

Effectiveness of Cold Saline Irrigation on Postoperative Pain– An In-Vivo Study

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Abstract

Aim: The aim of present study was to evaluate the effectiveness of cold saline irrigation as final irrigant on postoperative pain after single visit root canal treatment of teeth with vital pulp.

Material and method: In present study 30 patients with single rooted tooth were included in the present study. The teeth were randomly divided into two groups. In the cold saline group, final irrigation was performed with 2.5°C saline solution for 5 min after completion of biomechanical preparation; whereas, in the control group (normal saline) same solution stored at the root temperature was used. Single visit treatment was performed in the present study. Participants were asked to rate the intensity of their postoperative pain using visual analogue scale after 24 hrs.

Result: Result showed that the cold saline group resulted in significantly less pain ($p < 0.05$) in comparison with compared to control group.

Conclusion: : The result shows that cold saline irrigation can be used as an effective means to reduce the post operative pain after single visit root canal treatment of teeth with vital pulp.

Keywords: Root canal treatment, Postoperative pain, Irrigation, Normal saline

Introduction: Success of endodontic treatment relies on the elimination of microorganisms from the infected root canal system by adequate chemomechanical debridement. This is followed by achieving a hermetic seal through three dimensional obturation. Even with utmost care, some patients experience pain or flare ups during and following the treatment. Pain management during and after root canal treatment is one of the most important aspects of endodontic practice.¹

One way to reverse the inflammatory process and control pain is with drugs such as Nonsteroidal anti-inflammatory drugs, corticosteroids etc. However, despite being comparatively safe drugs, side effects such as gastrointestinal intolerance and renal, hepatic, and respiratory disorders such as asthma have been reported with these drugs.²

Cryotherapy is a long-standing therapeutic technique that has been frequently applied in sports injuries and surgical procedures for pain management and postoperative care in the field of medicine. It is effective at reducing edema, pain, inflammation and recovery time. The term cryotherapy is derived from the Greek word cryos, meaning “cold”. Though, cryotherapy refers to lowering or decreasing the tissue temperature for therapeutic purposes, it actually does not imply implementing cold but rather extracting heat.^{3,4}

Cold saline plays a vital role in reducing postoperative pain and inflammation, by Vasoconstriction. The first physiologic tissue response to cryotherapy is a drop in local temperature, leading to reduced cellular metabolism, which in turn causes cells to use less oxygen and reduces blood flow as induced by vasoconstriction, leading to limitation of the damage. In addition, it affects peripheral nerve endings by diminishing the threshold needed to activate the tissue nociceptors and decreases the speed of painful nerve impulses.⁵ So, the present study was conducted to evaluate the effect of cold saline irrigation on post operative pain.

Material and method: Present study was conducted in Department of Conservative Dentistry and Endodontics after obtaining ethical clearance from institutional ethical board.

Total 30 patients aged between 18 and 60 years with single rooted tooth requiring endodontic therapy were included in the study. Maxillary or mandibular single rooted teeth diagnosed with asymptomatic irreversible pulpitis or symptomatic irreversible pulpitis with either normal apical tissues or symptomatic apical periodontitis were included in the study. Patients with immature apices or root resorption were excluded from the study. Medically compromised patients, pregnant females, patients using medications such as analgesic or anti-inflammatory drugs, patients who refused to participate in the study were also excluded from the study. Patients were randomly divided into control group: normal saline (Group A = 15) and cold saline group (Group B = 15). All procedure was 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.

