RESEARCH PAPER

Efficacy of Mental and Incisive Nerve Block in Achieving Pulpal Anesthesia for Mandibular Second Premolar Extraction: A Prospective Clinical Trial

Krovvidi Sai Vivek[1*] and Dr. Rajprakash[2]

[1] 1st year Macro facial surgery, Saveetha Dental College & Hospitals, Chennai*
[2] Professor, Saveetha Dental College & Hospitals, Chennai
*[*]**Corresponding Author:** 152504003.sdc@saveetha.com*

Received: 28th Feb, 2026; Revised: 6th March 2026; Accepted: 7th April, 2026; Available Online: 20th April, 2026

Abstract
Background: The dense cortical bone and structural differences in nerve distribution make it tough to achieve effective pulpal anesthesia for mandibular tooth extraction. Traditional mandibular anesthetic methods include the inferior alveolar nerve block (IANB), which is linked with a higher risk of failure and potential consequences such hemorrhage, trismus, and transitory facial nerve palsy]. A less invasive alternative procedure for anesthetizing mandibular premolars is the mental-incisive nerve block (MINB).
Aim: To determine whether pulpal anesthesia may be adequately achieved during extraction of mandibular second premolars using only a mental-incisive nerve block.
Materials and Methods: A private dental institution's Oral and Maxillofacial Surgery Department was the site of this prospective clinical trial. Included in the study were sixty patients, ranging in age from twenty-five to fifty, who needed a critical mandibular second premolar extracted. Pulp vitality was measured at baseline using electric pulp testing (EPT) and cold testing. The area surrounding the mental foramen was numbed with 1 milliliter of 2% lignocaine mixed with 1:80,000 adrenaline. Cold testing and EPT were used to reevaluate the pulse oximetry following the initial administration of the anesthetic. A Visual Analog Scale (VAS) was used to record the level of pain experienced during extraction.
Results: Fifty-one out of sixty patients (85%) were able to get pulpal anesthesia enough for extraction with just a mental-incisive nerve block; no additional inferior alveolar nerve block was necessary. Because some patients did not receive enough anesthetic, nine of them (15%) needed additional local infiltration. About 3.6 ± 1.2 minutes elapsed before the average onset of anesthesia. A mean pain level of 1.2 ± 0.8 was recorded on the VAS during extraction.
Conclusion: Most individuals can get good anesthesia for extraction of the second premolar from the mandible with just a mental-incisive nerve block. However, additional anesthesia may be necessary on occasion due to anatomical variances in the distribution of nerves and the position of the mental foramen.
Keywords: Mental nerve block; Incisive nerve block; Mandibular premolar extraction; Pulpal anesthesia; Local anesthesia.
How to cite this article: Vivek KS, Rajprakash. Efficacy of Mental and Incisive Nerve Block in Achieving Pulpal Anesthesia for Mandibular Second Premolar Extraction: A Prospective Clinical Trial. Int J Drug Deliv Technol. 2026;16(59s): 833-838. DOI: 10.25258/ijddt.16.59s.97
Source of support: Nil.
Conflict of interest: None

1. INTRODUCTION

Pain management is of the utmost importance during oral and dental surgeries. The mandible's dense cortical bone and structural diversity in nerve routes make it difficult to achieve significant pulpal anesthesia in mandibular teeth[1-5] .

Despite its prevalence, the inferior alveolar nerve block (IANB) has a failure rate of 30-45% according to reports. Further potential issues include hematoma, temporary paralysis of the facial nerves, trismus, and intravascular injection[6-10].

A less intrusive option is the mental-incisive nerve block, or MINB. Pulpal innervation is supplied to premolars, canines, and incisors by the incisive nerve, whereas sensory innervation to the lower lip and chin is supplied by the mental nerve, which exits through the mental foramen[11-15].

- An essential clinical topic that needs answering is whether or if MINB is helpful in inducing pulpal anesthesia, given that the location of the mental foramen varies greatly across individuals. The purpose of this research is to determine if the local anesthetic effect of MINB is sufficient for the extraction of the second premolars from the mandible. The main

**Author for Correspondence: 152504003.sdc@saveetha.com*

objectives of this study to find out how often pulpal anesthesia is successfully produced by mental-incisive nerve blocks, to assess onset time of anesthesia, to evaluate pulpal response using cold test and electric pulp testing and to assess intraoperative pain using the Visual Analog Scale (VAS)[16-17].

