

COMPARISON BETWEEN EFFICACY OF MIXTURE OF 2% CHLORHEXIDIENE AND CALCIUM HYDROXIDE VS PLACEBO

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ABSTRACT

Objective: To compare the effect of mixture of 2% chlorhexidine and calcium hydroxide vs placebo on mean postoperative pain after endodontic treatment.

Materials and Methods: Two groups (30 patients in each group) were made to conduct this study. 2% Chlorhexidine in combination with calcium hydroxide was given to group a and placebo was administered to group b as intracanal medicament.

Results: There were 18 males in group-a and 15 males (50%) in group-b. In group-a, females were 12 (40%) and in group-b females were 15 (50%). Difference in mean postoperative score of group-a vs group-b (1.57 ± 1.07 Vs 7.17 ± 1.17) With p value < 0.001 Was significant. Age and gender stratification was also done.

Conclusion: 2% chlorhexidine in combination with calcium hydroxide has significantly reduced postoperative endodontic pain ($p < 0.001$) When used as intracanal medicament.

Keywords: Calcium Hydroxide, Chlorhexidine

INTRODUCTION

A considerable problem in treatment of root canal, especially in teeth with irreversible pulpitis is achieving proper anesthesia and effective control of postoperative endodontic pain. Tremendous advancement in root canal treatment and immense rise in the understanding about inflammation of associated periapical tissues has been created among endodontists, but even now pain after endodontic treatment is a serious challenge for dentist and patient.¹ Incidence of pain after endodontic treatment vary from 1.4 to 16%.²

Endodontic procedures are aimed to get rid of microorganisms and their toxic byproducts from the pulp filled canal system.³ The eradication of microorganism including instrumentation, irrigation and application of intracanal medicaments is a prob-

lematic job. Consequently, for eradication of infected tissues and microorganisms application of chemical irrigators and intra canal medicaments seem crucial in addition to mechanical debridement.⁴

Alkaline pH value of calcium hydroxide is round about 12.5. Liberation of hydroxyl ion from calcium hydroxide in an aqueous environment, renders it antimicrobial property. Most of the microorganisms that are source of root canal infection are unable to sustain alkaline environment.

One more intracanal medication with familiar broad-spectrum antimicrobial effects is chlorhexidine gluconate.⁵ Its successfulness against *E. faecalis*, a principal reason of endodontic treatment failures is popular. Chlorhexidine gluconate is both bacteriostatic and bactericidal in low and high concentrations respectively.⁵ Ability of chlorhexidine to bond with dentinal hydroxyapatite gives it a unique characteristic of substantivity.⁵

In a study conducted by Singh et al,⁶ there was a notable difference ($p < 0.001$) in pain reduction amongst the four experimental groups, that were a

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blend of chlorhexidine and calcium hydroxide, chlorhexidine, calcium hydroxide and control group (placebo). Pain reduction in groups, in which either a mixture of chlorhexidine with calcium hydroxide or chlorhexidine was used individually was remarkably higher ($p < 0.05$) than in groups in which calcium hydroxide and placebo was administered.⁶

The rationale of current study is to check the efficacy of mixture of 2% chlorhexidine and calcium hydroxide in decreasing postoperative pain after root canal instrumentation.

MATERIALS AND METHODS

This single blind randomized clinical trial study enrolled Sixty patients reporting to Operative Dentistry Department Islamic International Dental College and fulfilling the inclusion criteria. Sample size was calculated by Non-probability, Consecutive sampling technique and Open Epi calculator with mean 20.6 and 30.7 for group A and B respectively. Standard deviation for Group A was 3.3 and 5.13 for Group B while Variance was 9.1809 and 26.3169 for Group A and B respectively. Confidence interval (2 sided) was 95%. Ethical Committee of Islamic International Dental Hospital officially permit this research. Informed written consent was yielded from those patients who attain the inclusion criteria.

Total sixty patients of either gender with age limit of 20-60 years and complain of spontaneous moderate to severe pain were included in the study. Any type of permanent tooth with diagnosis of symptomatic irreversible pulpitis with normal periapex, were incorporated in the study. Patients with systemic diseases, pregnancy, mentally handicapped and terminally ill were precluded from the study. Also the patients with necrotic pulps, apical periodontitis, acute abscess, malposed teeth, immature apices and vertical root fractures were excluded from the study.

