

Cryotherapy in Endodontics. Overview of Action Mechanism, Physiological Effect and Applications.

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Definition of Cryotherapy



Cryotherapy refers to “**decreasing tissue temperature for therapeutic purposes by eliminating thermal energy**”.

It is applied in **medicine** primarily for **pain relief** and is also used for **destroying dysplastic tissue**, referred as “**cryosurgery**” by the National Cancer Institute.

Physiological effects of human tissues to exposure with cold temperatures (vascular, neurologic, tissue metabolism)



- Diminished rate at which nerve conduct electrical signals
- Alleviation of bleeding and swelling
- Mitigation of inflammation
- Decreased metabolism by more than 50%, allowing better oxygen flow to the injured tissues

Applications of cryotherapy in Dentistry

- After intraoral excisional surgical procedures
- After periodontal surgery
- After extractions and implant placement
- For reducing swelling, pain, and arthritis associated with temporomandibular joint disorder

Applications of cryotherapy in Endodontics

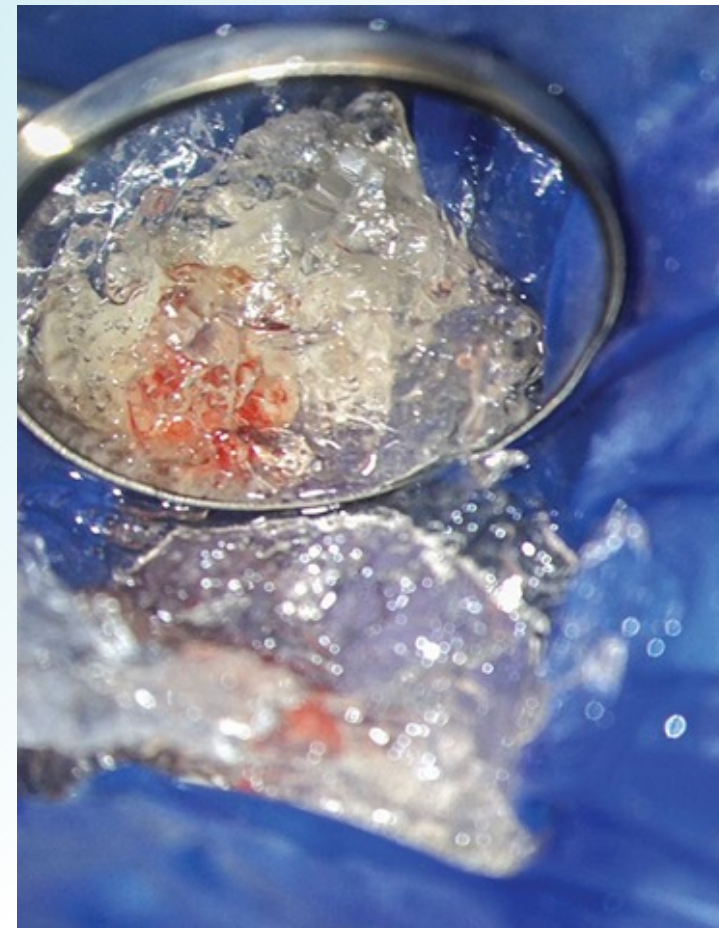
- After periradicular surgeries
- During root canal treatment by means of irrigation with cold saline, to minimize postoperative pain and inflammation
- As an adjunct to achieve hemostasis in vital pulp therapy

Examples of applications of cryotherapy in Endodontics

Vital Pulp Therapy

To control pulpal haemorrhage in direct pulp capping. Shaved sterile water ice (0°C) applied directly to exposed pulp tissue for 1 minute and then removed by high-suction.

The treated teeth became asymptomatic after 2 weeks and remained asymptomatic, vital, and functional over a follow-up period of 12–18 months.

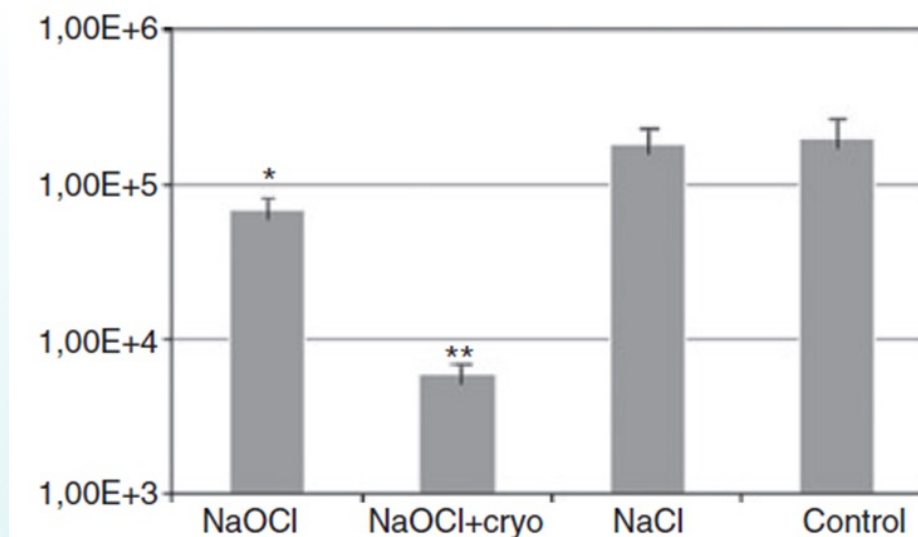


Inferior alveolar nerve block

Preoperative intraoral cryotherapy application increased the potency of inferior alveolar nerve blocks, especially in teeth with **symptomatic irreversible pulpitis**.