2. MATERIALS AND METHODS

Study Design: Prospective clinical study.
Study Setting: Department of Oral and Maxillofacial Surgery at a private dental institution.
Study Duration: Six months.
Sample Size: 60 patients.
Inclusion Criteria:

- Patients willing to provide informed consent
- Age between 20–50 years
- Vital mandibular second premolar requiring extraction
- ASA I or ASA II patients

Exclusion Criteria:

- Allergy to lignocaine
- ASA III or higher systemic disease
- Patients on anticoagulant therapy
- Pregnant or lactating women
- Acute infection at injection site
- Presence of cyst or tumor in the region
- Impacted mandibular premolars

3. PROCEDURE

Examination for pain, temperature, and electric pulp were all part of the initial assessment. A nerve block was applied to the area around the mental foramen using 1 milliliter of 2% lignocaine mixed with 1:80,000 adrenaline. Pulpal anesthesia was reevaluated after administration with the use of cold testing and EPT. After that, the extraction was carried out while the patient was monitored for any discomfort with a Visual Analog Scale Figures -1,2 shows Administration of a mental/incisive nerve block & Assessment of pulpal anesthesia using an electric pulp tester and Figure-3 shows Assessment of **pulpal anesthesia using cold tester.**

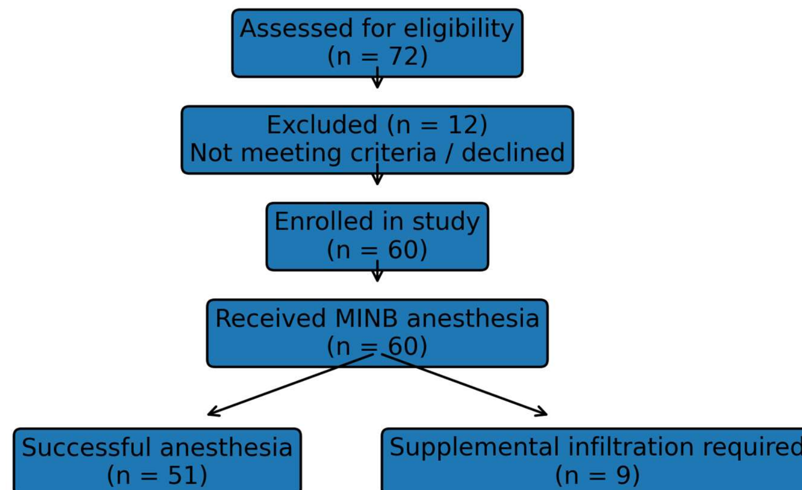
Statistical Analysis

After data was entered into Excel, SPSS version 26 was used for analysis. Categorical variables were represented as frequency and percentage, whereas continuous variables were shown as mean ± standard deviation. The replies before and after anesthesia were compared using paired t-tests. Statistical significance was set at $p < 0.05$.

RESULTS

The average age of the 60 patients in the research was 34.2 ± 7.1 years. Males constituted 56.7% and females 43.3%. In 85 percent of cases, the anesthesia that was achieved with the mental-incisive nerve block was sufficient. Extra infiltration was necessary for nine patients. About 3.6 ± 1.2 minutes elapsed before the average onset of anesthesia. During extraction, the average VAS pain score was 1.2 ± 0.8, suggesting that there was very little discomfort during the procedure (Tables 1-4).

CONSORT Flow Diagram



DISCUSSION

This study was conducted to evaluate the efficacy of the mental–incisive nerve block (MINB) in achieving adequate pulpal anesthesia for the extraction of

mandibular second premolars. The hypothesis beneath this study was that the mental–incisive nerve block alone could provide sufficient pulpal anesthesia for mandibular premolar extraction, thereby reducing the need for the conventional inferior alveolar nerve block (IANB). The specific aims of the study were to determine the success rate of MINB in achieving pulpal anesthesia, assess the onset time of anesthesia, evaluate intra-operative pain levels using the visual analog scale (VAS), and identify the proportion of patients requiring supplemental anesthesia[18-20].

The study findings demonstrate that the mental–incisive nerve block can achieve pulpal anesthesia in a substantial proportion of patients undergoing mandibular second premolar extraction. In the present study, adequate anesthesia was achieved in 85% of patients, allowing extraction to be completed without the need for additional nerve blocks. Only 15% of patients required additional local infiltration, suggesting that the technique provides reliable anesthesia in the majority of cases.

