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Effect of Diphenhydramine Mouthwash on Pain during Inferior Alveolar Nerve Block Injection

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ABSTRACT

Introduction: Pain management in dental procedures is a central concern, as discomfort during local anesthesia injections often reduces patient compliance and increases procedural anxiety. The inferior alveolar nerve block (IANB) is a commonly employed technique for mandibular anesthesia but is frequently associated with injection pain. Diphenhydramine, an antihistamine with local anesthetic properties, has recently gained attention as a topical analgesic agent. However, evidence on its clinical efficacy in reducing injection pain during IANB is limited. This study aimed to evaluate the effect of diphenhydramine mouthwash on pain perception during inferior alveolar nerve block injection in patients undergoing oral surgical procedures.

Materials and Methods: In this randomized clinical trial, 39 patients requiring bilateral IANB at the Faculty of Dentistry, Alborz University of Medical Sciences (2024), were enrolled. Using a split-mouth design, one side of the mandible was randomly assigned to rinsing with 15 mL diphenhydramine mouthwash for 30 seconds, while the contralateral side was rinsed with normal saline. Pain intensity during injection was assessed 5 minutes after rinsing using a 10-point Visual Analogue Scale (VAS). Statistical analysis was performed using paired t-tests, with significance set at $p < 0.05$.

Results: The mean VAS pain score was significantly lower in the diphenhydramine group (3.31±0.86) compared to the control group (4.92±0.84) ($p < 0.001$). The analgesic effect was consistent across age groups (19–79 years), genders, and different types of surgical procedures (tooth extraction, implant placement).

Conclusion: Diphenhydramine mouthwash effectively reduced pain during IANB injection and may serve as a simple, low-cost adjunct to improve patient comfort in oral surgery. Future studies should focus on optimizing dosing protocols and confirming long-term clinical benefits.

Keywords: Diphenhydramine mouthwash; Inferior alveolar nerve block; Local anesthesia; Pain management; Clinical trial.

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Introduction

Pain control remains one of the most critical aspects of dental practice, as anxiety and discomfort during procedures significantly affect patient cooperation and treatment outcomes. Among the various sources of pain in dentistry, injection of local anesthetics continues to be a major source of patient fear and dissatisfaction. Despite advances in local anesthesia techniques and pharmacological agents, the administration of inferior alveolar nerve block (IANB) in the mandible is still associated with notable discomfort, primarily due to needle insertion and deposition of the anesthetic solution [1]. Local anesthesia is indispensable in dentistry, providing temporary loss of sensation and allowing clinicians to perform invasive procedures with minimal patient distress. Typically, topical anesthetics such as lidocaine or benzocaine gels are applied prior to injection to minimize needle-related pain. However, their effect is often insufficient to eliminate discomfort, particularly during deep injections such as IANB [2,3]. The anatomical features of the mandible—including denser cortical bone and limited access to the inferior alveolar nerve trunk—reduce the success rates of anesthesia compared with maxillary injections, thereby heightening the need for adjunctive pain control strategies [4].

Diphenhydramine, an H1-receptor antagonist primarily used as an antihistamine, has also demonstrated local anesthetic properties by blocking sodium channels in neuronal membranes [5,6]. Owing to this mechanism, diphenhydramine has been used in various topical formulations for the relief of mucosal pain, as well as in situations where patients exhibit hypersensitivity to conventional local anesthetics [7]. When compounded into an elixir or suspension with carriers such as aluminum and magnesium hydroxide, diphenhydramine demonstrates improved adherence to the oral mucosa and prolonged anesthetic effects [8]. Despite its long history of safe use and favorable pharmacological profile, evidence supporting its application as a pre-injection rinse in dentistry remains scarce. Despite the availability of various topical anesthetics, their limitations are well documented. In the maxilla, infiltration techniques combined with surface anesthetics generally achieve high success rates, with more than 95% of cases resulting in adequate anesthesia [9]. Conversely, in the mandible, the success of IANB is considerably lower, reported to be approximately 80–85% [10]. The reduced efficacy arises from anatomical barriers such as the thick cortical plate of the mandibular alveolar bone and anatomical variations in the inferior alveolar nerve, both of which complicate needle placement and anesthetic diffusion [11]. These limitations not only affect the predictability of anesthesia but also expose patients to repeated injections, prolonged discomfort, and heightened procedural anxiety. In this context, pre-injection mouth rinses have gained attention as adjuncts to improve patient comfort. Agents such as benzidamine hydrochloride, chlorhexidine, and benzocaine-based rinses have been studied for their analgesic or anti-inflammatory properties, but results remain inconsistent [12–14]. Diphenhydramine, with its dual role as an antihistamine and a sodium-channel blocker, stands out as a promising alternative. Its additional anti-inflammatory and mucosal protective effects may further contribute to reducing pain perception during needle insertion [15,16]. Yet, few clinical trials have systematically evaluated its role as a pre-injection rinse, particularly in IANB procedures. The rationale for this study lies in addressing the persistent problem of pain during mandibular block anesthesia and exploring whether diphenhydramine mouthwash could serve as a practical, low-cost, and readily available solution. By investigating its analgesic efficacy, this research aims to expand the scope of non-invasive strategies for dental pain control, potentially improving both the quality of care and patient compliance.

