

# Comparison the Clinical Effect of 2% Chlorhexidine and MTAD as Final Rinse in Controlling Post Operative Pain in Single Visit Root Canal Treatment

Rajesh Kumar<sup>1</sup>, Naresh Kumar<sup>2</sup>, Hareem Qazi<sup>3</sup>, Priya Rani<sup>4</sup>, Sarang Suresh Hotchandani<sup>5</sup>,  
Muhammad Muzamil Alvi<sup>6</sup>

<sup>1</sup>Assistant Professor Pediatric Dentistry Muhammad Medical & Dental College, Mirpur Khas

<sup>2</sup>Assistant Professor Operative Dentistry, Bhattai Medical & Dental College, Mirpur Khas

<sup>3-5</sup>FCPS Resident, Operative Dentistry & Endodontics Liaquat University of Medical and Health Sciences, Jamshoro

<sup>6</sup>MSc. Resident Operative Dentistry & Endodontics, Liaquat University of Medical and Health Sciences, Jamshoro

## Author's Contribution

<sup>1,3</sup>Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work, <sup>2</sup>Active participation in active methodology, statistical analysis, <sup>4,6</sup>Drafting the work or revising it critically for important intellectual content, <sup>5</sup>Final approval of the version to be published

Funding Source: None

Conflict of Interest: None

Received: Mar 27, 2022

Accepted: Aug 18, 2022

## Address of Correspondent

Dr. Sarang Suresh

FCPS Resident Liaquat University of Medical and Health Sciences, Jamshoro

hotchandanisarang@gmail.com

## ABSTRACT

**Objectives:** To compare the mean postoperative pain associated with the use of 2% chlorhexidine or MTAD as final rinse in cases of Symptomatic Apical Periodontitis presenting to the LUMHS operative dentistry department for single visit root canal treatment.

**Methodology:** This single blind randomized controlled trial was conducted at the Department of Conservative Dentistry LUMHS, Jamshoro from February to June 2018. We included 60 patients' teeth with symptomatic apical periodontics. Thirty patients in group A received 2% chlorhexidine solution, while thirty patients in group B received MTAD. Preoperative and postoperative pain levels were assessed using a visual analogue scale.

For qualitative variables such as gender, tooth type, and pre and postoperative pain, frequency and percentages were calculated. The chi-square test with a p value of 0.05 was used to compare the two groups.

**Results:** The mean age in both groups were 30 years. Most of the teeth involved in both groups were on the anterior side. Patients in group A had an average age of 30.97±7.29 years. There was no statistically significant difference in the mean pain score between groups at p=0.86 after 7 days, with a score of 0.97 for group A and 0.93 for group B, respectively.

**Conclusion:** Chlorhexidine and MTAD groups have been equally effective in reducing postoperative pain in a single visit as a final rinse.

**Keywords:** Chlorhexidine, MTAD, Symptomatic Apical Periodontitis, Single visit root canal treatment.

Cite this article as: Kumar R, Kumar N, Qazi H, Rani P, Hotchandani SS, Alvi MM. Comparison the Clinical Effect of 2% Chlorhexidine and MTAD as Final Rinse in Controlling Post Operative Pain in Single Visit Root Canal Treatment. *Ann Pak Inst Med Sci.* 2022; 18(3):170-174. doi. 10.48036/apims.v18i3.637

## Introduction

One visit endodontic therapy saves time, reduces inter-visit infection, and is more acceptable to patients.<sup>1</sup> Short and long-term results are excellent in irreversible pulpitis, but not in necrotic pulp or symptomatic apical periodontitis (SAP). In a single-visit endodontic procedure, pain and uncertainty about periapical healing are the most common side effects.<sup>2</sup>

