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EVALUATING EFFECT OF USING COLD SALINE AS FINAL IRRIGANT DURING ENDODONTIC TREATMENT ON POST OPERATIVE PAIN

Dr Sami Faisal Jamdar[1*], Dr Mustafa Al Hajjiahmed[2], Dr Jaza Hameed Aldhafiri[3], Dr Khalid Alsubaie[4], Dr Majid Alshammari[5], Dr Maram Almanasif[6], Dr Mariam Abdullah Alkhaldi[7], Dr Abdul Majid Alanezi[8], Dr Yazeed Alruwaili[9], Dr Eman Almomin [10], Muhammed Musallam Al Dhafiri[11], Ibrahim Khalluf Alanezi[12], Muhammad Ali Alanezi [13], Fayez Alhumedi Alshammari[14]

[1*]Specialist Maxillofacial Surgeon, Department of Oral Maxillofacial Surgery, Central Hospital Hafar al batin, Ministry of Health Hafar al batin, Saudi Arabia

[2,3,4,5,6,7,8,9,10]General Dentist, Ministry of Health, Hafar Al batin, Saudi Arabia

[11,12,13,14]Dental Assistant, Ministry of Health, Hafar Al batin, Saudi Arabia

***Corresponding Author:** Dr Sami Faisal Jamdar

*Department of Oral Maxillofacial Surgery, Central Hospital Hafar al batin, Ministry of Health Hafar al batin, Saudi Arabia.

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Abstract

Background and Objective: Postoperative pain (POP) as a result of root canal preparation is a significant side effect of endodontic treatment. Cryotherapy can be used to prevent it. The current study was conducted to evaluate the effect of cold saline irrigation on post-operative pain in patients suffering from pulpal and periapical illnesses.

Methods and materials: Patients who presented to the Outpatient Department of Conservative Dentistry and Endodontics complaining of discomfort in their lower posterior teeth were evaluated for participation in this randomised control trial. After cleaning and shaping, the patients were randomly assigned to one of two groups: control or experimental. For 5 minutes, the experimental group got 20ml cold saline (2.5o C) irrigation given to the working length using a sterile cold needle. In the control group, the identical approach was applied with normal saline solution at room temperature. The investigation included 100 samples in total. The patients were subsequently told to keep track of the existence, duration, and intensity of postoperative pain at 6 and 24 hours, as well as painkiller intake.

Results: There was no statistical difference between the two groups. There were more cases of only mild pain in the cryotherapy group (16 patients) compared to the normal saline group (13 patients), and only 8 patients experienced moderate pain in the cryotherapy group whereas 11 patients experienced moderate pain in the normal saline group and 2 patients experienced intense pain in the normal saline group, indicating lower pain scores in the cryotherapy group.

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Conclusion: Despite the fact that the cryotherapy group had lower pain scores and analgesic intake, the outcomes of this study were not statistically significant. However, a bigger sample size is needed to demonstrate the efficacy of this unique strategy for lowering postoperative pain.
Keywords: Cold Saline**,** Cryotherapy, Endodontic Treatment, Postoperative pain

Introduction

One of the most essential parts of endodontic practise is the management of postoperative pain and discomfort regularly experienced by patients following endodontic treatment; it is common and occurs in 3 to 58% of all cases.[1,2] Root canal vital and necrotic remnants, microbes and their toxins, and irrigators that protrude beyond the apical foramen during endodontic therapy may cause inflammation and postoperative symptoms like as mild to severe pain, or so-called flare-ups.[3-5]
Non-pharmacological ways for reducing postoperative pain include counseling, preoperative patient-calming approaches and explanations, occlusal modifications, verbal anaesthesia, music therapy, medicines to more specific counseling, and surgical procedures such as cryotherapy. Long-acting anaesthesia, antihistamine medication, nonsteroidal anti-inflammatory drugs, narcotic analgesics, and steroidal anti-inflammatory drugs are among the pharmacologic approaches. Furthermore, the use of pain relievers is connected with an elevated risk of injury, including gastrointestinal discomfort and other systemic adverse effects.[6-10] As a result, alternate treatments for managing postoperative pain, such as cryotherapy, are being investigated.
CRYOTHERAPY is derived from the Greek word "cryos" (cold). In truth, cryotherapy does not include the application of cold, but rather the withdrawal of heat. In an endodontic practise, postoperative pain control is critical. According to Hargreaves and Hutter, this condition can be predicted in teeth with preoperative discomfort, pulp necrosis, and symptomatic apical periodontitis.[11]
Irritants can trigger cellular, humoral, and neurovascular tissue responses in pulp. A biphasic reaction in the pulp creates increased pulpal pressure and decreased blood flow, leading to permanent pulpitis or pulp necrosis. If this condition spreads to the periradicular tissues, it can lead to a painful condition known as Symptomatic apical periodontitis. Symptoms of symptomatic irreversible pulpitis, pulp necrosis, and symptomatic apical periodontitis can be attributed to a variety of factors, including changes in periapical pressure, microbial factors, chemical mediators of pain, and psychological factors, which ultimately causes patients to visit the dentist in a hurry.[1]
Medications such as nonsteroidal anti-inflammatory medications, corticosteroids, and others can be used to reverse the inflammatory process and manage pain.[11]
Cold saline has been shown in previous research to lessen pain and reliance on nonsteroidal anti-inflammatory medicines. This subject is still unexplored and could benefit the endodontic industry by reducing reliance on nonsteroidal anti-inflammatory medicines and managing postoperative pain, both of which are critical in preserving patient rapport and ensuring a benefit to clinical endodontic practice.
The trials addressed this due to a dearth of data on the effect of utilising room temperature saline as the final irrigation on post-endodontic pain. The current study sought to determine the effect of

