

Effect of Intra-Canal Cryotherapy on Post-Endodontic Pain Within 24hrs in Single Rooted Teeth

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ABSTRACT

Objective: To evaluate the effect of 2.5°C cold saline irrigation as final irrigant on postoperative pain after single-visit root canal treatment in 24 hours in teeth with symptomatic apical periodontitis.

Study Design: Cross-sectional study

Place and Duration of Study: This study was conducted at the Department of Operative Dentistry at Isra Dental College Hyderabad from July 2019 to December 2019.

Materials and Methods: 60 patients after fulfilling the inclusion criteria were eligible and included to the study. The teeth were randomly divided into two groups (n = 30) (i.e. the control group and the cryotherapy group). In the cryotherapy group, final irrigation with 2.5°C saline solution for 5 min was performed following completion of root canal therapy, whereas in control group same solution stored at the root temperature was used. Treatments were performed in a single visit. Participants were asked to rate the intensity of their postoperative pain using visual analogue scale at 24 h.

Results: Data was analysed by Student's t test and Fissure Exact Test. In the cryotherapy group level of reported postoperative pain was significantly lower than the control group (P < 0.05, t-test).

Conclusion: The outcome of this investigation indicates that cryotherapy is one of beneficial strategy in reduction of postoperative pain in single visit endodontic treatment in teeth with symptomatic apical periodontitis.

Key Words: cryotherapy, endodontic pain, postoperative pain

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INTRODUCTION

Elimination of Post-operative pain is related to the success of endodontic therapy, many clinical studies have reported its occurrence in 3 and 58% of patients.^{1,2} Post-operative endodontic pain is more common scenario in teeth with necrosed pulp, but still the relationship between post-operative pain and pulpal status is controversial.

Multiple factors have been associated in eliciting pain in cases of irreversible pulpitis, pulp necrosis with symptomatic periapical periodontitis such as biological factors, inflammatory mediators, inflammatory exudates and psychological status.^{3,4}

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The regime mostly used to control post operative endodontic pain is usually through medications. commonly prescribed drugs are nonsteroidal anti-inflammatory drugs, paracetamol, or corticosteroids. These drugs are associated with side effects so different strategies have been tried to reduce post operative pain.⁵

Use of proper irrigant solution and elimination of microbes and their remnants has a profound effect on the reduction of post operative pain. the most commonly used root canal irrigation solution is Sodium hypochlorite (NaOCl) which have both tissue-dissolving and antimicrobial properties.⁶ NaOCl have high surface tension due to which its penetration into irregularities of the root canal system is somewhat limited in canals with fins, isthmi and dentinal tubules.⁷ In addition NaOCl also do not have any residual antimicrobial activity⁸, infected or contaminated dentin may turn a potential source of persistent apical periodontitis.

In 2004 Nadler et al.,⁹ stated that "Cryotherapy is the application of cold material to lower the temperature of the surrounding tissues to control pain". by using cold saline (2.5 °C) for 5 min which can reduce temperature of the outer surface of the root more than 10 °C which can reduce the effects of inflammation on the periradicular tissue.¹⁰ In an in-vitro study, a higher reduction in the Enterococcus faecalis count was

obtained by sodium hypochlorite (NaOCl) followed by cryotherapy when compared to NaOCl alone.¹¹

MATERIALS AND METHODS

The study was approved by the local clinical research ethics committee of the ISRA Dental College Hyderabad, before starting treatment patients an informed consent was obtained and preoperative pain was recorded using visual analogue scale (VAS). 60 adult patients with either gender, age range between 18 to 60 years. Single rooted carious teeth. With pain associated with affected teeth confirmed by vertical percussion were included in the study Patients with Previously root canal treated teeth. Immature teeth with incomplete root formation. Teeth with internal or external resorption. Multi rooted teeth. Teeth with periodontal disease and mobility were excluded.

Data Collection Procedure: The 60 patients were randomly divided by envelop method into two equal groups (60 in each) group A and B respectively. The preoperative apical diagnosis was determined according to the radiograph and percussion test. Then anaesthesia (lidocaine 2% with adrenaline 1:80000) was given to the patient, and rubber dame was placed. For each tooth, proper access cavity preparation was done, followed by pulp extirpation and working length determination then canals were enlarged with the hand files to size 25. The canals were irrigated with NaOCl then final irrigation was done with either 2.5 C saline or saline at room temperature for 2 min using side vented needle, then root canal treatment was completed. and patients were instructed to record their postoperative pain after 24 hours using the (VAS) scale. A refrigerator was used to obtain 2.5 C saline. And thermometer was used to measure the temperature.