The mean onset time of anesthesia was 3.6 ± 1.2 minutes, indicating a relatively rapid onset following administration of the anesthetic solution. In addition, the mean pain score during extraction was low (VAS 1.2 ± 0.8), reflecting minimal intraoperative discomfort for most patients. These results support the hypothesis that the mental–incisive nerve block is an effective anesthetic technique for mandibular premolar procedures and may serve as a viable alternative to the inferior alveolar nerve block in selected cases[20-23].

The results of the present study are consistent with previously published literature evaluating the effectiveness of the mental–incisive nerve block in dental procedures involving mandibular premolars and anterior teeth. Several authors have reported that MINB can provide effective pulpal anesthesia in the premolar region due to the anatomical distribution of the incisive branch of the inferior alveolar nerve[24-26].

Earlier studies have reported success rates ranging from 70% to 90%, depending on factors such as anesthetic technique, volume of anesthetic solution, and anatomical variations of the mental foramen. For instance, studies by Malamed and colleagues highlighted that the mental–incisive nerve block can provide adequate anesthesia for mandibular premolars when sufficient pressure is applied at the mental foramen to allow diffusion of anesthetic into the incisive canal. Similarly, clinical investigations by Meechan and Nist et al. demonstrated that incisive nerve block may enhance pulpal anesthesia in cases where the mental nerve block alone is insufficient[27-29].

The 85% success rate observed in the present study falls within the range reported in the literature and supports the growing evidence that MINB is a reliable technique for premolar procedures. However, the requirement for supplemental anesthesia in a subset of patients highlights the influence of anatomical variability, including variations in the location of the mental foramen and accessory innervations .

Compared with the conventional inferior alveolar nerve block, MINB offers several advantages such as a lower risk of complications, reduced incidence of nerve injury, and improved patient comfort, making it a useful alternative in appropriate clinical scenarios.

This study has several strengths. First, it was designed as a prospective clinical trial, which allows systematic evaluation of anesthetic outcomes under controlled conditions. Second, the study employed objective methods such as electric pulp testing (EPT) and cold testing to assess pulpal anesthesia, enhancing the reliability of the results. Third, pain perception during extraction was quantified using the visual analog scale (VAS), providing standardized assessment of patient experience].

However, certain limitations should also be considered. The study was conducted in a single clinical center, which may limit the generalizability of the findings. The sample size of 60 patients, although adequate for preliminary evaluation, may not fully represent the broader population. Additionally, anatomical variations in the location and morphology of the mental foramen were not evaluated radiographically, which could influence anesthetic success. Future studies with larger sample sizes, multicenter designs, and imaging-based anatomical assessment would provide more comprehensive evidence regarding the effectiveness of mental–incisive nerve block techniques.

CONCLUSION

For most patients, pulpal anesthesia for mandibular second premolar extractions can be effectively provided by a mental-incisive nerve block alone. Although supplementary anesthesia is sometimes necessary, the procedure can be a good substitute for inferior alveolar nerve blocks in some circumstances.

Table 1: Demographic Characteristics

Variable	Value
Mean Age	34.2 ± 7.1 years
Male	34 (56.7%)
Female	26 (43.3%)

Table 2: Success Rate of Mental–Incisive Nerve Block

Outcome	Number	Percentage
Successful anesthesia	51	85%
Supplemental infiltration required	9	15%

Table 3: Onset Time of Anesthesia

Parameter	Mean ± SD
Onset time	3.6 ± 1.2 minutes

Table 4: Pain During Extraction (VAS)