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cold saline irrigation on post-operative pain in individuals suffering from pulpal and periapical illnesses.

Material and Methods

A randomized controlled trial was conducted. Patients reporting to the Outpatient Department of Conservative Dentistry and Endodontics, with complaint of pain in relation to lower posterior teeth, were screened for eligibility, for this randomized control trial.

Inclusion criteria were: Patient having symptomatic apical periodontitis, differentiated from periapical abscess (breach in lamina dura) was strictly adhered to and Patient having pupal necrosis patient having pain vas score of 3-5.

Patients who were younger than 18 years or older than 50 years, teeth with multiple canals, re-treatment cases, presence of root resorption, open apex, preexisting pain and/or periapical pathosis, endodontic mishaps, sealer puff, and patients who used analgesic or anti-inflammatory drugs before the treatment were excluded.

History of the patient, visual analog scale, percussion test and cold test, intra and extra oral examination were the prerequisites required. In the first appointment, the patient was asked to fill a questionnaire regarding the level of preoperative pain experienced by the patient. Local anesthesia ([1:200000] lidocaine with epinephrine) was administered to the patient, Access opening was done using access opening burs followed by extirpation of pulpal tissue and cleaning and shaping was done using protaper rotary system. During cleaning and shaping, irrigation was done using common irrigants namely Sodium hypochorite and Edta 17%. After the completion of cleaning and shaping, the final irrigation was done by 20 ml of 2.5 degree Celsius cold saline for 5 minutes for the experimental group and similar irrigation protocol was followed for control group but saline at room temperature was used for irrigation. Temporary restoration was placed and the cavity was sealed. The patient was asked to fill a form to rate pain experienced during the procedure. The patient was handed a second questionnaire which also contained 2 VAS scale for pain experienced at 6 hours and 24 hours. It also contained questions regarding the duration of pain, Number of analgesic intake. Patient was asked to take analgesics only on SOS basis. Patient was asked to submit this questionnaire at 2nd appointment. Obturation was performed at the second appointment.

Experimental groups

Group A (n=50): Patient who received final irrigation with saline at room temperature. Group B (n=50): Patient who received final irrigation with saline at 2.5 degree Celsius.

Statistical analysis

The recorded data was compiled and entered in a spreadsheet computer program (Microsoft Excel 2007) and then exported to data editor page of SPSS version 15 (SPSS Inc., Chicago, Illinois, USA). For all tests, confidence level and level of significance were set at 95% and 5% respectively.

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Results

There was no statistically significant difference between the two groups. However, Table 2 shows that there were more cases that experienced only mild pain in the cryotherapy group (16 patients) compared to the normal saline group (13 patients), and only 8 patients experienced moderate pain in the cryotherapy group whereas 11 patients experienced moderate pain in the normal saline group and 2 patients experienced intense pain in the normal saline group, indicating that the cryotherapy group had lower pain scores.

Table 1: Postoperative Pain among Study Participants

Postoperative Pain	Cryotherapy (Mean±SD)	Normal Saline (Mean±SD)	P value
Baseline	1.23±0.41	1.49±0.56	0.23
POP 6 HRS	0.99±1.360	1.12±1.29	0.09
POP 24 HRS	0.51±0.70	0.74±1.10	0.10
Analgesic	0.60±0.71	1.02±1.06	0.45

Statistically significance at p≤0.05

Test applied Mann Whitney Test

Table 2: Number of Cases Experiencing Mild, Moderate and Severe Pain

Pain	Cryo therapy	Normal Saline	Total
Mild	16	13	29
Moderate	8	11	19
Severe	0	2	2

Discussion

Necrotic pulps typically create an environment favorable for the growth of a variety of oral bacterial species, notably strictly anaerobic bacteria. Most investigations indicated a positive link between necrotic teeth with painful apical pathosis and flare-up rate.[13,14] Endodontic therapy creates a healing environment in the periradicular region, although the procedure itself may cause pain. Several strategies have been proposed to alleviate this pain.[15,16] Cryotherapy is the most recent and untested of these.[15] As a result, this randomized clinical trial was carried out to see if cryotherapy application can minimize POP in patients receiving root canal treatment for symptomatic irreversible pulpitis with normal periradicular tissue.

