

The Effect of Cryotherapy on Anesthesia Success Rate in Molars with Symptomatic Irreversible Pulpitis: Systematic Review and Meta-Analysis

Y. W. Huang¹, D.D.S, J. A. Ravelo², D.D.S

¹Department of International Comprehensive, NYU College of Dentistry, ²Department of Cariology and Comprehensive Care, NYU College of Dentistry



Introduction and Aim

This systematic review and meta-analysis study aimed to assess the efficacy of cryotherapy applications on the success rate of anesthesia in patients with symptomatic irreversible pulpitis (SIP).

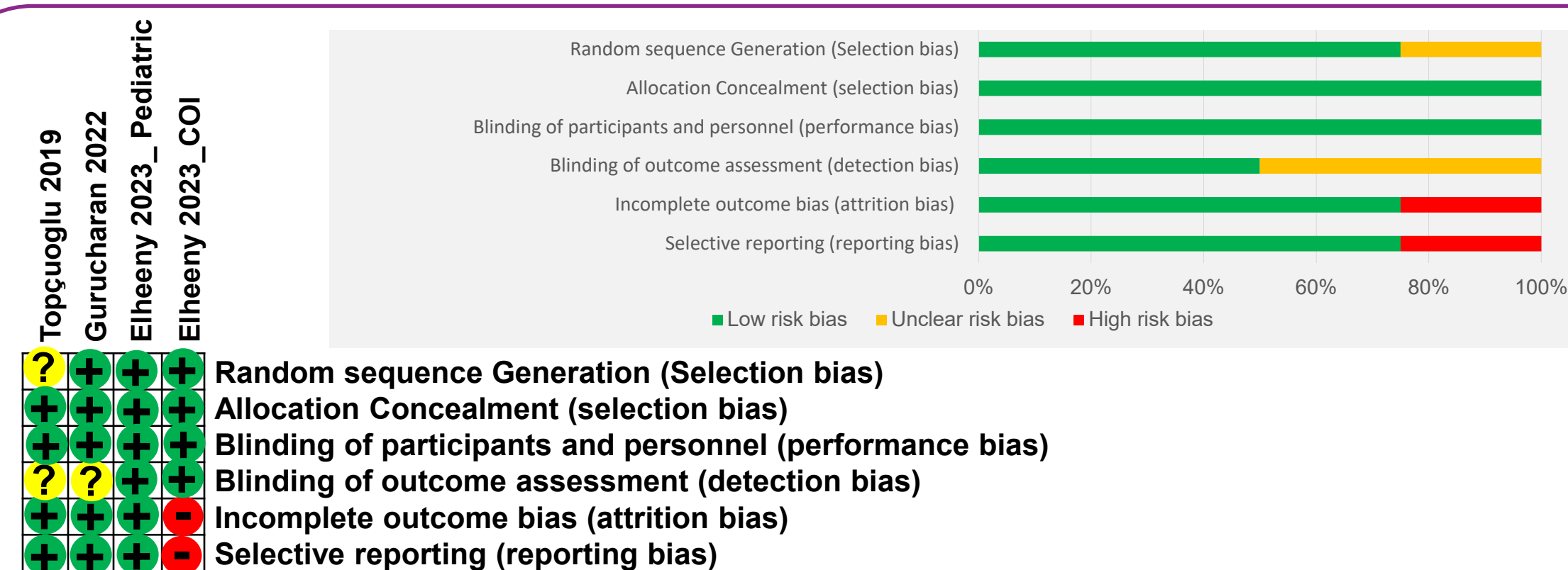
METHODS & MATERIAL

This article searches from: Scopus, Medline, CINAHL, PubMed, Cochrane Database of Systematic Reviews, Embase, Web of Science.

The search criteria include: 1.) Published date from 01/01/2010 to 08/01/2023 and in English. 2.) The search strategy was conducted as follows: (("Endodontics" AND "Cryotherapy" [All Fields]) OR (anesthesia" AND "Cryotherapy" AND "Endodontics" [All Fields]) OR ("Inferior alveolar nerve blocks" AND "Cryotherapy" [All Fields]) OR ("IANB" AND "Cryotherapy" [All Fields])). 3.) Exclusion criteria include: duplicate, comment, irrelevant, no data.

Meta-analysis was performed using Cochrane RevMan with Q and I² test statistics assessed.