Objectives of the Study

The primary objective of this clinical trial was to determine the effect of diphenhydramine mouthwash on pain perception during inferior alveolar nerve block injection. Specifically, the study sought to:

1. Assess mean pain scores during IANB injection on the side rinsed with diphenhydramine.

2. Compare these scores with those obtained from the contralateral side rinsed with normal saline.

3. Evaluate whether diphenhydramine mouthwash provided consistent analgesic benefits across different age groups, genders, and surgical procedures.

Through these aims, the study intends to contribute new clinical evidence to the field of dental anesthesia, bridging a gap in the literature and supporting the development of patient-centered strategies for pain management.

Materials and Methods

Study Design

This investigation was designed as a randomized clinical trial conducted at the Faculty of Dentistry, Alborz

University of Medical Sciences, in 2024. The trial adopted a split-mouth design, a method frequently recommended in dental research to minimize interindividual variability by allowing each patient to serve as their own control [12,15]. Ethical approval was obtained from the Ethics Committee of Alborz University of Medical Sciences (IR.ABZUMS.REC.1403.344), and the trial was registered at the Iranian Registry of Clinical Trials (IRCT20250412065293N1). All participants provided written informed consent prior to enrollment, consistent with the Declaration of Helsinki [13].

Study Population

The study population comprised patients attending the Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Alborz University of Medical Sciences. Eligible patients were adults (≥ 18 years) requiring bilateral inferior alveolar nerve block (IANB) anesthesia for oral surgical procedures, including extraction of mandibular third molars, removal of residual roots, or implant placement.

Inclusion Criteria

Participants were required to meet the following conditions:

1. Age above 18 years.

2. Clinical indication for bilateral IANB in the mandibular arch.

3. Absence of any contraindication to lidocaine with epinephrine (standard anesthetic used for block injection).

4. No systemic illness or medication use that could interfere with pain perception or local anesthesia.

Exclusion Criteria

Patients were excluded if they had:

1. A history of systemic disease (e.g., cardiovascular, hepatic, or neurological disorders).

2. Known hypersensitivity to diphenhydramine, lidocaine, or related compounds.

3. Pregnancy or lactation.

4. Active oral infections at the intended site of injection.

These criteria were established in accordance with previous clinical trials assessing adjunctive strategies for IANB anesthesia [12,16].

Sampling and Randomization

A convenience sampling method was employed, and a total of 39 eligible patients were recruited. Based on the split-mouth design, each patient contributed two study sites (left and right mandibular quadrants), resulting in 78 observations overall. Sample size was calculated using the Cochran formula, incorporating data from Bendgude et al. (2019), which reported mean pain scores following topical anesthetic interventions (18). With a significance level of $\alpha = 0.05$, a power of 90% ($\beta = 0.10$), and an estimated standard deviation of 1.8, the minimum sample size was determined to be 35 patients. To account for potential dropouts, the final sample included 39 participants. Randomization of the intervention and control sides was performed using a simple coin toss method. For each patient, one side of the mandible was assigned to the diphenhydramine mouthwash group, and the contralateral side was assigned to the normal saline group. This allocation ensured balanced exposure to both interventions within each individual, thus controlling for inter-patient variability in pain perception [15].

Intervention Protocol

For the control side, patients rinsed with 15mL of 0.9% normal saline solution for 30 seconds. For the intervention side, patients rinsed with 15 mL of diphenhydramine mouthwash (containing diphenhydramine hydrochloride elixir compounded with aluminum hydroxide and magnesium hydroxide carriers to enhance mucosal adherence) for 30 seconds. These formulations were prepared under standardized pharmaceutical protocols, consistent with prior descriptions of diphenhydramine's local anesthetic properties [5,7,8]. Following rinsing, IANB was administered using 1.8 mL of 2% lidocaine with 1:100,000 epinephrine, delivered via a standard aspirating dental syringe with a 27-gauge long needle. The injections were performed by a single experienced oral surgeon to minimize operator-related variability. Pain intensity during the injection was assessed 5 minutes after rinsing on each side.

Outcome Measurement

The primary outcome was pain intensity during injection, measured using the Visual Analogue Scale (VAS), a validated tool widely used in clinical pain research [19]. Patients were instructed to mark their perceived pain on a 10 cm horizontal line anchored at "0 = no pain" and "10 = worst pain imaginable." The numerical score was recorded immediately after each injection.

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Demographic data, including age, gender, and type of surgical procedure, were also collected using a structured checklist. These variables were considered potential covariates influencing pain perception and were therefore included in the analysis [12,16].

Statistical Analysis

All data were entered into SPSS version 27.0 (IBM Corp., Armonk, NY, USA) for analysis. Continuous variables (e.g., age, VAS pain scores) were expressed as mean±standard deviation (SD), while categorical variables (e.g., gender, type of surgery) were reported as frequencies and percentages. Normality of data distribution was assessed using the Shapiro–Wilk test. As pain scores were normally distributed, the paired t-test was used to compare mean VAS scores between the diphenhydramine and saline groups within the same patient. Independent variables such as gender and type of surgical procedure were also explored in subgroup analyses using appropriate parametric tests. A significance level of $p < 0.05$ was adopted for all statistical comparisons [12,14]. The study's statistical framework mirrored previous trials assessing adjunctive anesthetic strategies, such as premedication or topical rinses, which have validated the use of paired comparisons for split-mouth designs [12,18].