In every patient, after recording preoperative pain levels, local anaesthesia with 2% lignocaine containing 1:80000 epinephrine (Lignox 2%) was administered. The endodontic access cavities were prepared with endo access burs under rubber dam isolation. Pulp extirpation was done using a broach and a glide path was established with a #10 K-file (Mani, Tochigi, Japan). Working length was established and confirmed radiographically. The root canals were instrumented with Protaper Universal System (Dentsply) using endodontic motor (E-Connect Pro, Orikam) under copious irrigation with 3% sodium hypochlorite (Prime dental). The root canals were flushed with 5ml of 17% EDTA solution. In the control group, following completion of biomechanical preparation, final irrigation was performed using 5 mL of 0.9% physiological saline solution at the room temperature. In cold saline group, the root canals were irrigated with 5 ml of cold saline at a temperature of 2.5°C; the solution was stored in refrigerator until use. The final irrigation was performed for 5 min in both the groups using 27 G bevelled needle tip inserted 2 mm short of the WL. In both groups, the root canals were dried with paper points and obturated with cold lateral compaction technique using gutta-percha cones (DiaDent) and sealapex sealer (Sybron Endo, United States). Coronal access cavities were restored with direct composite restorations using dentinal adhesives and universal composite resin (3M, Z250). Postoperative pain was determined by using VAS scores after 24 hrs. The VAS included a 10 cm straight horizontal line numbered at each centimetre with following criteria; 0-1- no pain; 2-3- mild pain; 4-6- moderate pain; 7-10-severe pain. The data were entered over a spreadsheet, and statistical analysis was performed using SPSS software version 17 (IBM, Chicago, United States).

Result: A total number of 30 patients, 14 males and 16 females participated in the study and were randomly allocated in the study between Group I- control group (normal saline) and Group II- Cold Saline

VAS scale was used to measure the post operative pain. t- test was used to determine the statistical significance. It was found that the mean pain score in the Cold saline group (2.24 ± 0.45) was lower than that of the control group (4.05 ± 0.56). (**Table 1**)

t-test was used to determine the differences in mean pain scores between the groups. The result obtained was statistically significant with $P < 0.05$, suggesting cold saline irrigation was to be more effective in reducing postoperative pain sensation.

| Table no 1: Mean Pain Score | | |
|-----------------------------|-----------------|---------|
| Group | Mean Pain Score | P value |
| Group I Control group | 4.05 ± 0.56 | P<0.05 |
| Group II Cold Saline Group | 2.24 ± 0.45 | |

Discussion: The most important objective of endodontic treatment is complete tissue debridement and to minimize the number of microorganisms in root canal system followed by 3d obturation of the prepared root canal space.⁶

Postoperative pain is a frequent complication associated with root canal treatment, especially during apical instrumentation of tooth with pre-existing periradicular inflammation objective.⁷

Present study was conducted to evaluate the effect of cold saline as final irrigant on post operative pain. The uses cold saline as a form of treatment in which the tissues are briefly exposed to very cold temperatures in order to promote healing and other therapeutic results. It is also very cost effective and does not cause any side effect to patient's health. Vera et al. (2015) showed that irrigation of root canals with 2.5°C cold saline solution for 5 min reduced external root surface temperature.⁸

The present study showed that root surface temperature plays a vital root in manifestation of post operative pain. Cryotherapy reduced postoperative pain following single-visit root canal treatment in teeth with vital pulps probably by reducing external root surface temperature. It is widely believed that the therapeutic application of cryotherapy leads

to a reduction in pain and swelling. Saeki et al. (2002) and other authors stated that pain relief with cold application could be due to many mechanisms including altered nerve conduction velocity (NCV), vasoconstriction, inhibition of nociceptors, a reduction in muscle spasms and/or a reduction in metabolic enzyme activity levels.⁹ Cryotherapy could also be effective as a counterirritant to pain through diffused noxious inhibitory controls, pain gate theory, suppressed nociceptive receptor sensitivity or via the analgesic descending pathway of the central nervous system such as endorphins.¹⁰

Conclusion: The result shows that cold saline irrigation can be used as an effective means to reduce the post operative pain after single visit root canal treatment of teeth with vital pulp.

Sources of support – Nil

Acknowledgement – None

Conflict of interest – The authors declare that they have no conflict of interest.

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