ORIGINAL ARTICLE

POST-OPERATIVE PAIN AFTER USE OF INTRA-CANAL CORTICOSTEROID IN ROOT CANAL TREATMENT OF VITAL TEETH

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ABSTRACT

Endodontic therapy carried out on vital pulps is associated with an increased incidence and intensity of pain. Various intra-canal medicaments are proposed to reduce post-operative pain after Root canal treatment. The objective of the study was to determine the frequency of post-operative pain after use of intra-canal dexamethasone in root canal treatment of vital teeth when compared with the Prednisolone. One hundred and twenty patients (with age range between 18-50 years) were randomly divide into two equal group. One group received Decadron (dexamethasone 4mg / ml) intravenous solution as intra-canal medicament, and the 2nd group received prednisolone acetate solution 2.5% in aqueous suspension obtained as commercial preparation. After 24 hours Post-operative pain was marked on Visual Analog Scale. There was statistically significant difference ($p<0.05$) between dexamethasone and prednisolone groups, with dexamethasone being more effective in reducing post-operative pain.

Key Words: *post-operative, pain, corticosteroids, intra-canal, root canal treatment, vital teeth.*

INTRODUCTION

Endodontic procedures are a necessary evil required to salvage teeth. Postoperative endodontic pain is notoriously more severe and frequent in comparison to other dental procedures.[1]

Pathogenesis of postoperative endodontic pain is linked to inflammatory reactions. The pathway of inflammation involves release of numerous chemical mediators, such as prostaglandins, leukotrienes, prostacyclins, lymphokines and chemokines like interferon-á (IFN-á), interferon ã (INF ã), interleukin-1 (IL-1), IL-8, histamine, 5-hydroxytryptamine (5-HT), and tissue necrosis factor-á.[2] These mediators are responsible for various cellular and tissue changes which eventually result in pain and swelling.[2]

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Glucocorticoids are steroid agents that have potent anti-inflammatory effects. They have the ability to block both acute and chronic inflammatory pathways by preventing the phospholipids in cellular membranes from converting into arachidonic acid. Hence, release of chemical mediators such as prostaglandins, thromboxane A2, prostacyclin and leukotrienes is inhibited.[2]

Glucocorticoids are principle ingredients of an intra-canal medicament known as Ledermix. Owing to the anti-inflammatory properties of glucocorticoids, this medicament has been documented to reduce postoperative pain during root canal treatment.[3] Both dexamethasone and prednisolone are corticosteroids with predominantly glucocorticoid activity. Regarding anti-inflammatory potential, dexamethasone is five to six times as potent as prednisolone.[4] Chance et al determined that placement of prednisolone in the canal of patients with vital pulp tissue was accompanied by a statistically significant ($p=0.007$) reduced incidence of post-operative pain after 24 hours (37%).[5] Similarly another study showed dexamethasone to be significantly associated with reduced post-operative pain frequency after 24 hours of treatment.[6]

Locally corticosteroids alone are not used as intra-canal medicament in root canal treatments in dental practice. This study is to explore the role of prednisolone and dexamethasone in preventing post-operative pain

after initial endodontic instrumentation in root canal treatment of vital teeth in order to make the endodontic procedure more comfortable for the patient.

METHODOLOGY

An approval for this study was obtained from the ethical committee of the Islamic international dental hospital (IIDH). One hundred and twenty patients reporting to the out patient department of operative dentistry and endodontics were assessed for eligibility to participate in this clinical trial. Informed written consent was obtained from each subject. Preoperative radiographs and pretreatment pulp vitality testing (cold test and electric pulp test) was carried out. Patients were divided randomly into two equal groups each based on Lottery Method. Preoperative pain assessment was done by using Visual Analogue Scale. One group received Decadron (dexamethasone 4mg/ml) intravenous solution as intra-canal medicament, and the 2nd group received prednisolone acetate solution 2.5% in aqueous suspension obtained as commercial preparation. After coronal access cavity preparation, Working Length determination to the radiographic apex was obtained, and the canal preparation was accomplished by using the step-back technique. The minimum diameter of the apical one-third of each prepared canal was equivalent to a standard #25 K file. The canal was dried with paper points, then 0.1cc of solution was placed into the canals of respective group and worked apically with a pumping motion by means of #25 K file. The canals were then dried with paper points to within 3mm of the apex to allow some residual solution to remain in contact with periapical tissues. A sterile cotton pellet moistened with saline was used to cover the canal orifice(s) and the access cavity was sealed to a 3- to 4-mm. depth with Cavit. Patients were called after 24 hours and post-operative pain status was evaluated by Visual Analogue Scale.