Ethical Considerations

This study adhered to ethical principles outlined in the Declaration of Helsinki and received official approval from the Ethics Committee of Alborz University of Medical Sciences (IR.ABZUMS.REC.1403.344). The trial was prospectively registered in the Iranian Registry of Clinical Trials under the identifier IRCT20250412065293N1. All participants signed a written informed consent form after receiving verbal and written explanations of the study objectives, procedures, and potential risks. Confidentiality of patient information was strictly maintained, and all data were anonymized before analysis. Participation was voluntary, and patients retained the right to withdraw at any stage without affecting their treatment [13,15].

Variables and Data Collection

The following variables were systematically recorded:

- Independent Variable: Type of mouthwash (diphenhydramine vs. saline).
- Dependent Variable: Pain intensity during IANB injection, assessed using the VAS scale.
- Covariates: Age, gender, and type of surgery (implant placement, root extraction, or third molar extraction).

Pain scores were documented immediately after injection on each side, and demographic/surgical details were collected through structured clinical forms. This methodology is consistent with prior clinical studies assessing pain in dental injections [16,19].

Reliability and Validity of Pain Measurement

The Visual Analogue Scale (VAS) was selected due to its widespread acceptance as a reliable tool for subjective pain assessment in dental anesthesia research [19]. Patients were carefully instructed before the procedure to ensure they understood how to rate their pain on the scale. By using the same investigator to explain and record VAS scores, inter-observer variability was minimized.

Control of Confounding Factors

The split-mouth design inherently controlled for individual differences in pain threshold and anxiety, as each patient experienced both intervention and control conditions. Additionally, standardization of operator (single experienced surgeon), anesthetic agent (2% lidocaine with epinephrine), and injection technique reduced procedural variability [12,15]. To further mitigate bias, randomization of sides was performed using a coin toss. Patients and the operator were blinded to the type of rinse, as mouthwashes were prepared in identical unmarked containers by an independent pharmacist. This single-blind design ensured patient blinding and minimized expectation bias, although operator blinding to the rinsing solution was not feasible due to taste differences, which is a limitation acknowledged in similar clinical trials [18].

Sample Size Justification

Sample size estimation was performed based on effect sizes reported in Bendgude et al. (2019), who evaluated the efficacy of topical anesthetics in reducing injection pain among pediatric patients [18]. Using the standard deviation from that study (SD = 1.8), a clinically meaningful difference (δ) of 1.0 point on the VAS scale, $\alpha = 0.05$, and $\beta = 0.10$ (power = 90%), the calculated minimum sample size was 35 patients. To accommodate a 10% dropout rate, 39 patients were enrolled, consistent with recommendations for clinical dental research [12,18].

Summary of Methodological Framework

In summary, this study utilized a randomized, split-mouth clinical trial design with 39 participants under-

going bilateral IANB. Each patient rinsed with diphenhydramine mouthwash on one side and saline on the contralateral side prior to anesthetic injection. Pain intensity during injection was recorded using the VAS scale, and results were analyzed using paired t-tests. Ethical protocols and methodological rigor were maintained throughout, aligning with international standards for clinical trials in dentistry [13,15,19].

Results

Participant Characteristics

A total of 39 patients (78 injection sites) were enrolled and completed the study. The mean age of participants was 45.69±16.85 years (range: 19–79 years). The sample included 24 females (61.5%) and 15 males (38.5%). Surgical procedures performed included third molar extractions (46.2%), implant placements (33.3%), and residual root extractions (20.5%). Demographic and baseline surgical characteristics are summarized in Table 1.

Pain Scores: Descriptive Statistics

Pain during injection was assessed using the Visual Analogue Scale (VAS) at 5 minutes post-rinsing.

- Diphenhydramine mouthwash group: Mean pain score=3.31±0.86 (range: 1–5).
- Saline mouthwash group: Mean pain score=4.92±0.84 (range: 3–6).

The distribution of scores is illustrated in Figure 1, showing a clear downward shift in pain perception for the intervention side.

Normality Testing

The Shapiro–Wilk test confirmed normal distribution of pain scores in both groups ($p > 0.05$). Skewness and kurtosis values also fell within acceptable ranges (–2 to +2), validating the use of parametric statistical tests.

Comparative Analysis

A paired t-test revealed a statistically significant reduction in pain scores for the diphenhydramine group compared with the saline group ($t = 11.917$, $df = 38$, $p < 0.001$). The mean difference between groups was 1.61 points on the VAS, which is both statistically and clinically significant, as reductions greater than 1 point on a 10-point scale are generally considered meaningful in dental anesthesia studies [12,18].

Subgroup Analyses

By Gender

Both males and females experienced significant reductions in pain with diphenhydramine mouthwash compared with saline ($p < 0.001$). No significant interaction between gender and treatment effect was observed ($p > 0.05$) (Figure 2).

