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Antifungal Efficacy of 5·25 percent sodium hypochlorite , 2 percent chlorhexidine gluconate and 17 percent EDTA with and without antifungal agent as root canal irrigant

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Poster Award
First Prize

Introduction

Numerous studies have revealed possible role of fungus in the incidence of endodontic infections. After Enterococcus faecalis Candida albicans is one of the most relevant microorganism associated with failed endodontic treatment. Resistance to calcium hydroxide and its ability to penetrate into dentinal tubules are possible reasons for the occurence of oral candida species in cases of post treatment apical periodontitis.

Objectives

The aim of this invitro study was to evaluate the antifungal efficacy of 5·25 percent Sodium Hypochlorite, 2 percent Chlorhexidine Gluconate, and 17 percent EDTA as final irrigant with and without the inclusion of an Antifungal agent that is 1 percent Clotrimazole on Candida albicans.

Material and Methods

Thirty single rooted teeth were selected. They were decoronated and chemomechanically prepared with the help of Gated Glidden drills and Kerr files. Then they were inoculated with candida albicans suspension. After this they were incubated at 37° celsius and 91 percent humidity for 96 hours.These 30 samples were divided into TWO groups of 15 samples each.

GROUP 1 - Without antifungal agent
GROUP 2 - With antifungal agent that is 1 percent Clotrimazole.

The GROUP 1 containing 15 samples was further subdivided into three subgroups of 5 samples each. Samples in subgroup 1 were irrigated with 5·25 percent sodium hypochlorite, samples in subgroup 2 were irrigated with 2 percent chlorhexidine gluconate, and samples in subgroup 3 with 17 percent EDTA.

The GROUP 2 containing 15 samples which is with antifungal agent was similarly subdivided into three subgroups of 5 samples each and was similarly irrigated with 5·25 percent sodium hypochlorite, 2 percent chlorhexidine gluconate, and 17 percent EDTA respectively but was followed by 1percent clotrimazole as a final rinse. Then aliquots from these samples were plated on 4 percent sabouraud agar, and the colony forming units were evaluated.

Fig. 1: 30 single rooted teeth were selected

Fig. 2: While decoronating

Fig. 3: After decoronation

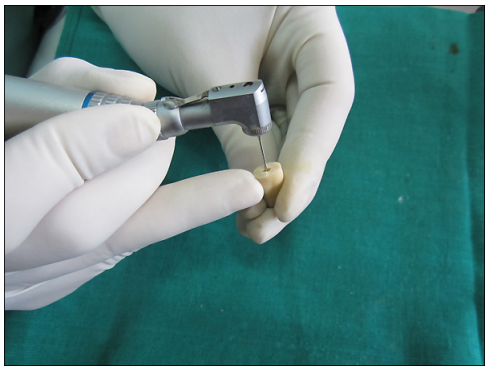

Fig. 4: While biomechanical canal preparation using gates glidden drills

Fig. 5: Doing biomechanical canal preparation using kerr files

Fig. 6: Canals prepared

Fig. 7: Teeth samples ready for inoculation

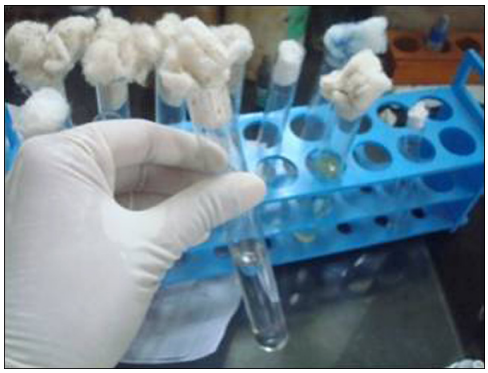

Fig. 8: Candida suspension

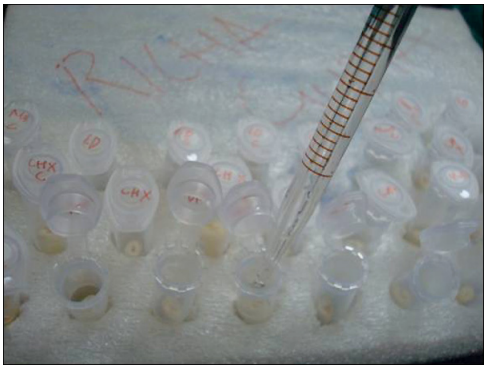

Fig. 9: While inoculation

Fig. 10: While placing in incubator

Fig. 11: Group 1 containing 15 samples

Fig. 12: Group 2 containing 15 samples

Results

5·25 percent sodiumhypochlorite exhibited superior antifungal efficacy compared to 2 percent chlorhexidine gluconate and 17 percent EDTA. On inclusion of 1 percent clotrimazole, there was a significant decrease in colony forming units. 5·25 percent sodiumhypochlorite and 2 percent chlorhexidine gluconate with clotrimazole showed significantly greater antifungal properties than 17 percent EDTA with clotrimazole.