The scale was divided into 4 categories:

No pain=0.

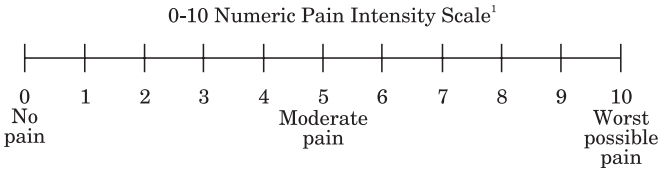
Mild pain but no medication required=1-3

Moderate pain that required a mild analgesic=4-7

Severe pain that required narcotic =8-10.

RESULTS

One hundred and twenty subjects participated in this study, divided into two groups of 60 participants each received prednisolone and dexamethasone as intra-canal medicament respectively. The participants aged between 18-50 years as a whole in both genders. Out of 120 patients 45(38%) patients were in the age range of 18-28 years, 52 (43%) patients in the age range of 29-39 years and 23 (19%) were in the age range of



Post Operative Pain Marking (Visual Analogue Scale)

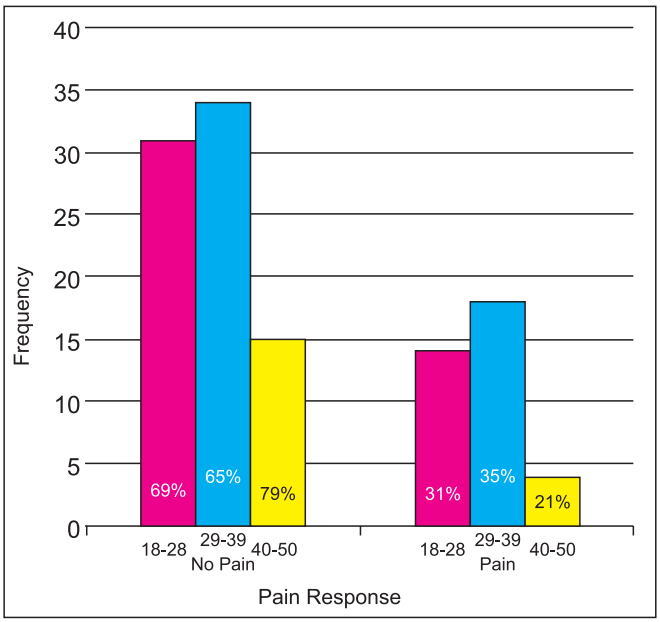


Fig 1: Comparison of Age group and perception of pain

TABLE 1: AGE GROUP, FREQUENCY DISTRIBUTION AND RESPECTIVE PERCENTAGES

Age	Frequency	Percentage
18-28	45	37.5%
29-39	52	43.3%
40-50	23	19.2%
Total	120	
Mean Age	32.1 Years	
Standard Deviation	7.29 Years	

TABLE 2: COMPARISON OF POST-OPERATIVE PAIN BETWEEN DEXAMETHASONE AND PREDNISOLONE GROUP (USING CHI SQUARE TEST)

	No Pain	Pain	Total
Dextamethasone	49	11	60
Prednisolone	31	29	60
Total	80	40	120
P Value	0.000 (<0.01)		

40-50 years. The mean age of the participants was 32.1±7.29 (Table 1). Gender-wise, 67 participants were females and 53 were males.

Out of 45 participants in age group (18-28), 31(69%) participants experienced no post-operative pain. Out of 52 participants in age group (29-39), 34(65%) experienced no pain and in age group (40-50), 15(79%) participants experienced no pain.(Figure 1) Out of 120 teeth that were involved, 66.7 percent were anterior teeth and 33.3 were posterior teeth.