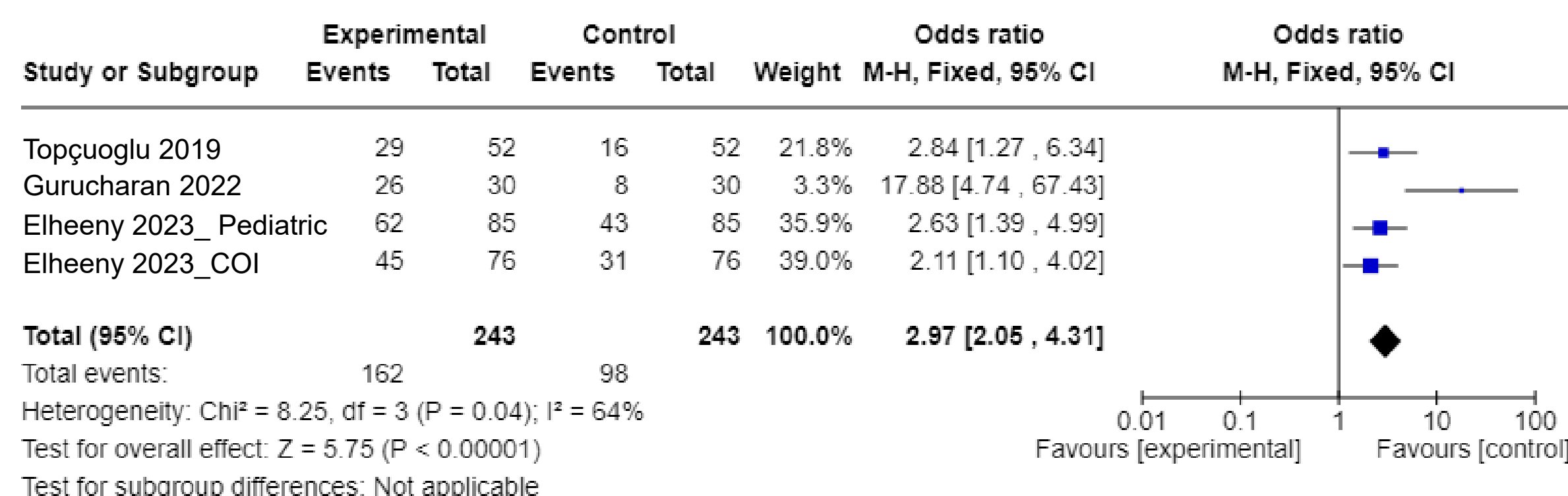
Bias-Diagram



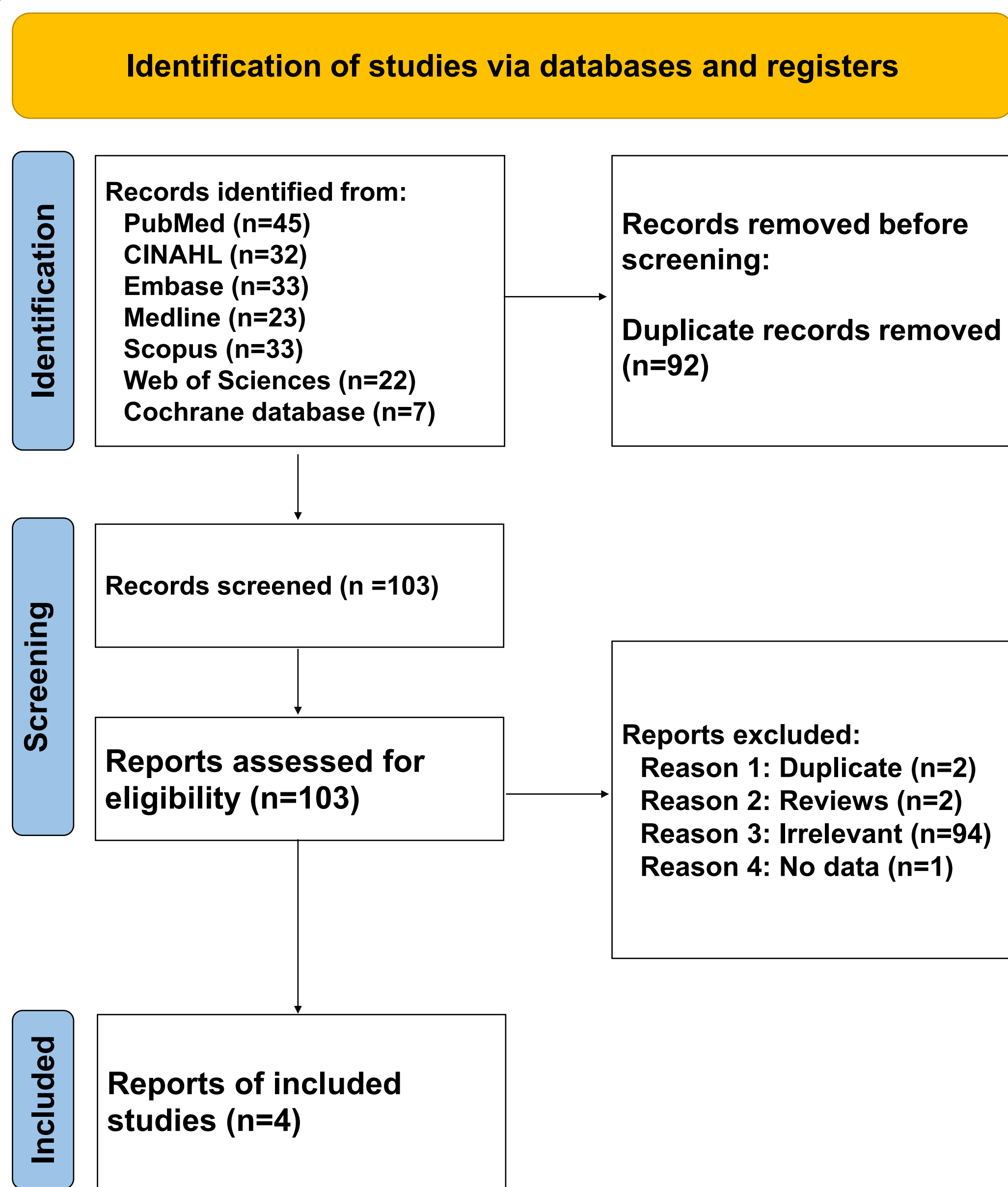
RESULTS

A total of 195 articles were identified, 92 were duplications, therefore, 103 articles deemed eligible for inclusion based on their titles and abstracts. Of these articles, 99 studies were excluded due to pre-agreed exclusion criteria and 4 studies were collected with 486 samples involving in this review.

Forest plot



Flow-Diagram



Conclusions/Summary

Cryotherapy has been shown to significantly improve the efficacy of anesthesia, decrease pain intensity, and improve results, combined with traditional anesthesia for achieving faster onset and reducing pain during endodontic treatment of molars with SIP. Therefore, it is recommended that cryotherapy be applied following anesthesia deposition.

References

1. Elheeny A. A. H., Sermani D. I., Saliab E.A., Turkey M. Cryotherapy and pain intensity during endodontic treatment of mandibular first permanent molars with symptomatic irreversible pulpitis: A randomized Controlled trial. Clin Oral Investig. 2023 Aug;27(8):4585-4593.
2. Elheeny A. A. H., Turkey M. Inferior Alveolar Nerve Block Plus Cryotherapy Anesthesia Success in Pulpectomy Of Primary Molars with Irreversible Pulpitis: a Randomized Clinical Trial. Pediatr Dent. 2023 Mar 15;45(2):107-112.
3. Gurucharan I., Sekar M., Balasubramanian S., Narasimhan S. Effect of precooling injection site and cold anesthetic administration on injection pain, onset, and anesthetic efficacy in maxillary molars with symptomatic irreversible pulpitis: a randomized controlled trial. Clin Oral Investig. 2022 Feb;26(2):1855-1860.
4. Topcuoglu H. S., Arslan H., Topcuoglu G., Demirbuga S. The Effect of Cryotherapy Application on the Success Rate of Inferior Alveolar Nerve Block in Patients with Symptomatic Irreversible Pulpitis. J Endod. 2019 Aug;45(8):965-969.