By Age Group

When stratified into three age categories (19–35, 36–50, 51–79 years), the analgesic effect of diphenhydramine was consistently observed across all groups. Paired comparisons demonstrated significant reductions in VAS scores for each subgroup ($p < 0.001$) (Figure 3).

By Surgical Procedure

The beneficial effect of diphenhydramine mouthwash was consistent across all types of oral surgery: third molar extraction, implant placement, and root extraction. The magnitude of pain reduction was slightly greater in patients undergoing third molar extraction (mean difference: 1.78 points) compared with implant placement (1.54 points) and root extraction (1.49 points), though these differences were not statistically significant ($p > 0.05$) (Figure 4).

Summary of Findings

1. Diphenhydramine mouthwash significantly reduced pain perception during IANB injection compared with saline.

2. The effect was consistent across age, gender, and type of surgery.

3. No adverse events or allergic reactions were reported, confirming the safety of diphenhydramine in this context.

These results corroborate findings from prior studies investigating adjunctive strategies for reducing injection pain in dentistry [12,18] and extend the evidence base to include diphenhydramine as a promising pre-injection rinse.

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Table 1. Baseline characteristics of participants (n = 39).

Variable	*n (%)*	*Mean±SD*	*Range*
Age (years)	-	*45.69±16.85*	*19-79*
Gender	*Female: 24 (61.5%)*	-	-
	Male: 15 (38.5%)	-	-
Surgical procedure	*Third molar extraction: 18 (46.2%)*	-	-
	Implant placement: 13 (33.3%)	-	-
	Root extraction: 8 (20.5%)	-	-

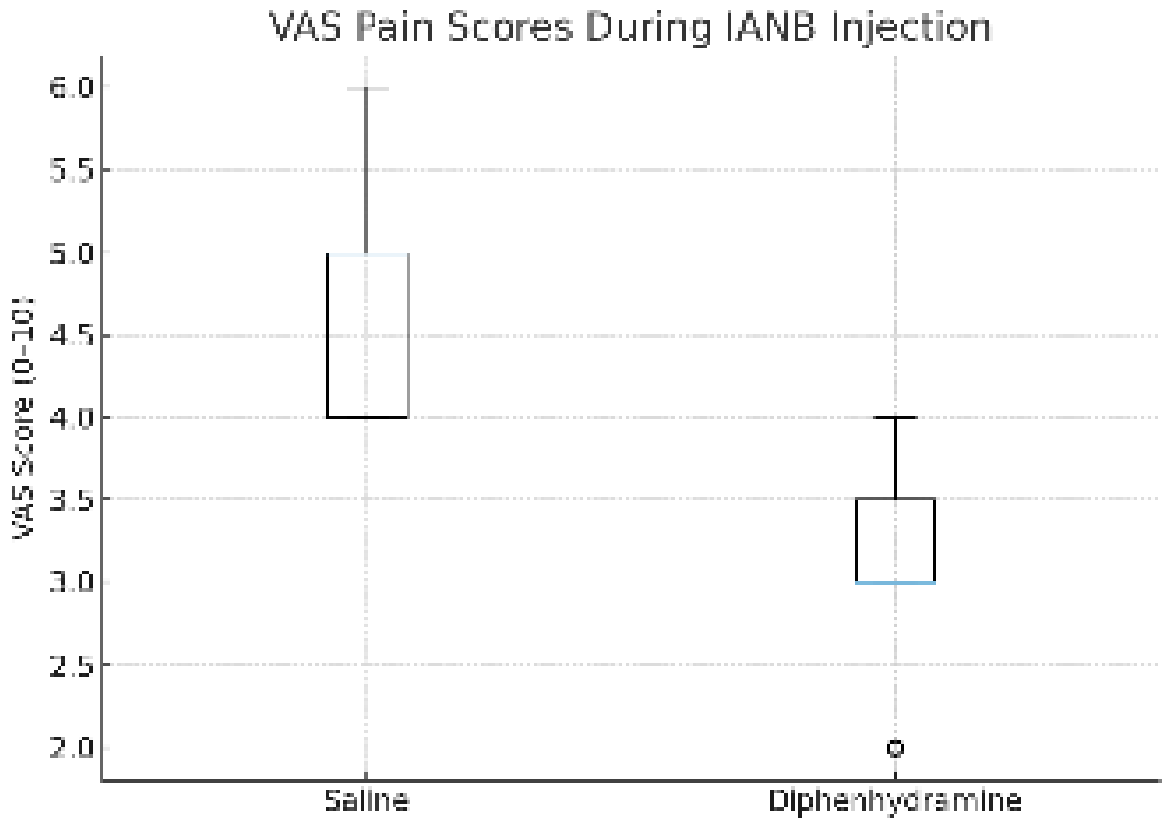


Figure 1. VAS pain scores during IANB injection.

Table 2. Comparison of VAS pain scores between groups (n = 39).

