

## “Effect of Intracanal Cryotherapy Application on Post-Operative Pain After Single Visit Endodontic Treatment in Molars with Symptomatic Irreversible Pulpitis”

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### Keywords

Cryotherapy, Visual Analog Scale, Symptomatic Irreversible Pulpitis

### Abstract

**Aim:** The purpose of the current study was to assess whether cold saline irrigation as the final irrigant reduced postoperative pain in teeth with symptomatic irreversible pulpitis treated in a single visit. **Material and method:** In present study 60 patients were selected which were further randomly divided into two equal groups. After finishing the biomechanical preparation, the final irrigation in the cold saline group employed 2.5°C saline solution for 5 minutes, whereas in the control group (normal saline), the same solution held at the root temperature was used. In the current investigation, a single visit was used as the treatment. Using a visual analogue scale, participants were asked to rate the severity of their postoperative discomfort. **Result:** Statistically, significant difference was observed in VAS score between both groups at 6 hours. **Conclusion:** The outcome demonstrates that a single visit root canal treatment can effectively be followed by cold saline irrigation to lessen post-operative pain.

### 1. Introduction

Modern endodontics is built on the principle of painless treatment, and managing pain following root canal therapy is one of its most crucial components. An individual is more likely to seek dental care because of pain. The most harmful and frightening event in ordinary endodontic clinical practise for both the patient and the doctor is the onset of pain during or after the treatment.<sup>1</sup>

Since the inflammation has not yet affected the peri-apical tissues and causes no pain or discomfort to percussion, teeth with symptomatic irreversible pulpitis may be challenging to diagnose. Thermal testing and the patient's dental history are the main methods for determining the pulpal state in such circumstances. Both Visual Analogue Scale (VAS) and category studies show an 81% prevalence of pre-treatment discomfort. Any pain experienced following the start of root canal therapy is referred to as post-

operative pain. The patient's lifestyle is disrupted by a flare up, which is persistent pain or swelling that starts a few hours after endodontic treatment. This situation necessitates an urgent appointment and active treatment.<sup>2</sup>

A complete cleaning and shaping of the root canal, irrigation, and three-dimensional obturation of the canal area are essential to the success of endodontic therapy. Depending on the irrigant used, irrigation can perform a variety of crucial tasks that include reducing friction between the instrument and dentine, improving the cutting efficiency of the files, dissolving tissue, cooling the file and tooth, and also washing and antimicrobial/antibiofilm effects.<sup>3</sup>

In the world of medicine, cold therapy, also known as cryotherapy, has been used for many years to treat pain after surgery and in a variety of sports injuries. By essentially removing heat from tissues, the administration of cold lowers tissue temperature.

Following intraoral surgical procedures, cold applications are utilised in dentistry to reduce postoperative pain. Studies have revealed that by lowering cellular metabolism, cryotherapy minimises secondary hypoxia harm.<sup>4</sup>

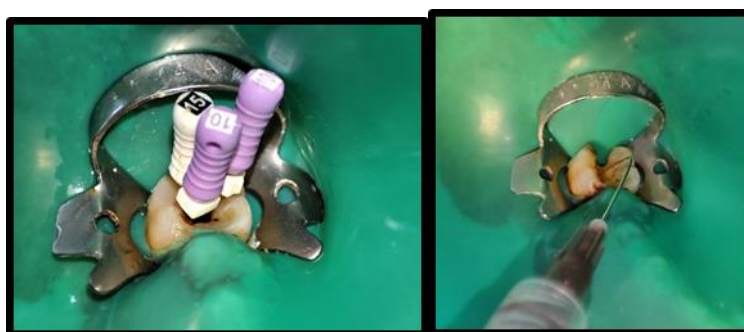
In one visit, the root canal system is completely biomechanically cleaned, shaped, and sealed using single visit endodontics (SVE), a conservative non-surgical treatment for a tooth with pulp involvement. Better diagnostic tools, instrumentation systems, disinfection procedures, and obturation techniques have all been developed, and they are now being regarded as an alternative to multi-visit root canal treatments. Single visit endodontics has many benefits, including fewer visits, less time spent in the chair, protection against root canal recontamination, fewer postoperative flare-ups, greater patient acceptability, and practise management issues.<sup>5</sup>