The root canal and root dentin must be cleaned to treat SAP, which means killing or removing bacteria and their byproducts. The intra-canal dressing of calcium hydroxide has been around for a long time. Between appointments, it has been used to keep the canals bacterial-free, which means an additional dentist visit and the risk of inter-appointment infections. It is possible to eliminate bacteria in final rinses with 2% chlorhexidine and an MTAD solution containing tetracycline and detergent (MTAD). Because of its antimicrobial properties and strength, chlorhexidine is a powerful

antiseptic when used as a final irrigation. Bacterial cell walls can be opened up by using chlorhexidine. Because chlorhexidine has a positive charge, this is the reason why it's so effective.<sup>3</sup> The most commonly used irrigant for cleaning and shaping is sodium hypochlorite. Precipitates may form during the cleaning and shaping process when chlorhexidine is used along with sodium hypochlorite, causing the surface to be stained and difficult to seal. To remove the smear layer on the surface of root, another chelating agent must be used along with chlorhexidine.<sup>4,5</sup>

A new irrigant solution, MTAD (tween 80), contains 3% doxycycline, 4.25% citric acid, and 0.5% polysorbate 80 detergents. Final rinsing with MTAD removes more bacteria than any other irritant.<sup>6</sup> Doxycycline, an antibiotic with a broad spectrum of activity, is included in MTAD to provide antibacterial properties as well as to remove the smear layer from the sample. In order to retain its antibacterial properties, tetracycline can bind to dentine and slowly release from dentine. The smearing layer is removed by adding citric acid to the solution. Polysorbate is used to lower the solution's surface tension and make it more wettable.<sup>7</sup> An experiment was conducted to compare the mean postoperative pain in cases of Symptomatic Apical Periodontitis in one visit root canal treatment presented at the LUMHS operative dentistry department with 2 percent chlorhexidine or MTAD used as the final rinse.

## Methodology

This single blind randomized controlled trial was conducted at the Department of Conservative Dentistry LUMHS, Jamshoro from February to June 2018, following approval from CPSP and the institutional ethics review committee (CPSP/REU/DSG-1576). Study participants were chosen from among those who presented themselves to the dental outpatient department (OPD) who met inclusion criteria and provided their written consent to participate in the investigation. Prior to beginning treatment, every patient was compelled to sign a written informed consent form, and patients with symptomatic apical periodontitis in permanent teeth of either gender aged 18 to 50 years were included in the study. Patients with periodontitis or periapical abscesses, those with severe medical conditions, those taking long-term analgesics, or those taking antibiotics were not allowed to participate in the study.

The sample size was calculated using open EPI software taking the mean of both groups in the pilot study conducted prior to this study. 60 people were enrolled in this trial (30 in each group). The CHX-induced postoperative pain is statistically significant at  $2\pm 1.86$ . Post-operative discomfort was measured as an average of  $0.45\pm 0.69$  in the study's pilot participants. Root canals that were to be final rinsed with 2% chlorhexidine solution for 5 minutes before obturation were divided into groups A and B, and those root canals that were not final rinsed with 2% chlorhexidine solution were examined (in which the root canal was final rinsed with 1ml of MTAD bio pure for 5 minutes and additional 4ml for 1 minutes). A lottery system ensured that each patient had an equal chance of being placed in either group A or B. Endodontic treatment was performed using the standard criteria under rubber dam isolation in both groups with rotary endodontic files (Hyflex) and irrigation with 3% Sodium Hypochlorite without activation. With the help of a visual analogue scale, preoperative and post-operative pain levels were rated. Pain Levels 1-3: Moderate to Mild The pain levels range from 4 to 10 (with 4 being mild to moderate and 8 to 10 being severe). For a period of seven days, patients were given a proforma printed with a VAS scale on which to record the degree of discomfort they experienced throughout the day. To treat severe pain, a patient was given ibuprofen-600mg/BD medication, as well as a phone number to call the doctor, and he/she was instructed to come into the OPD without an appointment if necessary. The proforma was used to calculate the VAS score, which was used to gauge the clinical effects 7 days after surgery.

SPSS version 21 was used to enter and analyze data. For quantitative variables such as age, duration, and preoperative and postoperative pain scores, mean and standard deviations were calculated. For qualitative variables such as gender, tooth type, and pre and postoperative pain, frequency and percentages were calculated. The chi-square test with a p value of 0.05 was used to compare the two groups. Stratification was used to control for confounders such as age and gender. P 0.05 was used as the significance level for the post stratification t test.