Group	*Mean±SD*	*Range*	*Mean Difference*	*t-value*	*p-value*
Saline (control)	*4.92±0.84*	*3-6*	-	-	-
Diphenhydramine (test)	*3.31±0.86*	*1-5*	*1.61*	*11.917*	*<0.001*

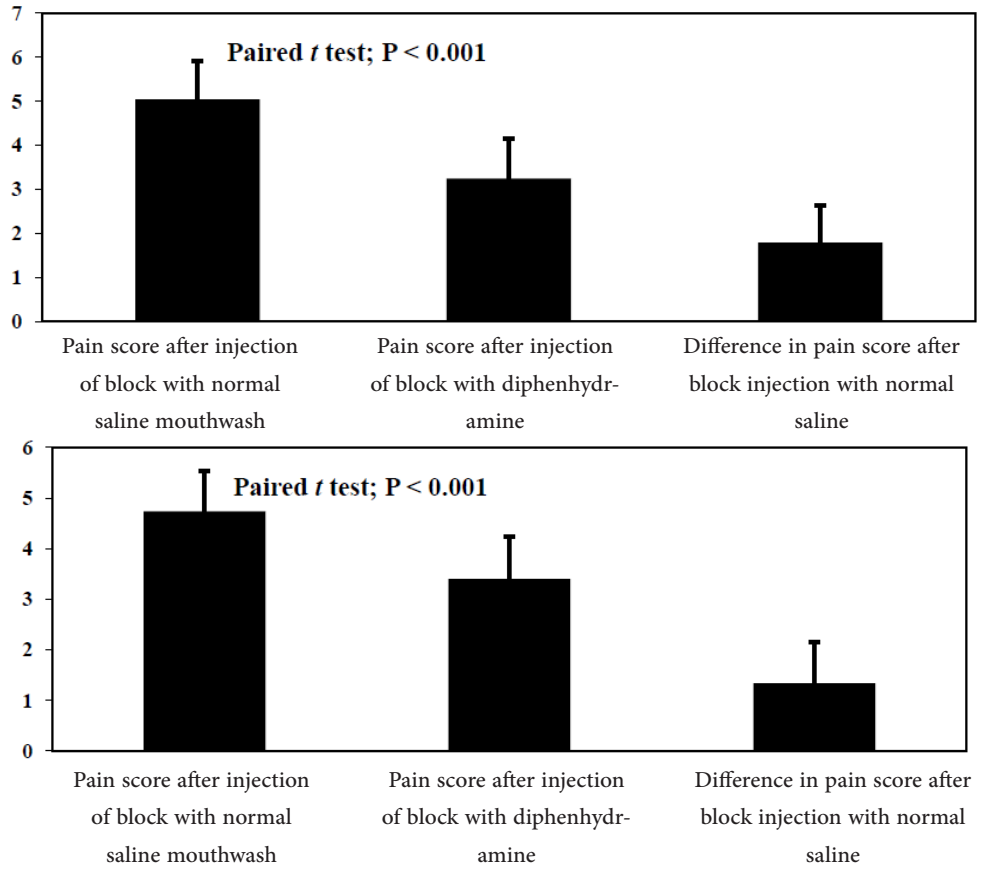
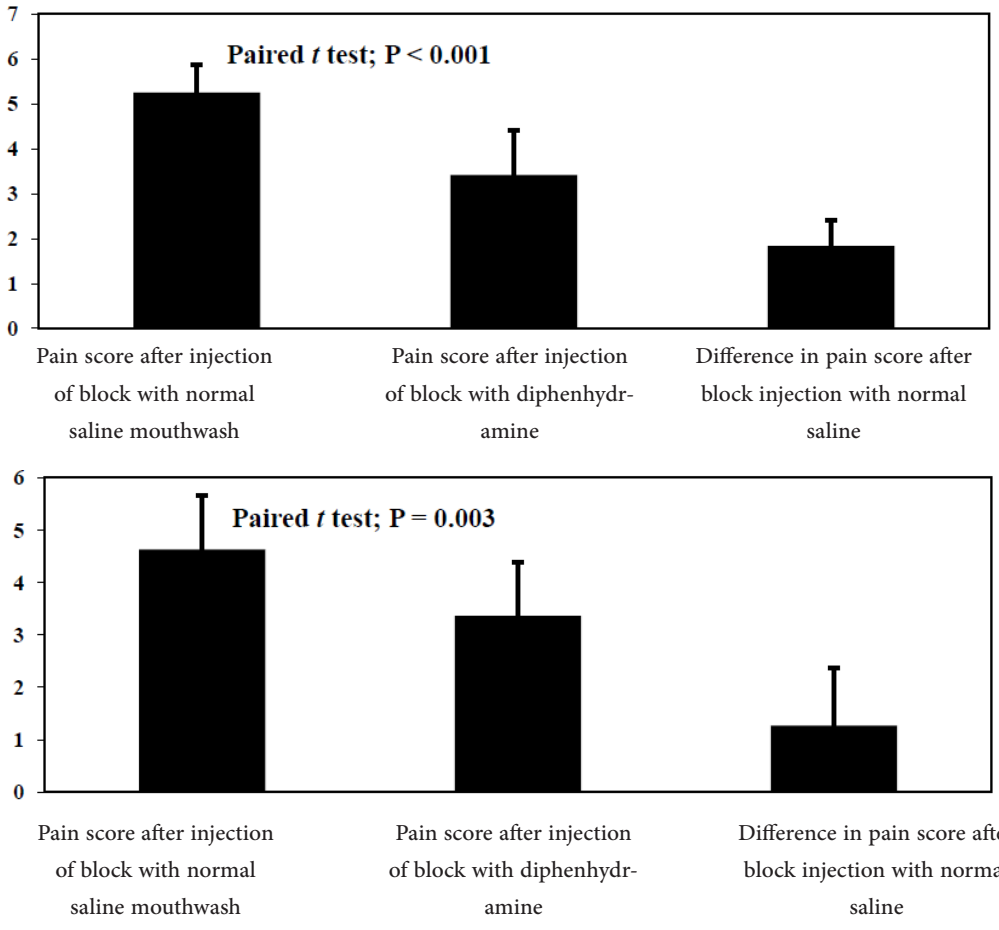


