 ± 5.95	-1.20	0.2420	Not Significant



GRAPH 4: Comparison of SPO2 on use of Conventional Technique vs Eye Massager

RESULTS

A total of 24 children completed both intervention phases of the crossover trial. All participants were included in the final analysis.

Anxiety Assessment (Facial Image Scale) (Table 1, Graph 1)

Baseline FIS scores demonstrated a statistically significant difference between the two visits. The mean baseline anxiety score in the Conventional (Tell–Show–Do) condition was 2.29 ± 1.04 , compared to 1.63 ± 0.71 in the Eye Massage condition (mean difference = 0.67 ± 1.17 ; $t = 2.80$; $p = 0.0102$).

Following inferior alveolar nerve block administration, anxiety levels were significantly reduced under the Eye Massage condition. The mean final FIS score was 2.63 ± 1.28 in the Conventional group and 1.13 ± 0.34 in the Eye Massage group (mean difference = 1.50 ± 1.31 ; $t = 5.57$; $p < 0.0001$). This indicates a highly significant reduction in procedural anxiety when eye massage therapy was employed.

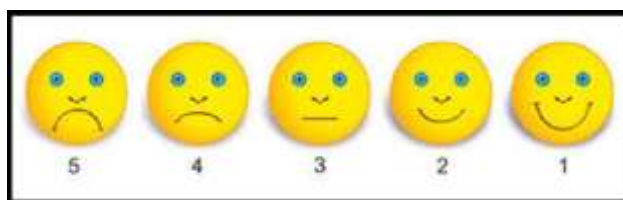


Figure 7: Depiction of the Facial Image Scale used by the patient

Pain Assessment (Wong–Baker Pain Scale) (Table 2, Graph 2)

Pain perception following local anesthetic administration was significantly lower in the Eye Massage condition. The mean pain score in the Conventional group was 3.25 ± 2.33 , whereas the Eye Massage group demonstrated a mean score of 2.00 ± 1.53 (mean difference = 1.25 ± 1.87 ; $t = 3.27$; $p = 0.0033$). These findings indicate a statistically significant reduction in perceived pain associated with the use of eye massage therapy.



Figure 8: Depiction of the Wong-Baker FACES Pain Rating Scale used by the patient

Pulse Rate Table (3, Graph 3)

- At baseline, pulse rate was significantly higher during the Conventional visit (99.42 ± 12.33 bpm) compared to the Eye Massage visit (89.92 ± 21.49 bpm) (mean difference = 9.50 ± 19.42 ; $t = 2.40$; $p = 0.0251$).
- During needle penetration, the mean pulse rate was 102.08 ± 14.71 bpm in the Conventional condition and 98.83 ± 16.66 bpm in the Eye Massage condition. The difference was not statistically significant (mean difference = 3.25 ± 16.37 ; $t = 0.97$; $p = 0.3408$).
- Post-procedure pulse rate values were identical between the two conditions (97.04 ± 12.45 bpm in Conventional vs 97.04 ± 15.10 bpm in Eye Massage), with no statistically significant difference observed (mean difference = 0.00 ± 13.80 ; $t = 0.00$; $p = 1.000$).

Oxygen Saturation (SpO₂) (Table 4, Graph 4)

Baseline oxygen saturation levels did not differ significantly between conditions ($98.33 \pm 1.58\%$ in Conventional vs $98.71 \pm 0.86\%$ in Eye Massage; $p = 0.3020$).

Similarly, no statistically significant differences were observed during needle penetration ($p = 0.0842$) or post-procedure ($p = 0.2420$). Oxygen saturation values remained within physiological limits throughout all time points in both conditions.

Summary of Findings

The use of periorbital eye massage therapy resulted in:

- A highly significant reduction in anxiety following IANB administration
- A statistically significant reduction in perceived pain
- No adverse alterations in pulse rate during or after the procedure
- No significant changes in oxygen saturation at any time point

These findings indicate that eye massage therapy effectively reduces psychological distress during inferior alveolar nerve block administration without compromising physiological stability.