Characteristics of studies

STUDY ID	Subgroup	Types of teeth	Cryotherapy methods	Supplemental anesthesia	Types of anesthetics
Topcuoglu 2019	2 different groups for IANB: Control groups: 52 patients with standard IANB. Cryotherapy groups: 52 patient with IANB and intraoral ice pack	Permanent mandibular molars	Ice pack in the mouth for 5 minutes	The article does not mention	3.6 mL 2% lidocaine with 1:100,000 epinephrine.
Gurucharan 2022	2 different groups for buccal infiltration: Control group: 30 patients with standard buccal infiltration Cryotherapy groups: 30 patient with buccal infiltration and ice stick and lidocaine (4-6 °C)	Permanent maxillary first molars	1. Precooled with an ice stick for 15 seconds 2. 1.8 mL cold 2% lidocaine hydrochloride with epinephrine (4-6 °C)	Topical anesthesia 2% lidocaine was applied.	2% lidocaine hydrochloride with 1:100,000 epinephrine.
Elheeny 2023_Pediatric	2 different groups for IANB: Control groups: 85 patients with standard IANB. Cryotherapy groups: 85 patient with IANB and intraoral ice pack (0-4 °C) for 2.5 minutes.	Primary mandibular molars	Small ice pack (0-4 °C) are placed in the buccal vestibule for 2.5 minutes.	Topical anesthesia 2% lidocaine was applied. Long buccal nerve block given.	2% lidocaine hydrochloride with 1:100,000 epinephrine.
Elheeny 2023_COI	2 different groups for IANB: Control groups: 76 patients with standard IANB. Cryotherapy groups: 76 patient with IANB and intraoral ice pack (0-4 °C) for 5 minutes.	Permanent mandibular first molars	Small ice pack (0-4 °C) are placed in the buccal vestibule for 5 minutes.	Topical anesthesia 20% benzocaine for 1 min.	3.6 mL of 4% articaine hydrochloride with 1:100,000 epinephrine