Figure 2. The effect of diphenhydramine mouthwash on the pain divided by gender A) female chart B) male chart.



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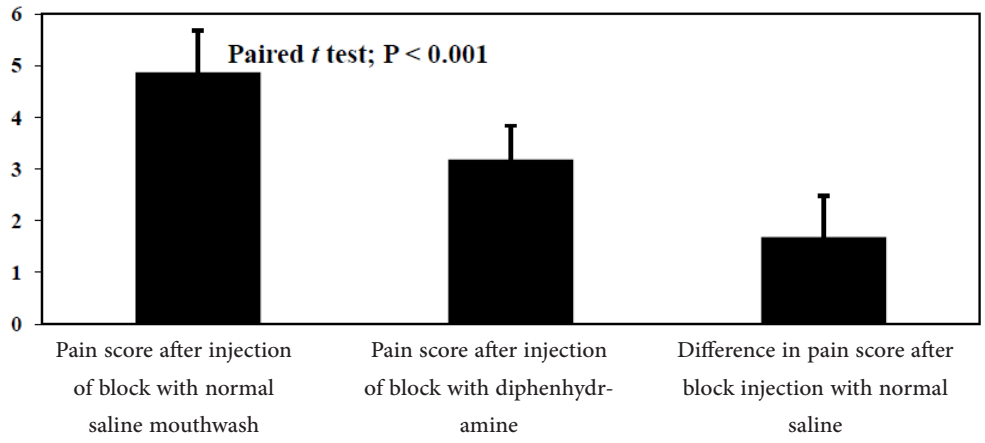

Figure 3. Comparison of the mean pain score 5 minutes after block injection with normal saline mouthwash and block injection with diphenhydramine mouthwash in patients referred by age group.