## 2. Methodology

A prospective, randomized, single blind clinical trial was conducted among adults aged between 20-50 years. The study participants were selected from the patients visiting the Department of Conservative Dentistry and Endodontics in Narsinhbhai Patel Dental College and Hospital, Visnagar. The sample size was estimated to be 60 which were further divided into two groups, 30 participants in each group. The Oral examination was done of all the patients and those diagnosed with symptomatic irreversible pulpitis were included in the study.

Patients with immature apices or root resorption were not included in the investigation. The study also excluded individuals with medical conditions, women who were pregnant, patients taking painkillers or anti-inflammatory treatments, and patients who declined to take part. Patients were assigned into two groups at random: normal saline (Group A) and cold saline (Group B).

All procedures were explained to the patients and informed consent was obtained before initiating the treatment. Prior to treatment the patients were instructed to complete a visual analogue scale (VAS) to determine their pain scores. A DENTSPLY endo access bur was used to create an endodontic access cavity while being thoroughly cooled by water. A sterile #10 K file (Mani, Japan) was used to obtain the initial glide path after full access. Using an apex locator (Root ZX small, J. Morita), the working length was determined, validated radiographically, and standardised to 0.5–1mm short of the apex. The canals were cleaned to at least size of 20 K hand file at the estimated working length followed by rotary endodontic instrumentation with NEO ENDO in a crown down technique. During preparation and between instrumentation, the canals were irrigated with 5ml of 3% sodium hypochlorite. The smear layer removal was done using 10ml of 17% EDTA. In the control group, final irrigation was carried out using 5 mL of 0.9% physiological saline solution at room temperature after biomechanical preparation was finished. 5 ml of cold saline was used to irrigate the root canals in the cold saline group at a temperature of 2.5 °C.



**Fig. 1:** Access opening, working length and cryotherapy with needle irrigation

In all the groups, canals were dried with paper points. The master cone was selected and introduced into the canal to full working length and was checked for snug fit criteria. The gutta percha cone was coated with the

AH Plus sealer, placed into the canal until the working length was reached. Upon completion of the root canal treatment, the access was sealed with Glass Ionomer restoration. (GC Universal restorative material). A

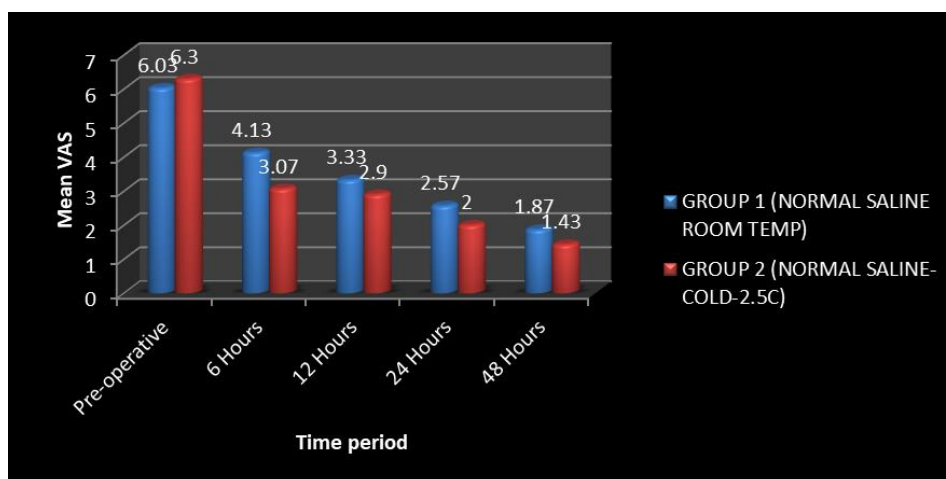
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sheet containing the VAS was given to each patient for them to record the intensity of pain felt after 6, 12, 24,

48 hours. None of the patients were prescribed with medications immediately after the treatment.