Antimicrobial efficacy against E Faecalis

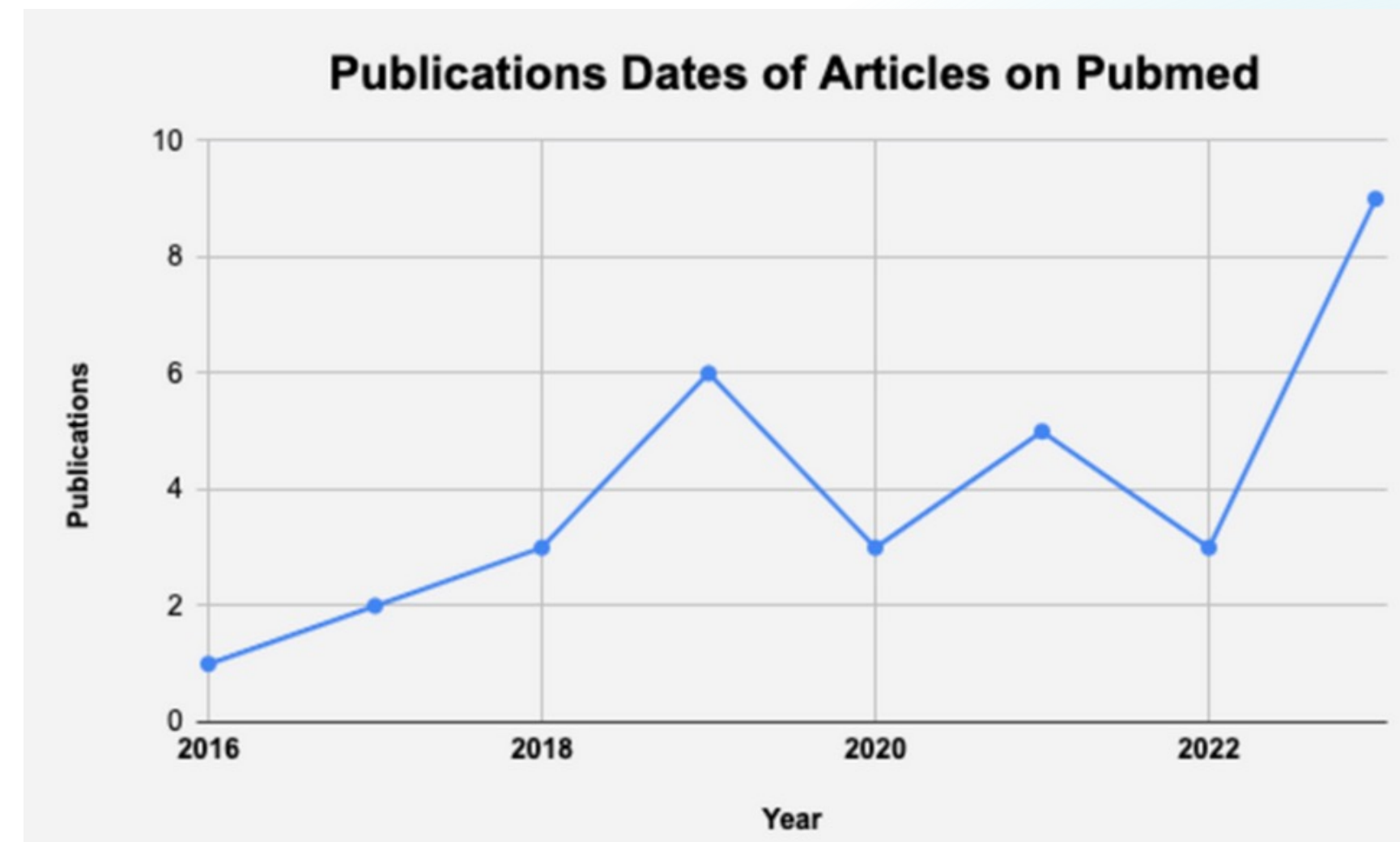
Cryo-instrumentation after NaOCl irrigation significantly reduced the number of bacteria in the root canal compared to NaOCl alone. The cryogenic fluid (liquid nitrogen), by suitably varying the duration of the treatment, can provide immediate freezing of bacterial cells and their cryodestruction.



