

EFFECT OF 2% CHLORHEXIDINE ROOT CANAL IRRIGATING SOLUTION ON POSTOPERATIVE PAIN

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ABSTRACT

The aim of this study was to determine the frequency of postoperative pain after cleaning and shaping of root canals using chlorhexidine irrigant for debridement. Study design was Randomized Controlled Trial. The study was conducted in Operative Dentistry Department, Armed Forces Institute of Dentistry, Rawalpindi from October 2013 to October 2014 over a period of 12 months.

A total of 220 patients with mandibular first premolar teeth having symptomatic irreversible pulpitis were divided into two equal groups. Group A patients were treated with 2% Chlorhexidine solution and Group B patients were treated with normal saline solution, that is, Control Group. Patient's pain response was recorded immediately after procedure and after 6 hours of treatment, using Visual Analogue Scale. Data was analyzed using SPSS version 20.

The studied subjects were 220 with mean age 32.84 (SD +8.836). Each Group had 110 patients. There was no statistically significant difference in the gender of the patients among both groups. Mild pain immediately after treatment was noted in 54.1% (n=119) of patients whereas 45.9% (n=101) patients had moderate pain. Mild pain after 6 hours of treatment was noted in 76.4% (n=168) of patients and 23.6% (n=52) had moderate pain.

Within the limitations of this study, it is concluded that the use of 2% Chlorhexidine solution did not had significant effect on the reduction of post-operative pain.

Key Words: Post-operative pain, Step down preparation technique, Root canal irrigants.

INTRODUCTION

Root canal therapy is thought of as a painful experience by many people.¹ With current concepts and methods, root canal treatment should be viewed as a mean of alleviating dental pain rather than to be a source of pain.² Ideal management of toothache needs the combination of correct diagnosis, followed by comprehensive treatment plan. In endodontics, the pain is relieved by chemo-mechanical preparation for the effective cleaning of causative organisms and obturation of the root canals that prevents and discourages the re-entry of infection causing flora into the root canal system.³

In case of acute irreversible pulpitis or necrosis, the endodontic treatment is treatment of choice. Acute

Irreversible pulpitis is characterized by the presence of severe pain that can be throbbing or stabbing in nature and is poorly localized. The intensity of pain is increased by the application of hot or cold stimuli. The duration of pain may take hours to days. In this case, the root canal treatment is indicated and can save the tooth from extraction.^{1,3}

Root canal treatment consists of preparation of the canals that include, cleaning and shaping of the root canals followed by the obturation of the canals. Latest concept of preparation is chemo mechanical preparation. This process of shaping and cleaning allows the effective and efficient cleaning of the root canal system from the infected micro-organisms that make the environment aseptic and is needed to cure the disease state. Different techniques are available for the canal preparation. Regardless of the preparation technique, copious amount of irrigation is required during preparation of canals to get the maximum beneficial results.

A number of antimicrobial irrigants have been recommended for cleaning and shaping of root canals. These materials are frequently placed in intimate contact with the tissues of the periodontium. Most irrigants

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and medications are cytotoxic to the host tissues, and consequently, there is virtually a universal consensus that their use should be restricted to the root canal. Clinical trials have shown that substances used for irrigation or intracanal medication may have no influence on the occurrence of postoperative symptoms. However, severe reactions have been reported after extrusion of some commonly used substances to the periradicular tissues.⁶ It is highly desirable that the chemical agents selected as an endodontic irrigants possess four major properties: antimicrobial activity, dissolution of organic tissues, aid in debridement of the canal system and nontoxicity to periapical tissues.⁷

The most popular endodontic irrigant is 5.25% sodium hypochlorite (NaOCl), which has been used well over four decades. Although it is an effective antimicrobial agent and an excellent organic solvent,⁸ it is known to be highly irritating to the periapical tissues,⁹ mainly at high concentrations. For this reason, the search for another irrigant with a lower potential to induce adverse effects is desirable. Attempts have been made to find other efficient irrigants with a high antimicrobial action and low toxicity.

2% Chlorhexidine gluconate (CHX) has been suggested as an alternative irrigating solution that could replace NaOCl. CHX is a cationic bisguanide that seems to act by adsorbing onto the cell wall of the microorganism and causing leakage of intracellular components. At low concentration, CHX has a bacteriostatic effect and at high concentration it has a bactericidal effect because of precipitation and/or coagulation of intracellular constituents.¹⁰ Its optimal antimicrobial activity is at pH 5.5-7.0.¹¹ CHX has a broad-spectrum antimicrobial activity, targeting both gram-positive and gram-negative microbes.¹²

The rationale of this study is to determine the frequency of postoperative pain, caused due to change in the bacterial load during disinfection of root canal, following irrigation using 2% CHX solution, so that a better root canal irrigant may be used in future for minimizing the inter appointment pain.

