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Original Research

Assessment of efficacy of oregano essential oil extract with other intracanal medicaments against Enterococcus faecalis

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***ABSTRACT*:**
Background: The bacteria, their metabolic products, enzymes, and different toxins are responsible for the onset, spread, and persistence of pulpal and periradicular pathosis. The present study was conducted to assess antimicrobial efficacy of oregano essential oil extract with other intracanal medicaments against Enterococcus faecalis. **Materials & Methods:** 50 single-rooted teeth were further divided into five groups each according to intracanal medicaments used. Group I: Oregano essential oil–25 µg/ml of distilled water, Group II:Omeprazole–2 mg/ml of distilled water, Group III: Ibuprofen–400 mg/ml of distilled water, Group IV: Diclofenac–400 mg/ml of distilled water and Group V- Calcium Hydroxide-16 mg/ml of distilled water. The antimicrobial assessment was performed on the 7th day, and dentine samples were collected to determine the number of colony-forming units. **Results:** Themean Enterococcus faecalis count was 2.8 in group I, 5.4 in group II, 8.3 in group III, 7.6 in group IV and 1.9 in group V. The difference was significant (P< 0.05). **Conclusion:** There was notable antibacterial activity in every group. Oregano essential oil has shown comparable antibacterial activity to calcium hydroxide against E. faecalis.
Key words:

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INTRODUCTION

The bacteria, their metabolic products, enzymes, and different toxins are responsible for the onset, spread, and persistence of pulpal and periradicular pathosis.Complete removal of intracanal microbes promotes healing, inhibits reinfection, and aids in long-term success by creating a healing environment.[1]In addition to proper biomechanical preparation and three-dimensional obturation of the root canal space, successful endodontic therapy also depends on thorough irrigation of the root canals, their intricate internal anatomy, and any other irregularities that might be difficult to access with instruments.[2]

Gram-negative anaerobic rods, Gram-positive anaerobiccocci, Gram-positive anaerobic, and facultative rods are mostcommonly isolated from RCS. Obligate anaerobes can beeasily eradicated through disinfection during RCS.[3] On theother hand, facultative bacteria can be found in the RCS evenafter chemo-mechanical preparation. The endodontic literature has focused on Enterococcus faecalis in particular because of its ability to endure harsh environments. Even when calcium hydroxide is present, it can endure and thrive.[4] E. faecalis makes use of the proton-pump that is already present in its cell membrane to keep the cytoplasm's homeostasis stable, even at a pH of about 11.5. Nevertheless, the earlier study had demonstrated that calcium hydroxide presented greater difficulties in completely removing bacteria from the root canals.[5,6]The present study was conducted to assess antimicrobial efficacy of oregano essential oil extract with other intracanal medicaments against Enterococcus faecalis.

MATERIALS & METHODS

The present study consisted of 50 single-rooted teeth of both genders. Ethical approval for the study was obtained.

A root canal preparation was performed using a standardized protocol, inoculated E. faecalis, which were further divided into five groups each according to intracanal medicaments used. Group I: Oregano essential oil–25 µg/ml of distilled water, Group II: Omeprazole–2 mg/ml of distilled water, Group III: Ibuprofen–400 mg/ml of distilled water, Group IV: Diclofenac–400 mg/ml of distilled waterand Group V-Calcium Hydroxide-16 mg/ml of distilled water. The antimicrobial assessment was performed on the 7th day, and dentine samples were collected to determine the number of colony-forming units. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table I Distribution of samples

Groups	Medicaments
Group I	Oregano essential oil extract
Group II	Omeprazole
Group III	Ibuprofen
Group IV	Diclofenac
Group V	Calcium hydroxide

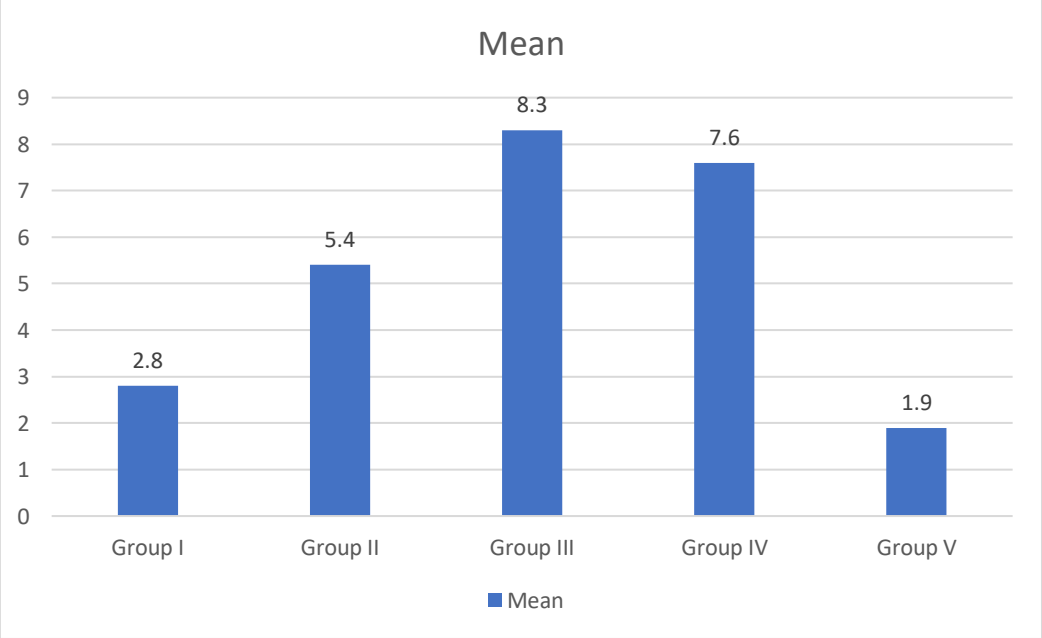
Table I shows the distribution of samples based on intracanal medicaments used.

