

Evaluation of Postoperative Pain after Using Dexamethasone Intracanal Rinse in Irreversible Pulpitis

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ABSTRACT

Objective: To evaluate the efficacy of dexamethasone as a final intracanal rinse in relieving postoperative pain of teeth with symptomatic irreversible pulpitis.

Study Design: Randomised controlled trial.

Place and Duration of the Study: Department of Operative Dentistry, PIMS, Islamabad, Pakistan, from June 2019 to December 2020.

Methodology: Sixty patients aged 18- 50 years diagnosed with symptomatic irreversible pulpitis were selected according to the inclusion criterion. After obtaining informed consent, root canal therapy (RCT) was initiated under rubber dam. Pulpectomy was done followed by canal preparation. The lottery method was utilised for the division of patients. Group A (experimental) received dexamethasone (4mg/ml in 5ml syringe) as a final rinse, while Group B (control group) recalled after 1 week and asked whether their pain had relieved or not as a yes/no question. After data collection teeth were obturated and permanent restoration was placed. Data were analysed using Chi-square test.

Results: The efficacy of dexamethasone as a final intracanal rinse was greater than saline 86.67% and 20.0%, respectively ($p < 0.05$) in relieving postoperative pain in teeth with symptomatic irreversible pulpitis.

Conclusion: Dexamethasone was proved to be more efficacious than saline in alleviating postoperative pain when used as a final intracanal rinse after canal instrumentation.

Key Words: Irreversible pulpitis, Dexamethasone, Postoperative pain, Pulpectomy.

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INTRODUCTION

Pain following root canal treatment (RCT) is a multifactorial phenomenon contributed by mechanical, chemical, host, and bacterial factors. It is the leading reason that prevents patients from attending the dental clinic.¹ Various studies have shown that the maximum pain incidence is usually seen during the first 24-72 hrs.² Endodontic treatment aims for elimination of bacteria along with their infectious byproducts from the root canal system.³

Ideal target population for pain research should be patients with preoperative pain because they are at an increased risk of developing postoperative pain.⁴ A plethora of strategies have been used to reduce postoperative pain. One of these is utilising intra-canal medications such as narcotics analgaesics, steroids or NSAIDs.⁵

Along with this, disinfection of the root canal system by mechanical preparation and use of irrigating solutions hastens the resolution of pulpal and periapical pathology.

Glucocorticosteroids inhibit phospholipase A2 enzyme leading to a reduction in prostaglandin and leukotriene levels and subsequently pain.⁶ Dexamethasone is being successfully used as an intracanal medicament, irrigating solution, and a tablet for pain relief in endodontics.⁷

A study conducted by Ali *et al.* showed that teeth treated with intracanal steroids were effective in decreasing the occurrence of pain after canal instrumentation in 55% patients when used alone and in 47.5% when used as a combination with calcium hydroxide.⁸ A study by Applebaum *et al.* concluded to be in favour of efficacy of steroid group as compared to saline for pain relief.⁹ Another study by Moscow *et al.* received statistically significant results in favour of intracanal steroids.¹⁰

Multiple studies have been conducted on the use of steroids as intracanal medicaments in the past. The dearth of studies regarding dexamethasone as a rinse formulation in endodontics necessitates thorough research and evaluation for analgaesia in the field of endodontics. The aim of this study was to determine the efficacy of using dexamethasone as an intracanal rinse following canal preparation to reduce concerns regarding systemic absorption.

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Table I: Gender-based distribution of patients.

	Group A (n=30)		Group B (n=30)		Total (n=60)	
	No. of patients	%	No. of patients	%	No. of patients	%
Male	15	50.0	17	56.67	32	53.33
Female	15	50.0	13	43.33	28	46.67

Table II: Stratification of dexamethasone rinse analgaesic efficacy with respect to age groups.