Parameter	Mean ± SD
VAS pain score	1.2 ± 0.8

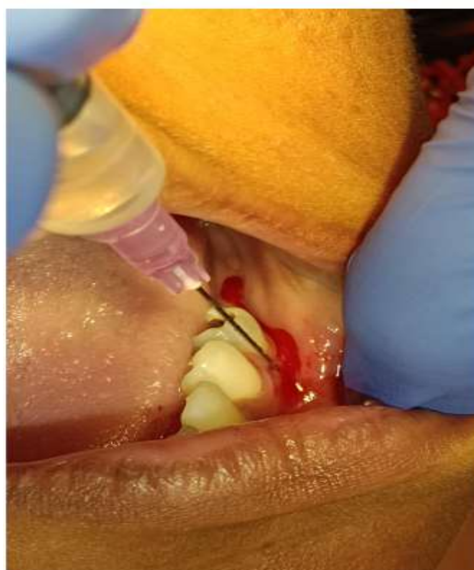


Fig-1 Administration of a **mental/incisive nerve block**

Fig-2 Assessment of **pulpal anesthesia using an electric pulp tester**

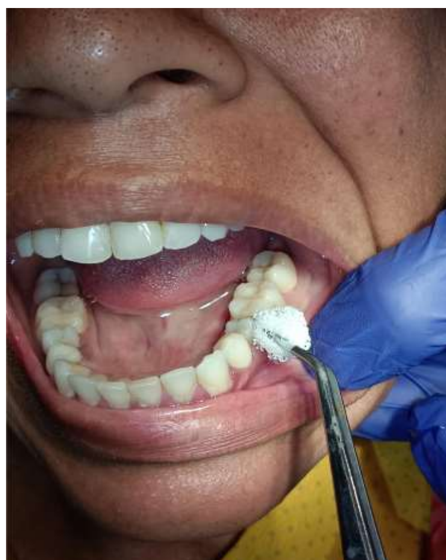


Fig-3 Assessment of **pulpal anesthesia using cold tester**

REFERENCES

1. **Nist RA, Reader A, Beck M, Meyers WJ.** An evaluation of the incisive nerve block and combination inferior alveolar–incisive nerve block for mandibular teeth anesthesia. **Journal of Endodontics.** 1992;18(9):455–459. https://doi.org/10.1016/S0099-2399(06)81336-7

2. **Ghabraei S, Bolhari B, Saberi EA, Khorasani MM.** Anesthetic efficacy of mental/incisive nerve block compared with inferior alveolar nerve block in mandibular premolars with irreversible pulpitis. **Clinical Oral Investigations.** 2019;23(2):839–845. https://doi.org/10.1007/s00784-018-2487-9

3. **Aggarwal V, Singla M, Miglani S, Kohli S.** Comparative evaluation of mental incisive nerve block for pulpal anesthesia in mandibular premolars. **Journal of Endodontics.** 2016;42(2):185–189. https://doi.org/10.1016/j.joen.2015.10.021da Silva CB, Volpato MC, Ramacciato JC, Motta RHL, Groppo FC, Ranali J. Anesthetic efficacy of articaine and lidocaine in incisive/mental nerve block. J Endod. 2010;36(3):438–441.

4. **Lozano González O, Salas Orozco MF, Trigueros Mancera J, Martínez Cuellar NG, Luna Domínguez C, Rosales García P.** Anesthetic efficacy of mental/incisive nerve block versus inferior alveolar nerve block in mandibular premolars with symptomatic irreversible pulpitis: A systematic review and meta-analysis. **Cureus.** 2025;17(11):e96492. https://doi.org/10.7759/cureus.96492

5. **Sülek T, Dumani A, Küden C, Kussever H, Yoldas O.** Anesthetic effectiveness of mental/incisive nerve block versus inferior alveolar nerve block in mandibular first and second premolars with symptomatic irreversible pulpitis: A randomized clinical trial. **Journal of Endodontics.** 2025;51(4):473–480. https://doi.org/10.1016/j.joen.2025.01.016

6. Siddique MH, et al. Comparative evaluation of two techniques of mental nerve block in mandibular premolar anesthesia: A randomized study. J Med Health Sci Res. 2025.

7. **Betz D, Finkelstein M.** Mental nerve block. In: **StatPearls** [Internet]. Treasure Island (FL): **StatPearls Publishing**; 2023. Available from: https://www.ncbi.nlm.nih.gov/books/NBK470214

8. **Khademi A, Saatchi M, Minaiyan M.** Anesthetic success rate of inferior alveolar nerve block for mandibular teeth: Clinical evaluation. **Journal of Dental Research, Dental Clinics, Dental Prospects.** 2022;16(1):12–17. https://doi.org/10.34172/joddd.2022.002Milani AS, et al. Effect of anesthetic volume on inferior alveolar nerve block success. J Endod. 2018.

9. **El-Kholey KE.** Anesthetic efficacy of 4% articaine during extraction of mandibular posterior teeth. **Oral Surgery, Oral Medicine, Oral Pathology and Oral Radiology.** 2016;122(4):e72–e76. https://doi.org/10.1016/j.oooo.2016.05.009Martin E, Nimmo A, Lee A. Articaine in dentistry: An overview of evidence and clinical applications. BDJ Team. 2021.

10. **Kriangcherdsak Y, Vongsavan K, Matthews B.** Success rate of inferior alveolar nerve block among dental practitioners. **International Dental Journal.** 2021;71(3):218–224. https://doi.org/10.1111/idj.12643.