DISCUSSION:

Effective management of anxiety and pain during inferior alveolar nerve block (IANB) administration remains a fundamental concern in pediatric dentistry. The present randomized crossover clinical trial was undertaken to evaluate the effectiveness of periorbital eye massage therapy as a passive distraction technique in comparison with

the conventional Tell–Show–Do (TSD) method. The findings of the study demonstrated that eye massage therapy significantly reduced both anxiety and pain perception without producing adverse physiological changes.

Anxiety Reduction

The most significant finding of the present study was the marked reduction in post-procedural anxiety observed in the eye massage group. Dental anxiety in children is a multifactorial phenomenon influenced by previous experiences, cognitive development, and environmental factors.^{8–10} Children often exhibit heightened anticipatory fear, particularly in relation to invasive procedures such as local anesthetic injections.^{10, 21}

The reduction in anxiety seen in the present study is consistent with previous literature emphasizing the role of distraction techniques in pediatric dental settings. Systematic reviews by Prado et al. and Liu et al. have demonstrated that distraction significantly reduces anxiety and improves behavior during dental procedures.^{15, 22} Similarly, randomized clinical trials by Shekhar et al., Nuvvula et al., and Aminabadi et al. have reported reduced anxiety levels with audiovisual and virtual reality-based distraction techniques.^{16, 23, 24}

One of the key mechanisms underlying the effectiveness of the eye massage device may be the elimination of visual stimuli associated with dental fear. Visual exposure to the syringe has been identified as a major trigger for anxiety in children.⁸ The periorbital eye massager occludes the visual field, thereby preventing the child from anticipating the injection. Comparable results have been reported with audiovisual distraction devices, which similarly divert visual attention away from the operative field.^{25, 26}

In addition, the tactile stimulation provided by the device may contribute to relaxation. Massage-based interventions have been shown to reduce sympathetic activity and promote a calming effect in anxious individuals.¹² The rhythmic vibration and compression produced by the eye massager may therefore modulate sensory input and reduce psychological stress.²⁷

The findings of the present study are also supported by recent investigations specifically evaluating eye massage devices. Gala and Kalaskar demonstrated that periorbital eye massagers significantly reduced dental anxiety in children and were comparable to virtual reality systems.¹⁸ Abed et al. further reported that combining eye massage with sensory inputs resulted in significant reductions in both anxiety and pain.¹⁹

Although minor variations in baseline anxiety were observed between visits, this is a recognized limitation in pediatric behavioral studies due to fluctuating emotional states.⁴ The crossover design adopted in the present study effectively minimized inter-individual variability, allowing each child to serve as their own control and strengthening the validity of the findings.⁵

Pain Perception

Pain perception in children is influenced not only by nociceptive stimuli but also by psychological factors such as anxiety and attention.^{6, 9} The present study demonstrated a statistically significant reduction in pain scores in the eye massage group.

The observed reduction in pain may be explained by the gate control theory of pain, which proposes that non-noxious stimuli can inhibit the transmission of pain signals.¹¹ The mechanical stimulation provided by the eye massager may have contributed to this modulation of nociceptive pathways.

In addition, distraction techniques are known to reduce cognitive attention directed toward painful stimuli. Studies by Aminabadi et al., Peretz and Gluck, and Padminee et al. have shown that distraction significantly reduces pain perception during dental injections.^{28, 29, 30}

Clinical trials specifically evaluating IANB have also reported similar findings. Aditya et al. demonstrated that distraction techniques significantly reduced anxiety and pain during inferior alveolar nerve block administration.³¹ Nagpal et al. further reported that combined distraction methods resulted in lower pain perception scores.³²

Other distraction modalities such as music therapy, video games, and audiovisual systems have also shown beneficial effects in reducing pain and anxiety.^{33, 34, 35} These findings collectively support the results of the present study and highlight the importance of attention modulation in pain management.

Physiological Parameters

Physiological parameters such as pulse rate and oxygen saturation were used as objective indicators of anxiety^{36,37}. Although baseline pulse rate differences were observed, no significant differences were noted during or after the procedure.