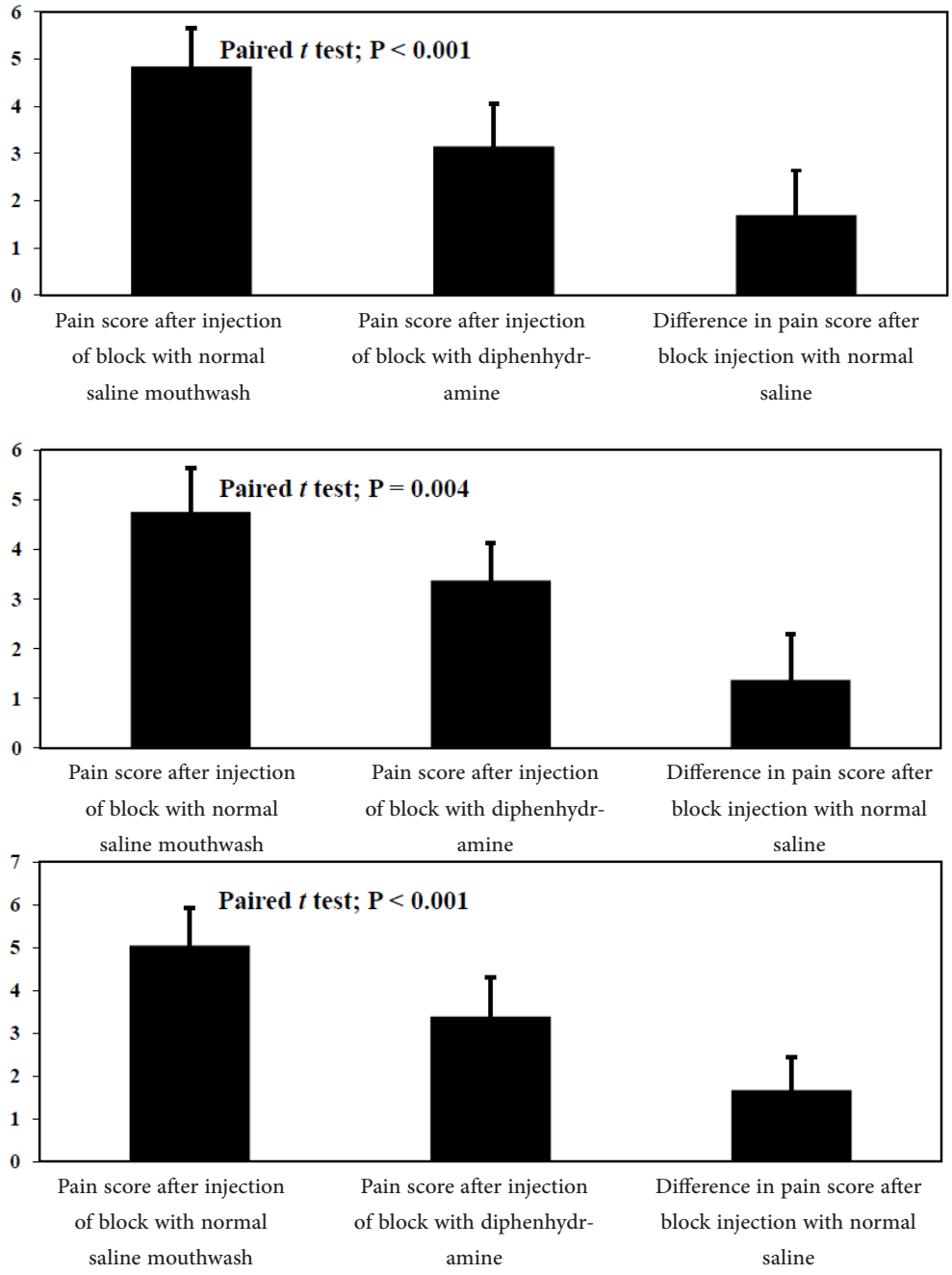

Figure 4. Comparison of the mean pain score 5 minutes after injection of a block with a mouthwash and a normal saline and injection of a block with a diphenhydramine mouthwash in patients referred by type of surgery.

Discussion

The present randomized clinical trial investigated the effect of diphenhydramine mouthwash on pain perception during inferior alveolar nerve block (IANB) injection. The results demonstrated that rinsing with diphenhydramine significantly reduced pain scores compared with saline, with a mean difference of 1.61 points on the Visual Analogue Scale (VAS). This reduction is both statistically and clinically meaningful, considering that even a one-point difference on the VAS is generally regarded as clinically significant in dental pain research [12,18].

Interpretation of Key Findings

Our findings support the hypothesis that diphenhydramine, when used as a pre-injection rinse, exerts local anesthetic effects that alleviate injection-related discomfort. The consistent analgesic benefit observed across all subgroups—age, gender, and type of surgical procedure—indicates that diphenhydramine may serve as a broadly applicable adjunct in clinical dental practice. Importantly, no adverse reactions were reported, aligning with the established safety profile of diphenhydramine when used topically [5,6,20]. The mechanism of action likely relates to the sodium channel blockade properties of diphenhydramine, which parallels the mode of action of conventional amide anesthetics such as lidocaine [5,7]. In addition, its anti-inflammatory and mucosal protective effects, mediated by histamine H1-receptor antagonism, may contribute to attenuating nociceptor sensitization at the injection site [23]. The use of aluminum hydroxide and magnesium hydroxide carriers in the rinse formulation may further enhance mucosal adherence and prolong the anesthetic effect [8].

Comparison with Previous Research

Pain during local anesthetic injection remains a common clinical challenge, particularly in the mandible, where dense cortical bone and anatomical variations reduce the predictability of anesthesia [9–11]. Numerous strategies have been proposed to reduce injection discomfort, including warming anesthetic solutions, buffering with sodium bicarbonate, and using alternative injection techniques such as Gow-Gates or Vazirani–Akinosi blocks [10,11,16]. While these methods have shown varying degrees of success, few are simple, low-cost, and easily implementable in routine practice. The current results align with earlier research exploring pre-injection rinses. For instance, St George et al. (2018) in a Cochrane review highlighted the inconsistent benefits of various topical anesthetics in improving patient comfort during injections [15]. Similarly, Bendgude et al. (2016) reported modest reductions in injection pain in children using topical anesthetics, but the effect was variable and often procedure-dependent [18]. Our findings suggest that diphenhydramine may offer a more reliable adjunct due to its dual pharmacological profile and enhanced mucosal retention. A particularly relevant comparison can be drawn with the study by Sio et al. (2019), which evaluated diphenhydramine–lidocaine–antacid mouthwash in managing radiotherapy-induced oral mucositis pain [20]. Although conducted in a different context, their results also confirmed the analgesic efficacy of diphenhydramine-based rinses, supporting the generalizability of its pain-relieving potential across oral settings.

Clinical Significance

From a clinical perspective, the observed reduction in injection pain has important implications for patient compliance and treatment acceptance. Dental anxiety and needle phobia remain prevalent barriers to care, often leading patients to delay or avoid necessary treatment [1,2]. By improving the comfort of injections, diphenhydramine mouthwash could contribute to reducing procedural anxiety and enhancing the overall patient experience. Moreover, the rinse is cost-effective, readily available, and easy to administer, making it a practical adjunct in everyday practice without requiring changes to existing anesthetic protocols. Another strength lies in the use of a split-mouth design, which minimized interindividual variability in pain perception and allowed robust within-subject comparisons [12,15]. This design strengthens the reliability of the observed effect size and underscores the consistency of diphenhydramine's analgesic benefit.