## Results

The mean age in both groups were 30 years. Most of the teeth involved in both groups were on the anterior side. The difference in pre-operative pain scores between groups was not statistically significant [ $8.13\pm 0.77$  vs.

8.17±0.83; p=0.87]. After seven days, the mean pain score in group A was 0.97±0.61, and the mean pain score in group B was 0.93±0.86; the difference between the mean pain scores in the two groups was not statistically significant (p=0.86) except in patient with age more than 40 years. Age, gender, tooth type, and pre-operative discomfort were all stratified before the study, and no significant differences were found, as shown in Tables I-IV.

**Table I: Groups Compare Pre And Post Operative Mean Pain Score.**

Pain	Group A		Group B		P-Value
	Mean±SD		Mean±SD		
Pre-Operative Pain	8.13±0.77		8.17±0.83		0.87
Post-Operative Pain	0.97±0.61		0.93±0.86		0.86

**Table II: Age Group Comparison of Post Operative Mean Pain Score.**

Age	Groups	N	Post-operative		P-Value
			Mean Pain score	SD	
<30	A	17	0.88	0.60	0.496
	B	19	1.05	0.84	
31 to 40	A	8	1.00	0.75	0.999
	B	6	1.00	1.09	
>40	A	5	1.20	0.44	0.035
	B	5	0.40	0.54	

**Table III: Gender Differences in Post-Operative Mean Pain Scores.**

Sex	Groups	N	Post-Operative		P-Value
			Mean pain score	SD	
Male	A	10	1.10	.568	0.926
	B	14	1.07	.829	
Female	A	20	.90	.641	0.737
	B	16	.81	.911	

**Table IV Comparison Of Post-Operative Measured Pain Scores Based On Tooth Type.**

Tooth Type	Groups	N	Post-Operative		P-Value
			Mean pain score	SD	
Posterior	A	10	1.00	0.66	0.652
	B	11	.82	1.07	
Anterior	A	20	.95	0.60	0.819
	B	19	1.00	0.74	

## Discussion

Patients and dentists alike have been concerned about endodontic pain for many years. Inter-appointment emergencies occurred in approximately 50 percent of the

patients who had root canal treatment in pulpless teeth, according to Torabinajed et al.<sup>8</sup> Microorganisms, changes in periapical tissue pressure, changes in chemical mediators, changes in cyclic mediators, and a variety of psychological factors can all play a role in the development and maintenance of chronic pain. Microorganisms in the canal are the most common cause of pain, due to a lack of proper disinfection. Root canal flora from infected patients revealed a wide range of microorganisms. Persistence of a painful periapical lesion may be caused by microorganisms that produce enzymes and endotoxins, which inhibit chemotaxis and phagocytosis.<sup>9</sup> A root canal infection must be treated successfully if the germs causing the infection are removed from the root canal space. As a result, it is often recommended that an antibacterial dressing be used after the preparation process is completed.<sup>10,11</sup>

The antimicrobial irrigant should ideally have the broad effect feasible against a wide range of bacterial species while not aggravating the surrounding tissue. Endodontists recommend chlorhexidine use inside the canal because it has a broad-spectrum antimicrobial effect. One benefit of chlorhexidine is its ability to hold onto root canal dentin while also being low in toxicity.<sup>12,13</sup> Despite its effectiveness in lowering postoperative discomfort, this combination was not compared to any other treatment and no attempt was made to assess the extent to which it offered pain relief.

For the treatment of infected root canals and the elimination of the bacteria *E.faecalis* and its isomer tetracycline-acid-detergent (MTAD) has been shown to be effective in removing the smear layer. Antimicrobial efficacy studies of MTAD compared to those of NaOCl and chlorhexidine have been few and far between. As an endodontic irrigant, it's unclear if it's better than NaOCl or Chlorhexidine.<sup>15</sup> Preoperative pain levels did not differ statistically significantly between groups, according to this study, except in patients older than 40 years. The mean pain score was not statistically different between groups after seven days.

