

Original Research

An invitro study of antibacterial efficiency of Qmix in root canal system

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ABSTRACT:

Background: Irrigating solutions used during root canal treatment act through direct contact with the bacteria targeted and offer long term antibacterial effect. The present study was conducted to assessed antibacterial efficiency of Qmix in root canal disinfection. **Materials & Methods:** 30 recently extracted mandibular teeth were randomly divided into 3 groups of 10 each. In group I, no irrigation was done. In groups II, teeth were treated with sodium hypochlorite and in group III with Qmix irrigating solutions. After irrigation the teeth were placed in vials, which contained 2 mL of the nutrient broth. **Results:** Group I yielded 76%, group II 20% and group III 4% colonies of E. Faecalis. The difference was significant (P< 0.05). **Conclusion:** QMix found to be highly effective in removing smear layer and decreasing level of E. Faecalis as compared to sodium hypochlorite.

Key words: Irrigating solutions, Sodium hypochlorite, QMix

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INTRODUCTION

One of the most important objectives of endodontic therapy is to completely eliminate intracanal microorganisms from the root canal system to create favorable environment for healing and to prevent reinfection in order to achieve long-term success.¹ Endodontic infections are polymicrobial in nature with predominant anaerobic microorganisms. Bacteria and their metabolic products, enzymes, and toxins play a vital role in the initiation, propagation, and persistence of pulpal and peri-radicular pathosis.² Although several factors contribute to endodontic failures, the literature reported that persistent intra-radicular or secondary infection is the major etiology for failed endodontic therapy. Studies have shown that microflora in failed root canal therapy are different from those found in untreated teeth.³

Irrigating solutions used during root canal treatment act through direct contact with the bacteria targeted and offer long term antibacterial effect (substantivity). It should be able to dissolve pulp tissue and inactivate endotoxins. The irrigants that are currently used during cleaning and shaping can be divided into antibacterial and decalcifying agents or combinations. They include sodium hypochlorite (NaOCl),

chlorhexidine, ethylene diamine tetra acetic acid (EDTA), mixture of tetracycline, an acid and detergent (MTAD).⁴ Qmix irrigating solution is a single solution used as final rinse after bleach for one-step smear layer removal and disinfection. Its nonantibiotic, premixed formula provides a “best practice” irrigation protocol in fewer steps for proven and effective irrigation made easy.⁵ It contains a mixture of a bisbiguanide antimicrobial agent, a polyaminocarboxylic acid calcium-chelating agent, and a surfactant, and has been found to be effective against bacterial biofilms. Its excellent bacteria killing properties eliminate greater than 99.99% of planktonic bacteria including resistant species Enterococcus faecalis and candida albicans.⁶ The present study was conducted to assessed antibacterial efficiency of Qmix in root canal disinfection.

MATERIALS & METHODS

The present study comprised of 30 recently extracted mandibular teeth of both genders. All were informed regarding the study with their written consent.

Teeth were sectioned upto cervical margin and cleaned with the solution of sodium hypochlorite. Access opening and biomechanical preparation was performed. Teeth were randomly divided into 3

groups of 10 each. In group I, no irrigation was done. In groups II, teeth were treated with sodium hypochlorite and in group III with Qmix irrigating solutions. After irrigation the teeth were placed in vials, which contained 2 mL of the nutrient broth. The vials were incubated at 37°C for 24 hours. The vials were checked for turbidity after 24 h incubation.

6 mL of broth from all the samples together was collected and seeded on a Petri dish containing UTI Hichrome agar in order to count the CFUs. Results were assessed statistically with p value less than 0.05 significant.

RESULTS

Table I Distribution of teeth

Groups	Group I	Group II	Group III
Solution	No irrigation	Sodium hypochlorite	Qmix
Number	10	10	10