This finding is consistent with previous studies that have reported stable physiological parameters during the use of distraction techniques.^{21,38} Changes in pulse rate at baseline may be attributed to anticipatory anxiety, which varies depending on the child's psychological state.⁴

Oxygen saturation remained stable throughout the procedure, indicating that the intervention is safe and does not interfere with systemic physiological function. These findings support the use of eye massage therapy as a non-invasive and physiologically safe behavior management technique.

Clinical Implications

Effective behavior management is essential for successful pediatric dental care. Anxiety and pain during dental procedures can lead to poor cooperation, increased treatment time, and long-term avoidance of dental care.^{8,16}

The findings of the present study suggest that eye massage therapy can serve as an effective adjunct to conventional behavior guidance techniques such as Tell–Show–Do. While TSD remains a fundamental technique recommended by the AAPD, it may not be sufficient for managing anxiety during invasive procedures.¹⁴

Compared to pharmacological approaches, eye massage therapy offers several advantages, including safety, ease of use, and cost-effectiveness.¹³ In contrast to advanced distraction techniques such as virtual reality, which require specialized equipment and training, eye massage therapy is simple and easily integrated into routine clinical practice.^{26,39}

Strengths and Limitations

The crossover design is a major strength of the present study, as it minimizes inter-individual variability and improves statistical reliability.⁵ The use of validated scales such as the Facial Image Scale and Wong–Baker Pain Scale further enhances the credibility of the findings.^{40,7}

However, certain limitations must be acknowledged. The sample size was relatively small, and the findings may not be generalizable to all populations. Additionally, psychological variability among children cannot be completely controlled.⁸

Future research should include larger sample sizes, different age groups, and comparisons with other distraction techniques to further validate these findings.

Overall Interpretation

Within the limitations of the present study, periorbital eye massage therapy was found to be effective in reducing anxiety and pain during inferior alveolar nerve block administration in children. The intervention was safe, non-invasive, and clinically feasible, supporting its use as an adjunct to conventional behavior management strategies.

CONCLUSION:

Within the limitations of the present randomized crossover clinical trial, periorbital eye massage therapy demonstrated significant effectiveness in reducing both anxiety and pain perception during inferior alveolar nerve block administration in children aged 7–12 years.

The intervention resulted in a statistically significant reduction in post-procedural anxiety and pain scores when compared with the conventional Tell–Show–Do technique. The findings are consistent with existing literature supporting the role of distraction techniques in pediatric dentistry.

Physiological parameters such as pulse rate and oxygen saturation remained stable, confirming the safety of the intervention.

Periorbital eye massage therapy represents a simple, non-invasive, and cost-effective adjunct to conventional behavior guidance techniques. Its incorporation into routine pediatric dental practice may improve patient cooperation, reduce procedural distress, and contribute to more positive dental experiences in children.

References:

1. Balic A. Biology Explaining Tooth Repair and Regeneration: A Mini-Review. *Gerontology*. 2018;64(4):382-388.
2. Nascimento MM, Gordan VV, Qvist V, Litaker MS, Rindal DB, Williams OD, et al. Reasons for placement of restorations on previously unrestored tooth surfaces by dentists in The Dental Practice-Based Research Network. *J Am Dent Assoc*. 2010;141(4):441-448.
3. Jingarwar MM, Bajwa NK, Pathak A. Minimal intervention dentistry - a new frontier in clinical dentistry. *J Clin Diagn Res*. 2014;8(7):ZE04-ZE08.
4. Raja SN, Carr DB, Cohen M, Finnerup NB, Flor H, Gibson S, et al. The revised International Association for the Study of Pain definition of pain: concepts, challenges, and compromises. *Pain*. 2020;161(9):1976-1982.
5. American Academy of Pediatric Dentistry. Use of Local Anesthesia for Pediatric Dental Patients. In: *The Reference Manual of Pediatric Dentistry*. Chicago, Ill: AAPD; current best practices document.
6. Tong H, Maloney TC, Payne MF, King CD, Ting TV, Kashikar-Zuck S, et al. Processing of pain by the developing brain: evidence of differences between adolescent and adult females. *Pain*. 2022;163(9):1777-1789.
7. Wong DL, Baker CM. Pain in children: comparison of assessment scales. *Pediatr Nurs*. 1988;14(1):9-17.
8. Klingberg G, Broberg AG. Dental fear/anxiety and dental behaviour management problems in children and adolescents: a review of prevalence and concomitant psychological factors. *Int J Paediatr Dent*. 2007;17(6):391-406.
9. Appukuttan DP. Strategies to manage patients with dental anxiety and dental phobia: literature review. *Clin Cosmet Investig Dent*. 2016;8:35-50.
10. Schmoedel J, Santamaria RM, Basner R, et al. Pain perception during injection of local anesthesia in pediatric dental patients with comorbidities or disabilities. *Clin Oral Investig*. 2021;25:5501-5510.
11. Sharma A, Suprabha BS, Shenoy R, Rao A. Cardiovascular changes due to dental anxiety during local anesthesia injection in healthy subjects: a clinical study. *J Conserv Dent*. 2018;21(4):411-414.
12. Brizuela M, Mohamed A, Lubin MF. Inferior Alveolar Nerve Block. In: *StatPearls*. Treasure Island (FL): StatPearls Publishing; updated regularly.
13. Randall CL, Gagnon G, Dudley J, et al. Pediatric dentists' use of nonpharmacological behavior guidance techniques: a cross-sectional study. *Pediatr Dent*. 2023;45(5):394-401.
14. American Academy of Pediatric Dentistry. Behavior Guidance for the Pediatric Dental Patient. In: *The Reference Manual of Pediatric Dentistry*. Chicago, Ill: AAPD; current best practices document.
15. Prado IM, Carcavalli L, Abreu LG, Serra-Negra JM, Paiva SM, Martins CC. Use of distraction techniques for the management of anxiety and fear in paediatric dental practice: a systematic review of randomized controlled trials. *Int J Paediatr Dent*. 2019;29(5):650-668.
16. Shekhar S, Suprabha BS, Shenoy R, Rao A. Effect of active and passive distraction techniques while administering local anaesthesia on the dental anxiety, behaviour and pain levels of children: a randomised controlled trial. *Eur Arch Paediatr Dent*. 2022;23(3):417-427.
17. Yan X, Chen J, Yu D, Deng K, Huang F, Huo Y. Effectiveness of virtual reality distraction interventions to reduce dental anxiety in paediatric patients: a systematic review and meta-analysis. *J Dent*. 2023;133:104515.
18. Gala UP, Kalaskar R. Comparative evaluation of the effectiveness of innovative periorbital eye massager and virtual reality eyeglasses for reducing dental anxiety during dental restorative procedures in children. *Int J Clin Pediatr Dent*. 2024;17(1):48-53.
19. Abed D, Bchara J, Abed D, Alfeel J, Bshara N. Reducing children's anxiety and pain in dental environment