A correlation was found between the frequency of flare-ups and the amount of necrotic pulp teeth in patients who had been treated many times.<sup>16,17</sup> To the contrary, root canal therapy was much more painful in teeth with irreversible pulpitis and acute apical periodontitis, as demonstrated by Segura-Egea et al.<sup>18</sup> There was no correlation between inter-appointment or after root canal

treatment obturation discomfort and tooth diagnosis by Harrison et al.<sup>19</sup> However, this is the first time that MTAD and NaOCl have been studied together, and the results show that MTAD is more effective than NaOCl at killing *E. faecalis* at 200 x dilution. When compared to other root canal irrigant and final rinse combinations, Shabahang<sup>20</sup> found that MTAD in combination with 1.3% NaOCl was the most efficient against *E. faecalis*. Seven of the eight *E. faecalis* strains studied by Newberry<sup>21</sup> were eliminated by using MTAD and 1.3 percent NaOCl. Davis<sup>22</sup> also reported that MTAD had considerably more zones of microbial suppression for *E. Faecalis* than NaOCl, Chlorhexidine, and Dermacyn did for this bacteria (a super oxidised water).

## Conclusion

In this study, chlorhexidine and MTAD were found to be equally effective as a single-visit final rinse to minimize postoperative discomfort. A decrease in microbial components that induce discomfort and inflammation can be achieved by using this irrigant during biomechanical canal preparation.

## References

1. Manfredi M, Figini L, Gagliani M, Lodi G. Single versus multiple visits for endodontic treatment of permanent teeth. *Cochrane database Syst Rev.* 2016;12(12):CD005296. <https://doi.org/10.1002/14651858.CD005296.pub3>
2. Tampi MP, Pilcher L, Urquhart O, Kennedy E, O'Brien KK, Lockhart PB, et al. Antibiotics for the urgent management of symptomatic irreversible pulpitis, symptomatic apical periodontitis, and localized acute apical abscess: Systematic review and meta-analysis-a report of the American Dental Association. *J Am Dent Assoc.* 2019;150(12):e179-216. <https://doi.org/10.1016/j.adaj.2019.11.001>
3. Jamil S, Jouhar R, Gandhi D, Tahira T, Shaikh J. Comparison between the mean postoperative pain score with two different file systems in patients with irreversible pulpitis-a clinical study in Altamash Institute of Dental Medicine. *Prof Med J.* 2019;26(08):1359-64. <https://doi.org/10.29309/TPMJ/2019.26.08.89>
4. Abraham S, Raj JD, Venugopal M. Endodontic irrigants: A comprehensive review. *J Pharm Sci Res.* 2015;7(1):5-9.
5. Mostafa Mehaa, El-Shrief YAI, Anous WIO, Hassan MW, Salamah FTA, El Boghdadi RM, et al. Postoperative pain following endodontic irrigation using 1.3% versus 5.25% sodium hypochlorite in mandibular molars with necrotic pulps: a randomized double-blind clinical trial. *Int Endod J.* 2020 ;53(2):154-66. <https://doi.org/10.1111/iej.13222>
6. Dioguardi M, Gioia G Di, Illuzzi G, Laneve E, Cocco A, Troiano G. Endodontic irrigants: Different methods to

improve efficacy and related problems. *Eur J Dent.* 2018;12(3):459-66. [https://doi.org/10.4103/ejd.ejd\\_56\\_18](https://doi.org/10.4103/ejd.ejd_56_18)