Age (years)	Group A (n=30)		Group B (n=30)		p-value
	Analgesia efficacy		Analgesia efficacy		
	Yes	No	Yes	No	
18-35	16 patients	03 patients	04 patients	14 patients	0.0001
36-50	10 patients	01 patient	02 patients	10 patients	0.0001

METHODOLOGY

The study was done with the approval of the ethical board of the Pakistan Institute of Medical Sciences (PIMS), Islamabad, Pakistan (Approval No. F. 1-1/2015/ERB/SZABMU/403). Verbal and written consent were obtained from the patients who met the inclusion criterion, which included healthy patients of both genders aged 18-50 years, with diagnosis of irreversible pulpitis and patients with preoperative moderate to severe pain (4 to 10) on VAS scale. Teeth with anatomical difficulties like calcified canals, furcation involvement, cases of endodontic-periodontic lesions, tooth mobility, pregnant females or patients with unstable systemic disease that might hinder dental treatment and history of corticosteroid allergy formulated the exclusion criterion. Sample size calculation indicated a sample size of sixty patients in total (thirty in each group) using the WHO calculator.

Following rubber dam application for proper isolation, the carious lesion was removed completely. The access cavities were prepared using a turbine handpiece. Pulp extirpation was done using barbed broaches and the root canal systems were adequately disinfected with normal saline solution before canal preparation. Cleaning and shaping of the canal was done till the calculated working length using the Protaper Universal rotary file system. After the chemo-mechanical preparation was done, the lottery method was used for equal division of patients. Group A (experimental) received dexamethasone as the final rinse (4mg/ml in 5ml syringe) while Group B (control) received saline as the final rinse. The access cavity was filled with a temporary filling (Cavit). Patients were recalled after one week and asked whether their pain had relieved or not as a yes/no question on the same visit. After collection of the data, teeth were obturated and permanent restoration was placed to finish off the RCT.

Data were analysed using SPSS software version 23. Chi-square test was used to analyse the data. A p-value less or equal to 0.05 was considered significant. Age was analysed using mean and standard. Frequencies and percentages were calculated for gender and pain efficacy between the two groups.

RESULTS

From a total of 60 patients, 32 (53.33%) were males and 28 (46.67%) were females, with male-to-female ratio of 1.1:1 as shown in Table I. The mean age of patients in Group A was 32.93 ± 8.14 years and in Group B was 33.30 ± 8.22 years.

The study showed greater efficacy of dexamethasone as an intracanal rinse in 86.67% of the experimental group as compared to only 20% in the control group. There was a significant difference between the two groups in relieving postoperative pain after canal instrumentation in teeth with symptomatic irreversible pulpitis ($p < 0.001$).

The efficacy of dexamethasone rinse as an analgaesic with respect to age groups was stratified for both groups and results are shown in Table II. Younger patients had higher frequencies of pain relief in both experimental and control groups owing to the fact that they have better periapical supply that leads to faster healing response of the periodontal tissues. Older patients show lesser frequencies in terms of pain relief in both experimental and control groups.

DISCUSSION

Pain after or during endodontic treatment is a frequent result of injury or insult to the peri-radicular tissues leading to flare-up of the underlying peri-radicular pathology.¹¹ Patients undergoing endodontic treatment usually complain of a painful sensation or sensitivity in the treatment area. Some studies reported that endodontic therapy patients report being in the most pain the day after treatment.¹²

For alleviating pain during endodontic therapy, clinicians resort to various measures such as occlusal reduction, incision and drainage, trephination, pulpectomy as well as measures like hypnosis and anxiety reduction.¹³ New advances in biomaterials, dental operating microscope (DOM) and improved root canal preparation armamentarium have led to higher success.¹² The role of analgaesics, opioids or corticosteroids to control and minimise postoperative pain

is extensive. The first course of action for analgesia is the use of local anaesthetics followed by nonopioid and then opioid analgesics. In case of failure, corticosteroids are the next available option.¹⁴ Stewart described corticosteroid application to reduce preoperative, intraoperative, and postoperative endodontic pain as early as 1956.¹⁵ No conclusive guidelines could be fabricated till date for the ideal route of administration of desired corticosteroid.