Table II Reduction of Enterococcusfaecalis count

Groups	Mean	P value
Group I	2.8	0.04
Group II	5.4	
Group III	8.3	
Group IV	7.6	
Group V	1.9	

Table II, graph I shows that the mean Enterococcus faecalis count was 2.8 in group I, 5.4 in group II, 8.3 in group III, 7.6 in group IV and 1.9 in group V. The difference was significant (P< 0.05).

Graph I Reduction of Enterococcusfaecalis count



DISCUSSION

A facultative anaerobe called Enterococcus faecalis is thought to be the cause of nine times more secondary infections than primary endodontic infections, accounting for 4% to 40% of cases.[7]Because biofilm formation allows it to withstand harsh environmental conditions, this extremely resistant microorganism can inactivate antimicrobial agents.[8]Therefore, a key factor in the root canal treatment's predictable long-term success is efficient chemomechanical debridement and root canal space disinfection. Chlorhexidine and sodium hypochlorite, two commonly used irrigants, have strong antibacterial properties.[9] They do, however, have some drawbacks,

including tissue toxicity, an offensive taste and smell, instrument corrosion, the inability to remove the smear layer, a decrease in the dentin's elastic modulus, and a reduction in its flexural strength.[10]The present study was conducted to assess antimicrobial efficacy of oregano essential oil extract with other intracanal medicaments against Enterococcus faecalis.

We found that the mean Enterococcus faecalis count was 2.8 in group I, 5.4 in group II, 8.3 in group III, 7.6 in group IV and 1.9 in group V. Janani K et al[11]compared and evaluated the antimicrobial effect of a new herbal intracanal medicament compared with the other four agents against E. faecalis. Group 1: Calcium Hydroxide-16 mg/ml of distilled water (n = 20), Group 2: Diclofenac–400 mg/ml of distilled water (n = 20), Group 3: Ibuprofen–400 mg/ml of distilled water (n = 20), Group 4: Omeprazole–2 mg/ml of distilled water (n = 20), and Group 5: Oregano essential oil–25 µg/ml of distilled water (n = 20). Group 1 (calcium hydroxide) showed a statistically significant reduction of E. faecalis ($P < 0.05$), followed by group 5 (Oregano essential oil extract).

Gupta et al[12]compared the antibacterial efficacy of Thymus vulgaris, Salvadora persica, Acacia nilotica, Calendula arvensis, and 5% sodium hypochlorite against Enterococcus faecalis.Herbal extracts of T. vulgaris, S. persica, A. nilotica and C. arvensis were prepared. Tryptone soya broth was used to grow E. faecalis and agar plates were prepared. The tested solutions (Group A: 5% NaOCl, Group B: 20% T. vulgaris, Group C: 12.5% S. persica, Group D: 10% A. nilotica, Group E: 10% C. arvensis) were added to the wells made on agar media. Agar diffusion test was performed. Plates were incubated at 37°C for 24 h. Bacterial zones of inhibition were recorded.The highest zone of inhibition against E. faecalis was shown by 5% NaOCl, followed by 10% C. arvensis, 20% T. vulgaris and 10% A. nilotica showed similar comparable antibacterial activity. The least zone of inhibition was showed by S. persica.

Gummuluri et al[13]evaluated the invitro antimicrobial efficacy of Novel Ethanolic Extract of Morinda Citrifolia by agar well diffusion and minimal inhibitory concentration. Resultsrevealed that the tested Ethanolic Extract of Morinda Citrifolia possesses potential antibacterial activity against Enterococcus feacalis when compared with standard antibiotic tetracycline. the highest zone of inhibition of 15mm was showed at 1000micrograms by agar well diffusion assay. The optimal antimicrobial activity was seen at 250micrograms for Morinda Citrifolia against Enterococcus feacalis.

CONCLUSION

Authors found that there was notable antibacterial activity in every group. Oregano essential oil has shown comparable antibacterial activity to calcium hydroxide against E. faecalis.

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