7. Wong J, Manoil D, Näsman P, Belibasakis GN, Neelakantan P. Microbiological Aspects of Root Canal Infections and Disinfection Strategies: An Update Review on the Current Knowledge and Challenges. *Front Oral Heal.* 2021;2. <https://doi.org/10.3389/froh.2021.672887>
8. Torabinejad M, Kettering JD, McGraw JC, Cummings RR, Dwyer TG, Tobias TS. Factors associated with endodontic interappointment emergencies of teeth with necrotic pulps. *J Endod.* 1988 ;14(5):261-6. [https://doi.org/10.1016/S0099-2399\(88\)80181-X](https://doi.org/10.1016/S0099-2399(88)80181-X)
9. Prada I, Micó-Muñoz P, Giner-Lluesma T, Micó-Martínez P, Collado-Castellano N, Manzano-Saiz A. Influence of microbiology on endodontic failure. Literature review. *Med Oral Patol Oral Cir Bucal.* 2019;24(3):e364-72. <https://doi.org/10.4317/medoral.22907>
10. Plotino G, Cortese T, Grande NM, Leonardi DP, Di Giorgio G, Testarelli L, et al. New technologies to improve root canal disinfection. *Braz Dent J.* 2016;27(1):3-8. <https://doi.org/10.1590/0103-6440201600726>
11. Kumar N, Kumar R, Harjani P, Suresh S. Clinical Effects of Amoxicillin-clavulanate and Calcium Hydroxide as Intracanal Medicament on Inter appointment Pain among Symptomatic Apical Periodontitis. *J Bahria Univ Med Dent Coll.* 2021;11(4):144-7. <https://doi.org/10.51985/JBUMDC2021047>
12. Iqbal A. Antimicrobial irrigants in the endodontic therapy. *Int J Health Sci (Qassim).* 2012 Jun;6(2):186-92. <https://doi.org/10.12816/0005998>
13. Basrani B, Santos JM, Tjäderhane L, Grad H, Gorduysus O, Huang J, et al. Substantive antimicrobial activity in chlorhexidine-treated human root dentin. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 2002;94(2):240-5. <https://doi.org/10.1067/moe.2002.124002>
14. Punathil S, Moyin S, Bhat SS, Hedge S, Pai A, James J. Comparison of Antibacterial Effect of Calcium Hydroxide Combined with Chlorhexidine and Povidone-Iodine Against *Enterococcus faecalis* in Dentinal Tubules of Human Incisors: An In Vitro Comparative Study. *J Pharm Bioallied Sci.* 2020 Aug;12(Suppl 1):S448-52. [https://doi.org/10.4103/jpbs.JPBS\\_134\\_20](https://doi.org/10.4103/jpbs.JPBS_134_20)
15. Srikumar GP V, Sekhar KS, Nischith KG. Mixture tetracycline citric acid and detergent - A root canal irrigant. A review. *J Oral Biol Craniofacial Res [Internet].* 2013;3(1):31-5. <https://doi.org/10.1016/j.jobcr.2012.09.001>
16. Mor C, Rotstein I, Friedman S. Incidence of interappointment emergency associated with endodontic therapy. *J Endod.* 1992;18(10):509-511. [https://doi.org/10.1016/S0099-2399\(06\)81353-1](https://doi.org/10.1016/S0099-2399(06)81353-1)
17. Hotchandani SS, Harjani PR, Memon M. Comparative clinical assessment of working length endo - motor apex locator versus radiographic method in endo- dontic therapy. *J Muhammad Med Coll.* 2021;11:74-8.

18. Segura-Egea JJ, Cisneros-Cabello R, Llamas-Carreras JM, Velasco-Ortega E. Pain associated with root canal treatment. *Int Endod J*. 2009;42(7):614-20. <https://doi.org/10.1111/j.1365-2591.2009.01562.x>
19. Harrison JW, Baumgartner CJ, Zielke DR. Analysis of interappointment pain associated with the combined use of endodontic irrigants and medicaments. *J Endod*. 1981 ;7(6):272-6. [https://doi.org/10.1016/S0099-2399\(81\)80006-4](https://doi.org/10.1016/S0099-2399(81)80006-4)
20. Shabahang S, Torabinejad M. Effect of MTAD on Enterococcus faecalis-contaminated root canals of extracted human teeth. *J Endod*. 2003;29(9):576-9. <https://doi.org/10.1097/00004770-200309000-00008>
21. Newberry BM, Shabahang S, Johnson N, Aprecio RM, Torabinejad M. The Antimicrobial Effect of Biopure MTAD on Eight Strains of Enterococcus faecalis: An In Vitro Investigation. *J Endod*. 2007;33(11):1352-4. <https://doi.org/10.1016/j.joen.2007.07.006>
22. Davis JM, Maki J, Bahcall JK. An in vitro comparison of the antimicrobial effects of various endodontic medicaments on Enterococcus faecalis. *J Endod*. 2007;33(5):567-9. <https://doi.org/10.1016/j.joen.2007.01.015>