Corticosteroids have multiple sites of action and have a robust anti-inflammatory action credited to the inhibition of phospholipase.¹⁶ They suppress the inflammatory response by decreasing the permeability of vessels and inhibiting the formation of arachidonic acid dexamethasone is one of the most commonly used drugs of this family that is being extensively studied and used for endodontic pain relief. It can be delivered as an intracanal rinse, intracanal medication, intra-ligamentary injection or in preoperative tablet form.¹⁷ Dexamethasone belongs to a family of long-acting steroids with a biological half-life between 36 and 72 hours. They should be considered only when other anti-inflammatory drugs have been proven useless.¹⁸

Ledermix paste presents itself as a reliable treatment option for irreversible pulpitis once the inflammatory pulp has been removed from the root canal system. Triamcinolone is one of the ingredients of ledermix. It is used to calm down the periradicular area that may have become irritated as a result of instrument overuse. As a result, it directly affects these tissues to lessen inflammation and attain a state of analgesia that the patient desires.¹⁹

Taking into consideration the historical studies and reviews done on steroids, it has been safely concluded that systemic steroids are effective when used as an aide, rather than a replacement, to endodontic treatment in the alleviation of post-treatment pain. Dexamethasone provides adequate anaesthesia during the first 24 hours, which is the period during which patients report the most pain.²⁰ A prior literature review recommends steroids to ideally be delivered at least a few hours preoperatively.²¹

According to a study, out of total 280 patients, 93 patients (63.3%) in the steroid group had no pain at all, whereas in the control group, 64 patients (48.1%) had no pain ($p = 0.01$).⁹ In another study postoperative pain evaluation at 24 hours showed that 22 out of 26 patients receiving steroid showed no pain as compared to 12 out of 22 patients who received saline solution (Chi-square = 6.77, $df = 1$ $p < 0.05$).¹⁰ A systematic review by Nogueira et al. studied the use of dexamethasone for pain alleviation in cases of symptomatic irreversible pulpitis.²⁰ The results showed a statistically significant difference favourable to dexamethasone group at 8 hours (RR = 1.97), 13 hours (RR = 2.54), and 24 hours (RR = 2.58). Glassman et al. compared inter-appointment administration of dexamethasone and a dextrose orally in

patients with asymptomatic inflamed pulps.²² It was found that dexamethasone effectively inhibited pain. Moskow et al. were among the first to use local corticosteroid by placing them within the root canal.¹⁰ It was concluded with a statistically significant difference between the dexamethasone and the placebo group after 24 hours. Study conducted by Yousaf et al. concluded that results were not statistically significant and normal saline, chlorhexidine, and dexamethasone when combined with calcium hydroxide were all effective in pain reduction after endodontic therapy however dexamethasone group showed the most pain reduction amongst all groups.¹¹

This method of endodontic analgesia has rarely been used and documented. The positive results of this study will open new avenues for dentists to master analgesia and provide higher levels of comfort to the patients during and after endodontic treatment.

CONCLUSION

Dexamethasone when used as a final intracanal rinse after canal instrumentation proved to be more efficacious in alleviating postoperative pain as compared to normal saline. This study recommends the use of dexamethasone routinely prior to obturation in teeth with symptomatic irreversible pulpitis in order to reduce pain.

ETHICAL APPROVAL:

The study was approved by the ethical review board (ERB) committee of the Shaheed Zulfiqar Ali Bhutto Medical University, Pakistan Institute of Medical Sciences (PIMS), Islamabad. (Approval No. F. 1-1/2015/ERB/SZABMU/403 Date: 28-03-2019).

PATIENTS' CONSENT:

Informed consent, both written and verbal, were obtained from the patients prior to initiating the procedure.

COMPETING INTEREST:

The authors declared no conflict of interest.

AUTHORS' CONTRIBUTION:

ID, AM: Conception and study design.

ID, AM, MAZ, AM: Data acquisition and drafting of the manuscript.

ID, SM, MRM: Data analysis and interpretation.

MRM, SM, ID, MAZ: Manuscript revision.

All authors approved the final version of the manuscript to be published.

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