Patients were split in two equal groups, group A and group B. Lists were drawn, patients were numbered as they come and allocated to either groups. Tooth was anesthetized using 1.8 ml of 2% lignocaine containing 1:100,000 epinephrine and isolated using rubber dam. Access cavity was made. Pulpectomy was done following which endodontic work length was taken with an apex locator and rechecked by a periapical radiograph. Step back technique was used. Irrigation was carried out using sodium hypochlorite. After drying canals, Inter appointment medicament was then packed in the canals in both groups. Mixture of 2% Chlorhexidine and calcium hydroxide was put down in canals of patients included in group A while No drug was placed in canals of patients in group B. Cavit (3M ESPE, St Paul, MN, USA) was set as a temporary restoration of endodontic access cavity and a questionnaire containing the VAS was provided to each individual for them to note the magnitude of pain felt after 24 hours. Root canal treatment was accomplished in the next appointment. Version 17 OF SPSS was availed to enter and analyze data. Descriptive statistic; was calculated for both qualitative and quantitative variables. For quantitative variables like age and pain scores mean $\pm$ SD was calculated. For qualitative variables like gender frequency and percentage was calculated. Mean pain score in two groups was compared by applying Independent samples t-test. Stratification of effect modifiers like age and gender was also executed. Post stratification independent sample t-test was used and P value ≤ 0.05 was notable.

RESULTS

There were 18 males in group-A and 15 males (50%) in group-B. In group-A, females were 12 (40%) and in group-B females were 15 (50%). Statistically outstanding difference was observed in mean postoperative score in group-A vs Group-B (1.57 ± 1.07 vs 7.17 ± 1.17) with p value < 0.001 .

Table 1: Distribution of patients by gender

Gender	Group-A		Group-B	
	2% Chlorhexidine and calcium hydroxide		(No drug)	
	No.	%	No.	%
Male	18	60.0	15	50.0
Female	12	40.0	15	50.0
Total	30	100.0	30	100.0

Table 2: Comparison of postoperative endodontic pain score

Group	Mean	Standard deviation
Group-A 2% Chlorhexidine and calcium hydroxide	1.57	1.07
Group-B (No drug)	7.17	1.17
t value	-19.262	
p value	P < 0.001	

Table 3: Stratification for age

Age (Year)	Group	Postoperative endodontic pain score		P value
		Mean	S.D	
20-40	Group-A	1.23	1.16	P<0.001
	Group-B	7.29	1.49	
41-60	Group-A	1.82	0.95	P<0.001
	Group-B	7.06	0.85	

DISCUSSION

Improper disinfection of the canal to reduce the bacterial load, causes pain. Contaminated and infectious root canals consist of complex microorganism flora which is accountable for offering various enzymes and endotoxins, as a consequence failure of chemotaxis and phagocytosis⁷ results in painful periapical lesions. Introduction of intracanal medicament, with the most long-lasting and greatest possible effects against various bacterial species is endorsed generally after root canal preparation. In this regard, using calcium hydroxide has been suggested in decreasing bacteria in the canal without causing irritation to periapical tissues.⁸ Calcium hydroxide's antimicrobial is attributed by its ability to alter bacterial cell walls. Calcium hydroxide also mutates a potent endotoxin,⁹ in this way rendering it less antigenic.¹⁰ Antimicrobial or tissue-altering reaction of calcium hydroxide is in charge for pain-preventive properties. In addition, It induces repair and controls inflammatory process.¹¹

Findings of the current study demonstrated that administration of chlorhexidine in combination with calcium hydroxide resulted in statistically significant reduction in pain score.

Chlorhexidine has swift and constant action in controlling postoperative pain. Its remarkable effect was evident within 4 h after placement. This remarkable effect confirms the results of previous studies,^{12,13} according to that chlorhexidine demon-

strated its high diffusibility and provided 100% hampering of microorganisms. Moreover, Chlorhexidine has potentiality to bring down or banish the endotoxins responsible for the onset of sudden pain, It might be the reason for its effectiveness as a intra canal medicament against postoperative pain and discomfort. However, according to Gomes et al¹⁴ 2% chlorhexidine was not successful in washing out microorganisms. Also, the present study does not agree with the results of study conducted by Gama et al,¹⁵ who found 0.2% chlorhexidine gluconate or calcium hydroxide in combination with CPMC (camphorated paramonochlorophenol paste) intracanal dressing to be equally fruitful in bringing down the discomfort after root canal therapy.

Chlorhexidine has potential to target both Gram positive and Gram negative microorganisms due to its broad spectrum of action.¹⁶ Chlorhexidine has remarkable effect against *E. fecalis*,¹⁷ anaerobic bacteria¹⁸ and *Candida albicans*¹² which are most resistant and impervious microorganisms in contaminated and infected root canal.

It can be concluded that, the mixture of calcium hydroxide and chlorhexidine is most useful in decreasing the postoperative pain when compared with placebo (1.57±1.07 vs 7.17±1.17) with P<0.001. Study initiated by Yoldas et al¹⁹ announced marvelous efficacy of mixture of calcium hydroxide and chlorhexidine to lessen post endodontic pain in endodontic retreatment cases. Contact angle of calcium hydroxide is reduced by the addition of ch-

lorhexidine which has an increased wetting effect in the root canal.²⁰ As long as study by Delgado et al¹⁷ is considered, no difference is found in antimicrobial action of chlorhexidine either used individually or in combination with calcium hydroxide.