- using an eye massage device combined with natural sounds: a randomized controlled trial. *Sci Rep*. 2025;15(1):1678.
20. Tirupathi S, Krishna N, Rajasekhar S, Nuvvula S. Eye Movement Distraction: A New Distraction Technique for Management of Dental Anxiety during Intraoral Local Anesthesia Administration in Children. *Int J Clin Pediatr Dent*. 2019;12(6):507-509.
 21. Rayen R, Muthu MS, Chandrasekhar Rao R, Sivakumar N. Evaluation of physiological and behavioral measures in relation to dental anxiety during sequential dental visits in children. *Indian J Dent Res*. 2006;17(1):27-34.
 22. Liu Y, Gu Z, Wang Y, Wu Q, Chen V, Xu X, et al. Effect of audiovisual distraction on the management of anxious pediatric dental patients: a systematic review. *Int J Paediatr Dent*. 2019;29(1):14-21
 23. Nuvvula S, Alahari S, Kamatham R, Challa RR. Effect of audiovisual distraction with 3D video glasses on dental anxiety of children experiencing administration of local analgesia: a randomised clinical trial. *Eur Arch Paediatr Dent*. 2015;16(1):43-50.
 24. Aminabadi NA, Erfanparast L, Sohrabi A, Oskouei SG, Naghili A. The impact of virtual reality distraction on pain and anxiety during dental treatment in 4-6-year-old children: a randomized controlled clinical trial. *J Dent Res Dent Clin Dent Prospects*. 2012;6(4):117-124.
 25. Felemban OM, Alshamrani RM, Aljeddawi DH, Bagher SM. Effect of virtual reality distraction on pain and anxiety during infiltration anesthesia in pediatric patients: a randomized clinical trial. *BMC Oral Health*. 2021;21(1):321.
 26. Custódio NB, Costa FDS, Cademartori MG, da Costa VPP, Goettems ML. Effectiveness of virtual reality glasses as a distraction for children during dental care: a systematic review. *Pediatr Dent*. 2020;42(2):93-102.
 27. Monteiro J, Tanday A, Ashley PF, Parekh S, Alamri H. Interventions for increasing acceptance of local anaesthetic in children and adolescents having dental treatment. *Cochrane Database Syst Rev*. 2020;2(2):CD011024.
 28. Padminee K, Hemalatha R, Shankar P, Senthil D, Jayakaran TG, Kabita S. Effectiveness of biofeedback relaxation and audio-visual distraction on dental anxiety among 7- to 12-year-old children while administering local anaesthesia: a randomized clinical trial. *Int J Paediatr Dent*. 2022;32(1):31-40.
 29. Peretz B, Gluck GM. Assessing an active distracting technique for local anesthetic injection in pediatric dental patients: repeated deep breathing and blowing out air. *J Clin Pediatr Dent*. 1999;24(1):5-8.
 30. Aminabadi NA, Farahani RMZ. The efficacy of distraction and counterstimulation in the reduction of pain reaction to intraoral injection by pediatric patients. *J Contemp Dent Pract*. 2008;9(6):33-40.
 31. Aditya PVA, Nuvvula S, Kamatham R, Nirmala SVSG. Comparison of effectiveness of three distraction techniques to allay dental anxiety during inferior alveolar nerve block in children: a randomized controlled clinical trial. *Heliyon*. 2021;7(9):e08092.
 32. Nagpal D, Amlani DV, Rathi P, Hotwani K, Singh P, Lamba G. Effect of audio distraction with thermomechanical stimulation on pain perception for inferior alveolar nerve block in children: a randomized clinical trial. *J Dent Anesth Pain Med*. 2023;23(6):327-335.
 33. Kharouba J, Peretz B, Blumer S. The effect of television distraction versus Tell-Show-Do as behavioral management techniques in children undergoing dental treatments. *Quintessence Int*. 2020;51(6):486-494.
 34. Ega S, Nuvvula S, Mallineni SK. Influence of parent-provided distraction and interactive distraction with a handheld video game on the child's responses during local anesthesia administration. *J Indian Soc Pedod Prev Dent*. 2020;38(4):413-418.
 35. Aitken JC, Wilson S, Coury D, Moursi AM. The effect of music distraction on pain, anxiety and behavior in pediatric dental patients. *Pediatr Dent*. 2002;24(2):114-118.
 36. McDonald RE, Avery DR, Dean JA. *Dentistry for the Child and Adolescent*. 10th ed. St. Louis: Mosby Elsevier; 2016.

37. Pisano M, Di Spirito F, Sangiovanni G, et al. The use of audiovisual distraction tools in the dental management of pediatric patients: a narrative review. *Children (Basel)*. 2024;11(9):1077.
38. Al-Khotani A, Bello LA, Christidis N. Effects of audiovisual distraction on children's behaviour during dental treatment: a randomized controlled clinical trial. *Acta Odontol Scand*. 2016;74(6):494-501.
39. Chen J, Deng K, Yu D, Fan C, Liu L, Gu H, et al. Recent developments in the non-pharmacological management of children's behavior based on distraction techniques: a concise review. *Healthcare (Basel)*. 2024;12(19):1940.
40. Buchanan H, Niven N. Validation of a Facial Image Scale to assess child dental anxiety. *Int J Paediatr Dent*. 2002;12(1):47-52