The medical literature has reported on the benefits of cryotherapy. According to physiologic and clinical evidence, administering cold by various approaches may reduce the conduction velocity of nerve signals, hemorrhage, edema, and local inflammation, and hence is beneficial in lowering musculoskeletal discomfort, muscle spasm, and connective tissue distension.[11] Cryotherapy produces vasoconstriction and antiedema. It reduces the amount of leukocytes that migrate to afflicted tissues, hence lowering endothelial dysfunction and the inflammatory response. It also

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slows the rate of painful nerve impulses. In a study on teeth with vital pulps, Keskin et al. observed considerably reduced POP with cryotherapy using saline at 2.5°C compared to saline solution at ambient temperature in single visit root canal treatment.[17] Vera et al. discovered that intracanal cryotherapy can reduce post endodontic pain in patients with necrotic pulp and symptomatic apical periodontitis by employing 2.5°C cold saline solution for 5 minutes.[11] Cryotherapy was proven in a randomised multicenter clinical trial by Vera et al.[11] to minimize both the incidence of postoperative pain and the need for medication in patients with necrotic pulp and symptomatic apical periodontitis. The results of studies that evaluated the effect of cryotherapy on reducing postoperative pain in cases of irreversible pulpitis with and without apical periodontitis revealed that cryotherapy was effective only in patients with apical periodontitis, whereas there was no significant difference in the incidence of postoperative pain between the groups in patients with only irreversible pulpitis.[18,19] This could be linked to cryotherapy's anti-inflammatory action, which is achieved by the reduction in temperature caused by the administration of cold saline, resulting in a reduction in periapical tissue edema and inflammation.

A suitable dosage for cryotherapy has not been established; it is varied and varies from tissue to tissue. When only a small quantity of fat and muscle is present, such as on a finger, cryotherapy should last 3 to 5 minutes. When compared to more extensively afflicted tissue, such as the hip, where the required time is roughly 20 minutes, this time is modest.

It has been reported that at roughly 3°C, there is total deactivation of myelinated A fibers and deactivation of nonmyelinated C fibres, as dropping body temperature decreases peripheral nerve transmission.[20,21] Cryotherapy is often used in endodontics for POP control. Cryotherapy works by lowering localized temperature, which leads to decreased cellular metabolism, which affects peripheral nerve endings by lowering the threshold required to activate tissue nociceptors and the speed of painful nerve impulses.[22]

In this study, tooth vitality made no difference in post-endodontic discomfort. These findings, however, were not discussed in this study. These findings contradict those of Sipaviciute and Maneliene[23], who discovered that 47-60% of patients with asymptomatic necrotic pulp tissue exhibit post-endodontic pain, however the pulp status effect on post-endodontic pain is debatable. According to two recent studies that conducted cryotherapy research on single-visit root canal treatment (RCT), pain was reduced when compared to the control group. Vera et al[11] used cryotherapy on 105 patients with necrotic pulp and discovered that intra-canal cryotherapy can reduce post-endodontic discomfort.

Cryotherapy has limited contraindications, such as Patients with systemic disorders, such as Raynaud's disease, which affects nearby small blood arteries, Cold allergy can occur in conjunction with urticaria because histamine is released after reheating the zone, resulting in red dots in the skin and cold-induced erythema, resulting in post-therapy redness, itchiness, muscle contraction and relaxation, unbearable pain, and Hemoglobinuria, a disease of red blood cells in which they disintegrate so quickly that haemoglobin is unable to combine with blood proteins. Above all, cold therapy is not recommended in cases of decreased nerve sensitivity or in locations where bigger nerves are close to the surface.

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The application of cold saline irrigation reduces the exterior root surface temperature by more than 10°C for 4 minutes. This temperature reduction is sufficient to generate a local anti-inflammatory impact in the periradicular tissues. According to the findings of our study, cryotherapy is a simple, cost-effective, and nontoxic method for POP management. In endodontic practice, managing post-operative discomfort following root canal treatment is critical. It is an unpleasant feeling that is perceived as discomfort by patients, and it has a high occurrence rate ranging from 3 to 58%.[12] It must be treated by the Endodontist in order to lessen the likelihood of postoperative pain.

Conclusion

Postoperative pain is the result of a complex Multifactorial process that is influenced by factors inherent in patients, the tooth, and the operator, Prior studies have identified patient- and tooth-related factors that influence the incidence and duration of postoperative pain hence concluding within the limitations of the study that, though there is lesser incidence of post operative pain and reduced analgesic consumption for the cold saline group. In the present study results were not statistically significant even though cryotherapy group showed reduced pain scores, and reduced analgesic intake. However a larger sample size is required to prove the effectiveness of this novel technique of reducing postoperative pain.

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