LIMITATIONS

This study has a small sample size and more studies should be done with larger sample size to further explore the effectiveness of mixture of calcium hydroxide and chlorhexidiene.

CONCLUSIONS

In conclusion, postoperative endodontic pain using mixture of 2% chlorhexidine and calcium hydroxide is significantly reduced ($p < 0.001$). The decrease in microbial causes leading to post treatment pain, inflammation and discomfort for patients and the dentist, can be reduced by use of intra canal medicament.

REFERENCES

1. Molchhari F, Yazdi K, Mahabadi AM, Modaresi SJ, Hamzeheil Z. Effect of Premedication with Indomethacin and Ibuprofen on Postoperative Endodontic Pain: a clinical trial. *Iran Endod J* 2016;11:57-62.
2. Shahi S, Asghari V, Rahimi S, Lotfi M, Samiei M, Yavari H, et al. Postoperative pain after endodontic treatment of asymptomatic teeth using rotary instruments: a randomized clinical trial. *Iran Endod J* 2016;11:38-43.
3. Saatchi M, Sholcraneh A, Navaei H, Maracy MR, Shojaei H. Antibacterial effect of calcium hydroxide combined with chlorhexidine on enterococcus faecalis: a systematic review and meta-analysis. *J Appl Oral Sci* 2014;22 :356-65.
4. Mohammadi Z, Giardino L, Mombeinipour A. Antibacterial substantivity of a new antibiotic-based endodontic irrigation solution. *Aust Endod J* 2012;38:26-30.
5. Atila-Pektas B, Yurdakul P, Gulmez D, Gorduysus O. Antimicrobial effects of root canal medicaments against *Enterococcus faecalis* and *Streptococcus mutans*. *Int Endod J* 2013;46:413-8.
6. Singh RD, Khatter R, Bal RK, Bal CS. Intracanal medications versus placebo in reducing postoperative endodontic pain. A double-blind randomized clinical trial. *Braz Dent J* 2013;24:25-9.
7. Dahlen G, Bergenholtz G. Endotoxic activity in teeth with necrotic pulps. *J Dent Res* 1980;59; 1033.
8. Kontakiotis E, Nakou M, Georgopoulou M. In vitro study of the indirect action of calcium hydroxide on the anaerobic flora of the root canal. *Int Endod* 1995;28:285-9.
9. Silva LAB, Nelson-Filho P, Leonardo MR, Rossi M, Pansani CA. Effect of calcium hydroxide on bacterial endotoxin in vivo. *J Endod* 2002;28:94-99.
10. Safavi KE, Nichols FC. Effect of calcium hydroxide on bacterial lipopolysaccharide. *J Endod* 1993;19: 76-7.
11. Fava LRG. Acute apical periodontitis: incidence of post-operative pain using two different root canal dressings. *Int Endod J* 1998;31:343-7.
12. Schafer E, Bossmann K. Antimicrobial efficacy of chloroxenol and chlorhexidine in the treatment of infected root canals. *Am J Dent* 2001;14:233-7.
13. Krithikadatta J, Indira R, Dorothykalyani AL. Disinfection of dentinal tubules with 2% chlorhexidine, 2% metronidazole, bioactive glass when compared with calcium hydroxide as intracanal medicaments. *J Endod* 2007;33:1473-6.
14. Gomes BPFA, Martino FC, Vianna ME. Comparison of 2.5% sodium hypochlorite and 2% chlorhexidine gel on oral reduction from primary infected root canals. *J Endod* 2009;35:1350-3.
15. Gama TG, de Oliveira JC, Abad EC, Rocas IN, Siqueira JF. Postoperative pain following the use of two different intracanal medications. *Clin Oral Investig* 2008;12:325-30.
16. Rocas IN, Siqueira JF. Comparison of the in vivo antimicrobial effectiveness of sodium hypochlorite and chlorhexidine used as root canal irrigants: a molecular microbiology study. *J Endod* 2011;37: 143-50.
17. Delgado RJR, Gasparato TH, Sipert CR, Pinheiro CR, Moraes IG, Garcia RB, et al.. Antimicrobial effects of calcium hydroxide and chlorhexidine on *Enterococcus faecalis*. *J Endod* 2010;36:1389-13.
18. Orstavik D, Hapassalo M. Disinfection of endodontic irrigants and dressings of experimentally infected root canals. *Endod Dent Traumatol* 1990;6;142-9.
19. Yoldas O, Topuz A, Isci AS, Oztunc H. Postoperative pain after endodontic retreatment: Single-versus two-visit treatment. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2004;98:483-7.
20. Basarani B, Santos JM, Tjaderhane L, Gred H, Gorduysus O, Huang J, et al.. Substantive antimicrobial activity in chlorhexidine-treated human dentin. *Oral Surg Oral med Oral Pathol Oral Radiol Endod* 2002;94:240-5.