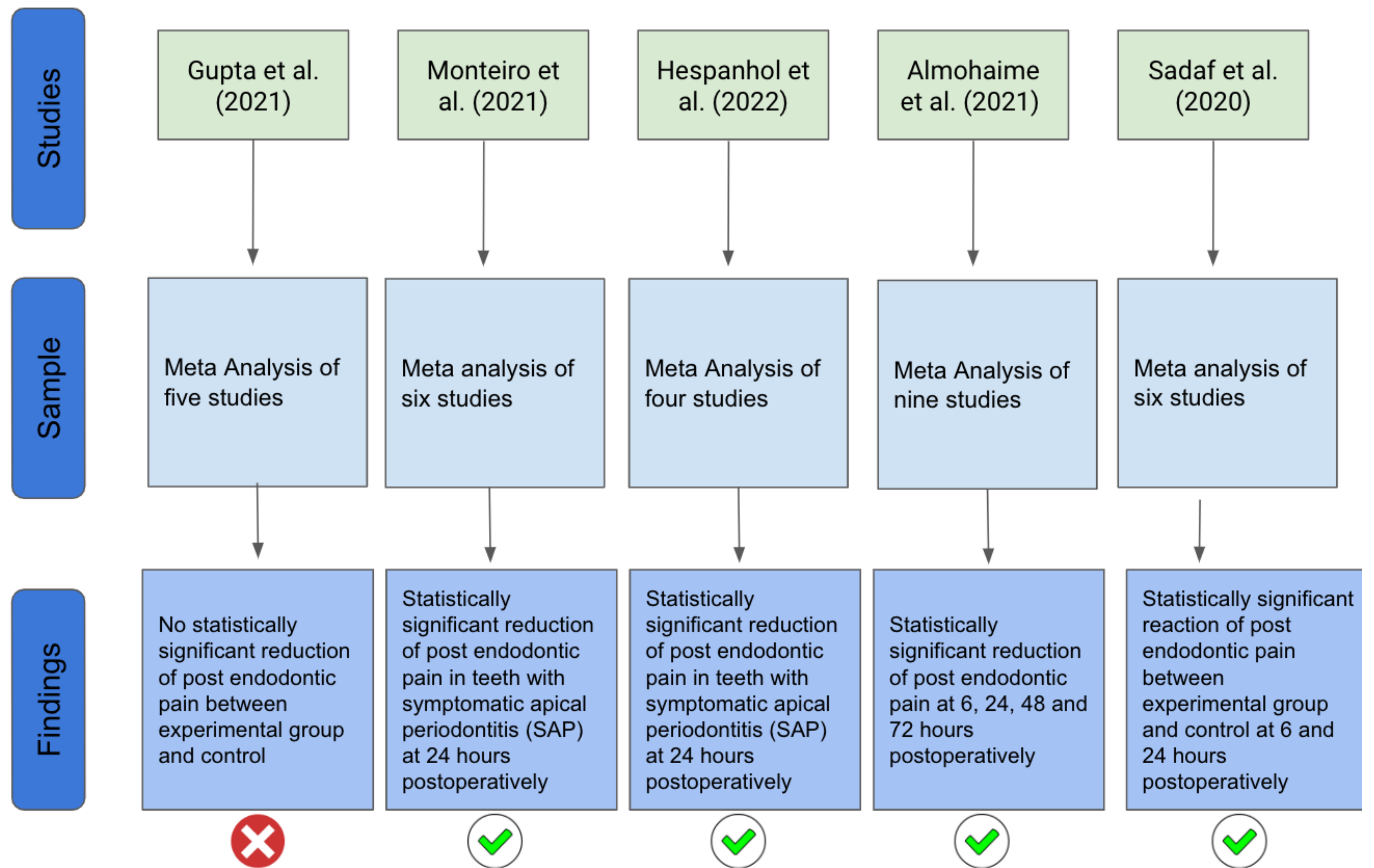
Aim: The purpose of this study is to review the applications of cryotherapy in endodontics including its **effects on post-endodontic pain**.

Methods: Articles published in English in the last ten years, utilizing the keywords “cryotherapy in endodontics” were selected. The screening process involved conducting an electronic search of PubMed. 41 articles were retrieved, 32 of which were deemed relevant.

Results: The most frequently discussed topic was the *effect of intracanal cryotherapy on postoperative endodontic pain* and among the reviewed papers 5 relevant systematic reviews and meta analysis published between 2020 and 2022 were retrieved. The full texts of the systematic reviews were reviewed and **qualitative synthesis** of the findings was conducted.



Results:





Conclusions:

✓ Most authors reported a **benefit of intracanal cryotherapy** on postoperative endodontic pain.

Despite that, there is **no standardisation** regarding

➤ the cryo-agent's type or volume

➤ application method

➤ duration needed to determine an optimal protocol.

✓ **Rigorously conducted trials with precise parameters** could validate the integration of cryotherapy into endodontic clinical practice, given its cost-effectiveness and absence of adverse effects when compared to pharmaceutical interventions.

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