11. **John G Meechan.** Supplementary local anesthesia techniques for mandibular molars. **British Dental**

Journal. 2002;193(7):381–386. https://doi.org/10.1038/sj.bdj.4801565

12. **Stanley F. Malamed. Handbook of Local Anesthesia.** 6th ed. St. Louis (MO): **Elsevier Mosby**; 2013.
13. **John G Meechan.** Effective local anesthesia techniques in dentistry. **Dental Update.** 1999;26(10):432–438.
14. **K E Yapp, Michael S Hopcraft.** The effectiveness of the incisive nerve block. **Australian Dental Journal.** 2007;52(3):215–218. https://doi.org/10.1111/j.1834-7819.2007.tb00488.x
15. **Gary Greenstein, Dennis Tarnow.** The mental foramen and nerve: Clinical and anatomical factors related to dental implant placement. **Journal of Periodontology.** 2006;77(12):1933–1943. https://doi.org/10.1902/jop.2006.060197
16. **Wei Cheong Ngeow, Yuzawati Yuzawati.** The location of the mental foramen in a selected Malay population. **Journal of Oral Science.** 2003;45(3):171–175. https://doi.org/10.2334/josnusd.45.171
17. **Sülek T, Dumani A, Küden C, Kussever H, Yoldas O.***Anesthetic effectiveness of mental/incisive nerve block versus inferior alveolar nerve block in mandibular first and second premolars with symptomatic irreversible pulpitis: A randomized clinical trial.* Journal of Endodontics. 2025;51(4):473-480.https://doi.org/10.1016/j.joen.2025.01.016.
18. **Ghabraei S, Shubbar A, Nekoofar MH, Nosrat A.** *Anesthetic efficacy of mental/incisive nerve block compared to inferior alveolar nerve block using 4% articaine in mandibular premolars with symptomatic irreversible pulpitis: A randomized clinical trial.* Clinical Oral Investigations. 2019;23(2):839-845. https://doi.org/10.1007/s00784-018-2500-4.
19. **da Silva CB, Berto LA, Volpato MC, Ramacciato JC, Motta RHL, Ranali J, Groppo FC.** *Anesthetic efficacy of articaine and lidocaine for incisive/mental nerve block.*Journal of Endodontics. 2010;36(3):438-441. https://doi.org/10.1016/j.joen.2009.12.014
20. **Lozano-González O, Salas-Orozco MF, Mancera JT, et al.** *Anesthetic efficacy of mental/incisive nerve block versus inferior alveolar nerve block in mandibular premolars with symptomatic irreversible pulpitis: A systematic review and meta-analysis.* Cureus. 2025;17(11):e96492. https://doi.org/10.7759/cureus.96492
21. **Aggarwal V, Singla M, Kabi D.** Effect of massage on the efficacy of the mental and incisive nerve block. *Journal of Endodontics.* 2013;39(1):21-24.
22. **Kanaa MD, Whitworth JM, Meechan JG.** A prospective randomized trial of different supplementary local anesthetic techniques after failure of inferior alveolar nerve block. *Journal of Endodontics.* 2006;32(4):296-298.
23. **Reader A, Nusstein J, Drum M.** Successful local anesthesia for restorative dentistry and endodontics. *Dental Clinics of North America.* 2011;55(2):401-417.
24. **Poorni S, Veniashok B, Senthilkumar AD, Indira R, Ramachandran S.** Anesthetic efficacy of articaine for mandibular buccal infiltration in irreversible pulpitis. *Journal of Endodontics.* 2011;37:1603-1607.
25. **Nydegger B, Nusstein J, Reader A, Drum M.** Anesthetic comparisons of 4% articaine and 2% lidocaine for mandibular premolars. *Journal of Endodontics.* 2014;40:1914-1917.
26. **Corbett IP, Kanaa MD, Whitworth JM, Meechan JG.** Articaine infiltration for anesthesia of mandibular first molars. *Journal of Endodontics.* 2008;34:514-518.
27. **Hayes E.** Anaesthesia for mandibular premolars with symptomatic irreversible pulpitis – which nerve block is best? *Evidence-Based Dentistry.* 2025.
28. Lozano González O, Salas Orozco MF, Trigueros Mancera J, Martínez Cuellar NG, Luna Domínguez C, Rosales García P. Anesthetic Efficacy of Mental/Incisive Nerve Block Versus Inferior Alveolar Nerve Block in Mandibular Premolars With Symptomatic Irreversible Pulpitis: A Systematic Review and Meta-Analysis. Cureus. 2025 Nov 10;17(11):e96492. doi: 10.7759/cureus.96492. PMID: 41384210; PMCID: PMC12694680.
29. Aggarwal V, Singla M. Factors affecting local anesthesia success in endodontics. *International Endodontic Journal.* 2017.