Out of 60 patients who received dexamethasone as intra-canal medicament, 49 patients experienced no pain after 24 hours and 11 patients reported with pain. While out of 60 patients who received prednisolone, 31 patients reported no pain and 29 patients reported with pain after 24 hours (Table 2). Chi square test was used to compare the two groups for significance. The result showed p value < 0.05, hence, there was statistically significant difference between the two groups (Table 2).

DISCUSSION

The purpose of this study was to determine the role of Dexamethasone and prednisolone as intra-canal medicament in reducing post-operative pain in patients undergoing root canal treatment of vital teeth. Post-operative pain following endodontic treatment of vital teeth most likely is caused by a combination of residual inflammatory mediators still present immediately following treatment. Such mediators can be the result of pulpal damage, but they can occur also due to over-instrumentation. Therefore, to control the initiation of pain clinically, an effective method would be to inhibit the inflammatory process. Corticosteroids have anti-inflammatory effects in periapical tissues following instrumentation in RCT.[7] In the past, several studies were conducted with the use of a corticosteroid as an intra-canal medicament.[3,4,5,6] The results of the present study suggests that dexamethasone as an intra-canal medicament reduce post-operative pain frequency significantly when compared to prednisolone. These findings are in agreement with the results of study by Moskow et al[6] who found that 84 percent of the patients on dexamethasone medication reported no pain at the end of the first 24-hour period of observation.

In another study Chance et al. found that 63 percent of the patients reported no pain after 24 hours after use of prednisolone as intra-canal medicament.[5] However the results of this study reported 52 percent patients with no pain when less potent prednisolone was used. In both studies, patient monitoring started 24 hours postoperatively. This study also monitor post-operative pain after 24 hours and therefore the short-term effect of the medication was not studied.

In this study, no incidence of postoperative flare-up or infection was found with the use of either dexamethasone or prednisolone. Theoretically, infection could have been a sequel of corticosteroid treatment because of the inhibition of the immune response that follows the use of steroids.

The probable reasons that no flare-up was found may be:

1 The apical pulps were vital and sterile,[8]

2 The treatment was performed under aseptic conditions[9]; and

3 The small amount of corticosteroid used resulted in very little immunosuppression.

To minimize the risks of infection, this study was restricted to teeth with vital pulps. Teeth showing periapical radiolucency were also excluded because corticosteroids affect bone healing. In the present study, no patient reported fever, malaise, lymphadenopathy, or swelling after 24 hours. However, a much larger study would be needed to assess this and other steroid-associated risks.

The methodology in this study like some previous ones[5,7,10] doesn't account for how much and over what time period the intra-canal medicament reaches the site of action, the periapical tissues. Very small concentrations of the agent are placed into the canal(s) and assuming apical patency of variable size must pass through the apical foramen via a concentration gradient against a potential back pressure from periapical transudate or exudate. This would seem to leave those studies that administered corticosteroids in a systemic manner (intramuscular, intraosseous, oral) in a known dose without any other agents as the critical ones in evaluating the efficacy of steroids in the ability to decrease endodontic pain.

Prior to interpreting the study it is important to remember that endodontic treatment itself has a major effect on reducing post treatment pain regardless of analgesic intervention.[11,12] This limitation is a problem in interpreting clinical studies in general and may explain why some endodontic clinical trials fail to detect analgesic treatment or only detect it in those patients with moderate/severe pain.' Another shortcoming of this study was the selected short observation period of 24 hours. It should have been extended to determine the full extent of the therapeutic effect of the drug, i.e., to at least 96 hours, assuring that the majority of the drug has been eliminated from the periapical tissues. Similarly, a long-term follow up on patients would allow studying any signs of recurring infection, attributable to the use of corticosteroids.

CONCLUSION

Dexamethasone as an intra-canal medicament during Root canal treatment of vital teeth appeared

to show a greater decrease in pain frequency over the observation period when compared to the prednisolone group.

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2	**Alia Ahmed:**	Supervised the study, Final approval of the version.
3	**Iffat Raza:**	Revised it critically for important intellectual content.
4	**Warda Khalid:**	Revised it critically for important intellectual content.