### 3. Result

Data was analyzed using SPSS version 20.0. Following statistical tests were done: 1) Mann Whitney U test 2) Friedman test



Statistically, significant difference was observed in VAS score between Group 1 (Normal saline – room temp) and Group 2 (Normal saline – cold 2.5C) at 6 hours. Statistically, no significant difference was observed in VAS score between Group 1 (Normal saline – room temp) and Group 2 (Normal saline – cold 2.5C) at pre-operative time period, 12 hours, 24 hours and 48 hours. Mean VAS score was less in Group 2 (Normal saline – cold 2.5C) ( $3.07 \pm 0.82$ ) than Group 1 (Normal saline – room temp) ( $4.13 \pm 1.10$ ).

### 4. Discussion

Pain is a multifaceted experience made up of a particular sensation and the response it elicits. The experience is also quite individualised. The majority of teeth undergo root canal therapy, which is a common dental procedure with success rates ranging from 30 to 98%. After receiving a root canal, some individuals may suffer slight discomfort, which is normal. In dentistry, postoperative discomfort is a regular occurrence. The patient's capacity for self-regulation as well as their level of fear also contribute to the causative elements, which are not entirely dependent on the treatment.<sup>6</sup>

Preoperative infections of the root canal system and peri-apical region may account for the greatly increased frequency and intensity of postoperative pain

in the presence of preoperative pain. During treatment, the peri-apical tissues that were initially inflamed could become secondarily irritated. In order to assess a particular therapy's success, pain relief is frequently used. Pre and postoperative assessment of pain and pain relief often serves to evaluate the effectiveness of a specific therapy.<sup>7</sup>

The practise of endodontics has undergone a total transformation due to the development of innovative methods, tools, and materials as well as a greater understanding of canal anatomy. Endodontic treatment in a single visit has grown in popularity in recent years. The benefits of SVE over multiple visits are that it is quicker, well received by patients, less likely to cause immune reactions from intracanal medications, prevents recontamination of root canals, and avoids complications with the placement of rubber dams, so it is regarded as an acceptable alternative.<sup>8</sup>

The name "cryotherapy" comes from the Greek word "cryo," which means "cold." In physiotherapy, it refers to bringing tissues' temperatures down or up for therapeutic reasons. In truth, cryotherapy involves removing heat rather than applying cold. The three primary effects of cold application (cryotherapy) are a reduction in metabolic activity, an increase in blood flow, and a suppression of neural receptors in the skin and subcutaneous tissues. As a result, it is effective in

lowering short-term application of inflammation, pain, edoema, and healing time.<sup>9</sup>

In teeth with vital pulp, cryotherapy reduced postoperative discomfort after root canal therapy, likely by lowering the temperature of the external root surface. According to Saeki et al. (2002), many processes, such as changed nerve conduction velocity (NCV), vasoconstriction, suppression of nociceptors, a decrease in muscle spasms, and/or a decrease in metabolic enzyme activity levels, may contribute to pain relief with cold application. Through reduced nociceptive receptor sensitivity, pain gate theory, diffused noxious inhibitory controls, or the analgesic descending pathway of the central nervous system, such as endorphins, cryotherapy may also be helpful as a counterirritant to pain.<sup>10</sup>

## 5. Conclusion:

Many advances have been made in the field of medicine with the development of newer materials and techniques and one such technique is Cryotherapy. However, there are only few studies analysing the influence of cryotherapy on postoperative pain. So, the present study was conducted to evaluate the incidence of postoperative pain after single visit RCT in symptomatic irreversible pulpitis using Cryotherapy.

Within the limitation of this study it can be concluded that: 1. There is statistical significant reduction in the pain ratings at the subsequent observation time points of 6, 12, 24, 48 hours. 2. Application of Cryotherapy resulted in significantly less postoperative pain compared to room temperature normal saline irrigation.

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