Limitations of the Study

While the findings of this trial are promising, several limitations must be acknowledged. First, the study employed a single-blind design, as patients were unaware of which rinse they received, but the operator could potentially identify the solutions due to differences in taste. Although the impact of this bias is likely minimal, a double-blind protocol would provide stronger evidence of efficacy [15,18]. Second, the sample size, although adequately powered to detect a clinically meaningful difference, was relatively modest (39 patients). While this was sufficient to demonstrate statistical significance, larger multicenter trials are necessary to confirm generalizability across diverse populations and clinical settings [12,18]. Third, the follow-up was

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limited to immediate pain perception during injection. Long-term outcomes, such as the duration of anesthesia, post-injection discomfort, or delayed adverse effects, were not evaluated. Future studies should incorporate longitudinal follow-up to determine whether diphenhydramine influences the overall anesthetic experience beyond the injection phase [20]. Finally, this study was conducted in a single academic center in Iran. Cultural and psychological factors influencing pain perception may vary across populations [2,13]. Replication in other settings would help validate the external applicability of these results.

Directions for Future Research

The promising analgesic effect of diphenhydramine mouthwash warrants further exploration in several areas:

1. Dose Optimization: Future studies should evaluate varying concentrations and volumes of diphenhydramine to identify the minimal effective dose and optimize the balance between efficacy and safety [23].

2. Combination Formulations: Investigating diphenhydramine in combination with other topical anesthetics (e.g., lidocaine or benzocaine) may provide additive or synergistic effects, as previously demonstrated in mucositis management [20].

3. Broader Applications: Beyond IANB, diphenhydramine mouthwash could be tested in other dental contexts, such as periodontal therapy, restorative procedures, or pediatric dentistry, where patient comfort is especially critical [17–19].

4. Mechanistic Studies: Further research is required to elucidate the precise mechanisms of action of diphenhydramine in oral tissues, including its potential anti-inflammatory effects and interaction with nociceptor pathways [5,23].

Integration into Clinical Practice

From a practical standpoint, diphenhydramine mouthwash represents a low-cost, easily accessible, and safe adjunct to routine dental anesthesia. The intervention requires minimal training, no modification of existing injection techniques, and can be implemented in a standard clinical setting without additional equipment. Its utility may be particularly beneficial in settings where patient anxiety is high, such as pediatric or geriatric populations [2,9]. Additionally, for patients with hypersensitivity to amide anesthetics, diphenhydramine has long been used as an alternative injectable local anesthetic [6]. The current findings extend its role to pre-injection pain management, highlighting its versatility in dental anesthesia.

Broader Implications

The clinical relevance of these findings extends beyond dentistry. Pain during injection is a common challenge across medical disciplines, including dermatology, otolaryngology, and minor surgical procedures. Given diphenhydramine's safety profile and established use in other topical applications, the results of this study may stimulate interest in exploring its use in non-dental injection contexts [20,23]. Furthermore, reducing injection-related discomfort can have a ripple effect on patient trust, satisfaction, and compliance, which are critical elements of patient-centered care. By offering a simple solution to a common clinical problem, diphenhydramine mouthwash may help bridge the gap between technical efficacy and patient experience. In summary, this study demonstrated that diphenhydramine mouthwash significantly reduces pain during IANB injections. Despite limitations in blinding, sample size, and scope of outcomes, the results provide compelling preliminary evidence for its use as a pre-injection adjunct. Future research should build upon these findings with larger, multicenter, and double-blind trials to confirm efficacy, optimize dosage, and explore broader applications. If validated, diphenhydramine mouthwash could become a valuable addition to the armamentarium of pain control strategies in dentistry and beyond.

Conclusion

This randomized clinical trial demonstrated that diphenhydramine mouthwash significantly reduces pain during inferior alveolar nerve block (IANB) injections compared with saline. The mean reduction of 1.61 points on the Visual Analogue Scale (VAS) was both statistically and clinically significant, confirming diphenhydramine's potential as a practical adjunct to enhance patient comfort in dental anesthesia. Importantly, the analgesic effect was consistent across different age groups, genders, and surgical procedures, suggesting broad applicability in clinical practice. The findings add to the growing body of evidence supporting the use of pre-injection rinses as simple, non-invasive strategies for pain control. Unlike many topical anesthetics that provide variable results, diphenhydramine offers the dual advantage of local anesthetic and anti-inflammatory properties, making it a versatile agent in oral healthcare. The absence of adverse reactions further reinforces its safety and feasibility for routine

clinical use. Despite these encouraging results, limitations such as the modest sample size, single-center setting, and lack of double-blinding highlight the need for further research. Future studies should focus on dose optimization, combination formulations, and evaluation in diverse clinical populations. In conclusion, diphenhydramine mouthwash represents a low-cost, easily implemented, and effective adjunct to conventional local anesthetic techniques. Its integration into dental practice has the potential to improve patient compliance, reduce treatment-related anxiety, and elevate the overall quality of care in oral and maxillofacial surgery.

Conflict of Interest

There is no conflict of interest to declare.

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