RESULTS

There were total 60 patients who took part in this study. The age of the patients was between 18 to 60 years which were divided into different age groups (fig 1) with the mean age of 37.2 years. (table 1) The sample was divided equally into two groups namely Group A and Group B representing control group and cryotherapy group respectively. (Table 2), shows the gender distribution of both groups. There were 43.3% and 50% males in group A and B respectively. Also, 56.7% and 50% females were in control and cryotherapy groups correspondingly. The results in (Table 3) depicts The frequency of Postoperative pain was found to be higher in Control group in 24 hours then the cryotherapy Group and it was statistically significant (p < 0.05) with mean pain score 0.60 SD±.498 for group A and 0.30 SD ±.466 for group B. Moreover, to test if there exist a relationship between postoperative pain and periapical radiolucency in both Groups, we have applied the Fisher's Exact Test, shows

that the incidence of postoperative pain was higher in patients with periapical radiolucency.

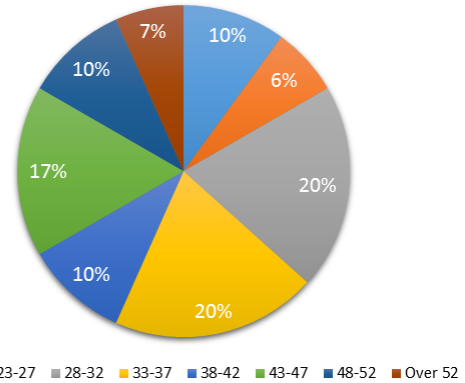


Figure No.1: Frequency of Different Age Groups

Table No.1: Age of Patients

Mean	37.2
Std. Deviation	10.2
Minimum	18 Years
Maximum	56 Years

Table No.2: Gender distribution of patients

Gender Distribution		
Group A	Males 13(43.3%)	Females 17(56.7%)
Group B	Males 15(50%)	Females 15(50%)

Table No.3: Number and Percentage of Post-Operative Pain After 24 Hours

	Group	pain		P-Value
		Yes	No	
Post-Operative pain	A	18 (60%)	12 (40%)	0.019
	B	09 (30%)	21 (70%)	

Table No.4: Mean and Standard Deviation of Post-Operative Pain

	Group A		Group B	
	Mean	SD	Mean	SD
Post-operative Pain	.60	±.498	.30	±.466

DISCUSSION

In this prospective cross sectional study cryotherapy was compared with the classic final irrigation protocol in teeth with symptomatic periapical periodontitis to reduce the post operative pain within 24 hours. The maximum postoperative pain was reported in single visit root canal treatment for symptomatic periapical periodontitis in 24 hours, which reduces significantly afterwards.¹² In this study the pulpal status

was no considered because the pulp status effect on post-endodontic pain is controversial.¹³

In this study Intracanal cryotherapy was used as a final irrigant with cold saline at a temperature of 2.5°C which reduces more than 10°C external root surface temperature.¹⁴ That is effective in reversing the effects of inflammation in short term application.

Cryotherapy is one of the innovative strategy to reduce post operative pain in single visit root canal treatment, in this study it was compared with room temperature normal saline irrigation as a final flush. We found statistical significant difference between two groups in reduction of post operative pain in first 24 hours which is in accordance with the studies of Al-Nahlawi et al., 2016;¹⁵ Keskin et al., 2016¹⁶ who also reported in reduction of post-operative pain in teeth with symptomatic apical periodontitis. In present study the teeth were selected irrespective of their pulpal status which is in contrast to the previous mentioned studies.

Alharthi and colleagues in 2019¹⁷ found through their research on the "Effect of intra-canal cryotherapy on post-endodontic pain in single-visit RCT: A randomized controlled trial" that there is no effect of temperature of normal saline in reduction of post endodontic pain in 24 hours as a final flush which is in contrast to our study which shows significant difference between control and cryotherapy in reduction of post operative pain.

In this study postoperative pain association with periapical radiolucency has been analysed through fissure test, that showed postoperative pain incidence is more in teeth with periapical radiolucency irrespective of the irrigation regimen which is in accordance with the studies conducted to evaluate the post operative pain and periapical radiolucency in single visit root canal treatment.¹⁸⁻²²

CONCLUSION

Post-operative endodontic pain reduction is most important aim of root canal treatment, mostly analgesic is prescribed for pain reduction, cryotherapy is one of beneficial strategy in reduction of postoperative pain in single visit endodontic treatment.

Author's Contribution:

Concept & Design of Study:	Madiha Zaighum
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Data Analysis:	Mehwish Memon, Talha Asad Khan, Hina Hassan
Revisiting Critically:	Madiha Zaighum, Sheba Ramzan
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Conflict of Interest: The study has no conflict of interest to declare by any author.

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