METHODOLOGY

Ethical approval was obtained from Armed Forces Institute of Dentistry (AFID). Randomized Controlled Trial (RCT) study was conducted in Operative Dentistry Department of Armed Forces Institute of Dentistry (AFID), Rawalpindi over a period of 12 months. Sample size of 220 was selected that is 110 patients in each group. Sample technique used was probability simple random sampling technique. Inclusion criteria consisted of patients of both genders aged 16-45 years with mandibular first premolars having symptomatic irreversible pulpitis. Exclusion criteria consisted of patients with acute abscess, incompletely formed root apices, teeth requiring retreatment, patients on medications like analgesics, anti-inflammatory or tricyclic anti-depressants, patient with allergy to endodontic medication and teeth with grade II or III mobility.

Data collection procedure consisted of diagnosis of symptomatic pulpitis determined by history, clinical examination, response to thermal and electrical pulp tests, cavity tests and radio-graphs. Resident of Operative Dentistry conducted this study. Patients were randomly divided into two equal groups, group A and group B, using lottery method following single blind technique. Teeth were anesthetized, isolated using rubber dam and were reduced out of occlusion, access cavity was made by sterile round bur in high speed hand-piece. Initial glide path was obtained by using #10 K-file of 0.02 taper. Working lengths were determined with an apex locator (J. Morita MFG Corp) and were confirmed using radiographs. Canals were prepared with step down technique to an apical ISO size of 30 using two different root canal irrigants. In Group A, 2% chlorhexidine solution and in Group B (control group), normal saline solution were used as endodontic irrigants. All root canals were irrigated with syringe that was placed down the canal and 3 mm short from apex. All canals were then dried using sterile paper points. After placing dry sterile cotton pellet in the pulp chamber of each tooth, the access cavity were closed with provis temporary restoration (Favodent Karl Huber GmbH). No intracanal medications were placed in any of the teeth in this study. The pain response was recorded by operative dentistry resident in Performa immediately after procedure and 6 hours after procedure using visual analogue scale. Patients who faced swelling and other side effects after their instrumentation appointment could contact endodontist for advice of medications or early appointment.

Data was analyzed by using SPSS 20. Descriptive statistics were presented for both qualitative and quantitative variables. Mean + S.D was calculated for age and VAS score. Frequency and percentages for gender and intensity of pain were calculated. Chi-square test was used to compare frequency of pain between the two groups. P value less than 0.05 was considered as statistically significant.

RESULTS

The studied subjects were 220 patients with mean age 32.84 (SD \pm 8.836) requiring treatment for mandibular first premolars having symptomatic irreversible pulpitis. Each Group had 110 patients. There were 72 males and 38 females in Group A which were treated using CHX as root canal irrigating solution. In Group B (control Group), there were 71 males and 39 females which were treated using normal saline as root canal irrigating solution. There was no statistically significant difference in the gender of the patients among both groups. (Table 1)

Proportion in percentages was determined for patients among which 65% (n=143) patients were male and 35% (n=77) patients were female. Patients below the age of 30 years accounted for 26.4% (n=58) and 73.6% (n=162) patients were above 30 years of age.

Pain was noted on visual analogue scale immediately after treatment and 6 hours after treatment. Mild pain immediately after treatment was noted in 54.1% (n=119) of patients and 45.9% (n=101) patients had moderate pain. Patients who had mild pain after 6 hours of treatment were 76.4% (n=168) and 23.6% (n=52) had moderate pain.

TABLE 1: GENDER DISTRIBUTION IN BOTH GROUPS CROSSTAB

| Count | | Group | | Total |
|-------------------------------------|--------|---------|---------|-------|
| | | Group A | Group B | |
| Gender | Male | 72 | 71 | 143 |
| | Female | 38 | 39 | 77 |
| Total | | 110 | 110 | 220 |
| Using Chi-Square test, p value=.888 | | | | |

TABLE 2: VISUAL ANALOG SCALE AFTER IMMEDIATELY TREATMENT CROSSTAB

| Count | | Group | | Total |
|---------------------------------------|---------------|---------------------|---------------------|-------|
| | | Chlorhexidine Group | Normal Saline Group | |
| Immediate VAS Groups | Mild pain | 56 | 63 | 119 |
| | Moderate pain | 54 | 47 | 101 |
| Total | | 110 | 110 | 220 |
| Using Chi-Square test, p value = .344 | | | | |