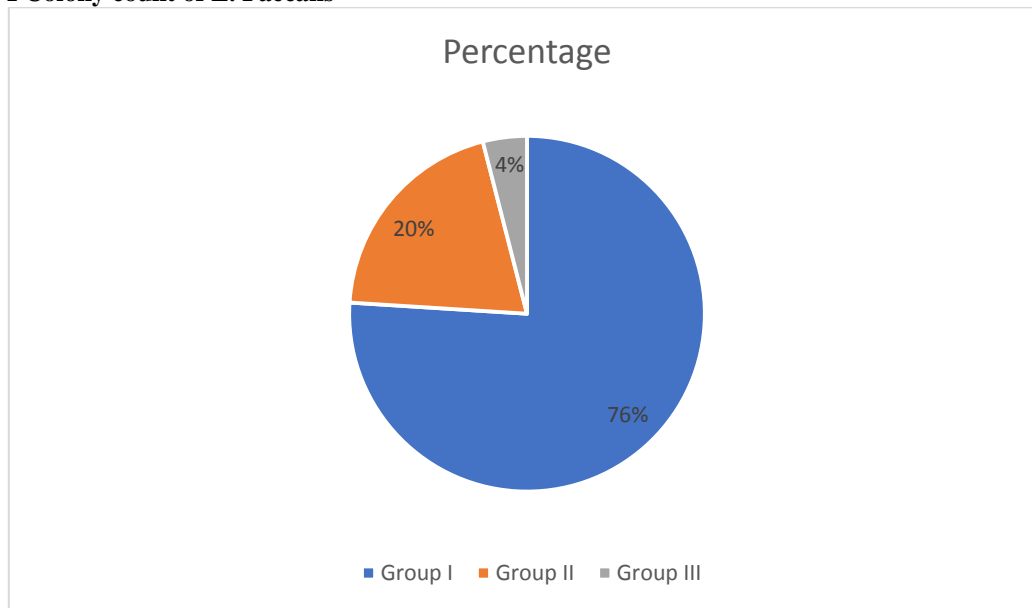
Table I shows distribution of teeth based on irrigation solutions used. Each group comprised of 10 teeth.

Table II Colony count of E. Faecalis

Groups	Percentage	P value
Group I	76%	0.05
Group II	20%	
Group III	4%	

Table II, graph I shows that group I yielded 76%, group II 20% and group III 4% colonies of E. Faecalis. The difference was significant (P< 0.05).

Graph I Colony count of E. Faecalis



DISCUSSION

Enterococcus faecalis (E. faecalis) and Candida albicans (C. albicans) are considered to be the most resistant species in infected root canals and they are often associated with endodontic treatment failures.⁷ E. faecalis is a gram positive, facultative anaerobic cocci commonly found in persistent root canal infection and commonly recovered in over one-third of the canal of endodontically treated teeth with persisting periapical lesions.⁸ Stojicic et al⁹ reported that QMix effectively killed E. faecalis biofilms grown on collagen-coated hydroxyapatite discs in vitro, and was superior to CHX and MTAD. QMix was known for its single irrigant that has both antibacterial and smear layer removal properties. Few

studies showed that 5% to 6% NaOCl was more effective than QMix against E. faecalis biofilm when 1 mL was used for 1 and 3 minutes. QMix showed better antibacterial property compared to NaOCl, when it was employed for longer exposure time and at higher volume.¹⁰ The present study was conducted to assessed antibacterial efficiency of Qmix in root canal disinfection.

In present study, in group I, no irrigation was done. In groups II, teeth were treated with sodium hypochlorite and in group III with Qmix irrigating solutions. Rashmi et al¹¹ evaluated the antimicrobial efficacy of Qmix irrigant in infected root canal system. Crowns of 60 extracted premolar teeth were sectioned at the cemento-enamel junction. Enterococcus faecalis was

inoculated on Brain heart infusion (BHI) agar plate and incubated anaerobically at 37 °C for 24 hours. In the negative group (n=20), there was no treatment. In the other group (n=20), the sections were irrigated with 5 mL of 5.25% NaOCl for 60 seconds. The third group (n=20) is treated with Qmix solution for 60-90 seconds. After the disinfection procedures, samples were subjected to CFU counting evaluations. After irrigation, the elimination of bacteria and the smear layer in the positive group were significantly superior, compared with the negative group.

We found that group I yielded 76%, group II 20% and group III 4% colonies of *E. Faecalis*. Elakanti et al¹² compared the antimicrobial efficacy of QMix™ 2 in 1, sodium hypochlorite (NaOCl), and chlorhexidine (CHX) against *Enterococcus faecalis* and *Candida albicans*.

Eighty freshly extracted, single-rooted human mandibular premolar teeth were instrumented and autoclaved. Samples were divided into two groups of 40 teeth each based on the type of microorganism used. Group I was inoculated with *E. faecalis* and Group II with *C. albicans* and incubated for 3 days. Each group was subdivided into four subgroups based on the type of irrigant used. Group IA, IIA, 5.25% NaOCl; Group IB, IIB, 2% CHX; Group IC, IIC, QMix™ 2 in 1; and Group ID, IID, 0.9% saline (the control group). Ten microliters of the sample from each canal was taken and was placed on Brain Heart Infusion agar and Sabouraud dextrose agar. The plates were incubated at 37°C for 24 h and colony forming units (CFUs) that were grown were counted. The greatest antimicrobial effects were observed in samples treated with QMix™ 2 in 1 ($P < 0.001$). No statistical significant difference was found between 5.25% NaOCl and 2% CHX ($P > 0.001$) against *E. faecalis* and *C. albicans*.

CONCLUSION

Authors found that QMix found to be highly effective in removing smear layer and decreasing level of *E. Faecalis* as compared to sodium hypochlorite.

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