TABLE 3: VISUAL ANALOG SCALE AFTER 6 HOURS OF TREATMENT CROSSTAB

| Count | | Group | | Total |
|-------------------------------------|---------------|---------------------|---------------------|-------|
| | | Chlorhexidine Group | Normal Saline Group | |
| VAS groups after 6 hours | Mild pain | 85 | 83 | 168 |
| | Moderate pain | 25 | 27 | 52 |
| Total | | 110 | 110 | 220 |
| Using Chi-Square test, p value=.751 | | | | |

Immediately After Treatment

After 24 hours, in Group A, 56 patients had mild pain, 54 patients had moderate pain and no patient had severe pain. In Group B, 63 patients had mild pain, 43 had moderate pain and no patient had severe pain. P-value was 0.344, which is insignificant. (Table 2)

After 6 hours

After 6 hours, in Group A, 85 patients had mild pain, 25 patients had moderate pain and no patient had severe pain. While in Group B, 83 patients had mild pain, 27 patients had moderate pain and no patient had severe pain. P value was 0.751. (Table 3)

There was no statistically significant difference when baseline characteristics like age and gender amongst patients treated with Chlorhexidine and normal saline root canal irrigants (p value>0.05).

There was no statistically significant difference in VAS score between the groups immediately after procedure and 6 hours follow up (p value>0.05).

DISCUSSION

Pain can be present before the dental treatment starts and can be present or absent during or after the treatment. Most common causes of pain after dental treatment are the result of certain pre-existing factors relating to tooth or can be because of certain iatrogenic factors during treatment phase. Apprehensive patients are more sensitive to pain in general, than those who are relaxed. Visual analogue scale is one of the most commonly used method to determine the amount of pain in many studies.^{1,2,6,8,12,13}

Successful endodontic treatment involves removal of necrotic tissue, bacterial infiltrates, and accumulated procedural debris. However, available irrigants may potentially cause postoperative pain which results in discomfort for the patients. The importance of irrigation used in root canal therapy cannot be understated. While mechanical instrumentation may remove significant numbers of bacteria in a canal system, the remaining bacteria can cause or sustain periradicular tissue inflammation.¹³⁻¹⁵ Therefore, antibacterial irrigation is of great importance to help eliminate or reduce bacteria to a level that allows tissue healing.

In the clinical realm of practice, the goal of endodontic therapy is to reduce bacterial populations in an infected canal to levels that are not detectable by culture procedures.¹⁴ In several studies, chlorhexidine as an irrigant has been shown to lower the number of post irrigant positive bacterial cultures, as well as the number of colony-forming units remaining in positive cultures.¹³ Because of its cationic properties, chlorhexidine can bind to surfaces covered with acidic proteins, such as the hydroxyapatite component of dentin, and be released at therapeutic levels, a phenomenon known as substantivity. This can occur in 48 hours to 72 hours after instrumentation.¹⁸⁻²⁰ In this study there was no significant difference in the inter appointment pain with

the use of chlorhexidine or normal saline irrigant which is almost similar to the results in other studies like in a study by Munir et al 65% subjects had mild pain and 35% subjects had moderate pain with chlorhexidine irrigant after 2 hours.²¹ The minor difference in results from our study is due to the factor of time because in our study 77.27% (n=85) had mild pain and 22.72% (n=25) had moderate pain after 6 hours with the use of chlorhexidine irrigant.

In another study there was significant difference in the pain experienced by patients with the help of visual analogue scale in patient with chlorhexidine and without chlorhexidine. This is difference in result as compared to our study might be due to the fact that in our study only patients of pulpitis were included and any patient with apical pathology was excluded contrary to the other study which only excluded patient requiring incision and drainage. This strict criteria in study was made to exclude any other confounding factor for pain.¹

Many factors should be considered when choosing an irrigant for endodontic therapy, including antimicrobial activity, effect on bonding properties, toxicity, and the ability of the irrigant to dissolve tissue. While chlorhexidine has been shown to be an effective antimicrobial agent capable of killing the pathogens involved in endodontic infections, it still lacks the soft-tissue dissolution properties that assist in a more complete cleansing of the canal. If employed as a final irrigant, the beneficial properties of chlorhexidine, such as antimicrobial substantivity, could be incorporated into the endodontic therapy.

CONCLUSION

Within the limitations of this study, the use of 2% Chlorhexidine solution did not had significant effect on the reduction of post-operative pain.

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CONTRIBUTION BY AUTHORS

- Khurram Waheed:** Selected title and study design. Helped in methodology and data collection.
- Javed Iqbal Bangash:** Data collection/discussion writing.
- Shoaib Rahim:** Statistical analysis helped in results compilation.