Fig. 13: Sub group 1 irrigated with sodium hypochlorite

Fig. 14: Subgroup 2 irrigated with chlorhexidine gluconate

Fig. 15: Subgroup 3 irrigated with ethylene diamine tetraacetic acid

Fig. 16: Plates before inoculation

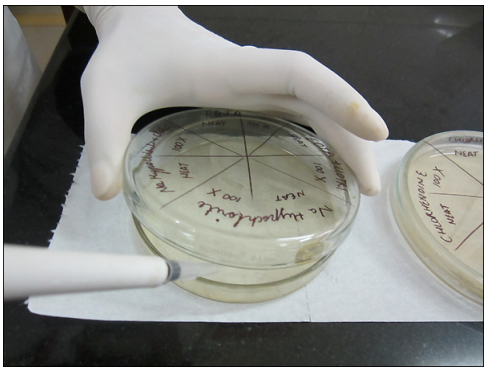

Fig. 17: While plating samples

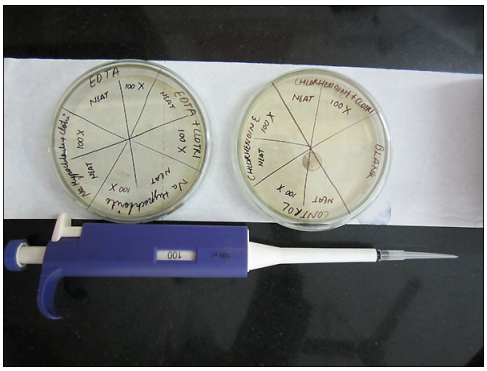

Fig. 18: After plating of samples

Groups	Mean (CFU)
Group 1 (without antifungal agent)	

5.25% NaOCl	22.20
2% CHX	34.40
17% EDTA	62.60
Group 2 (with antifungal agent)	
5.25% NaOCl + Clotrimazole	8.40
2% CHX + Clotrimazole	12.60
17% EDTA + Clotrimazole	28.20
Control group	
Distilled water	124.20

Tab. 1: Results showing mean colony forming units of candida in each group NaOCl stands for sodium hypochlorite EDTA stands for ethylene diamine tetraacetic acid CHX stands for chlorhexidine gluconate CFU stands for colony forming units

Fig. 19: Plates showing growth of candida in control samples

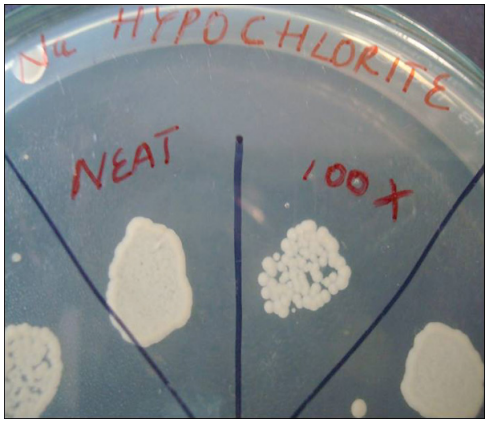

Fig. 20: Plates showing growth of candida in samples irrigated with sodium hypochlorite

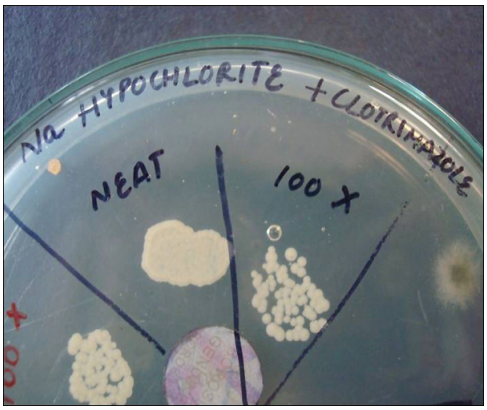

Fig. 21: Plates showing growth of candida in samples irrigated with sodium hypochlorite followed by clotrimazole as final rinse

Fig. 22: Plates showing growth of candida in samples irrigated with chlorhexidine gluconate

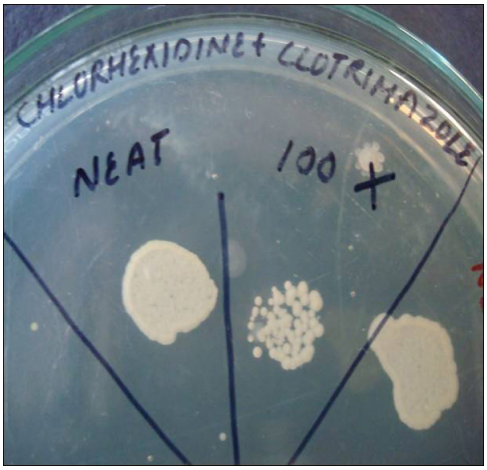

Fig. 23: Plates showing growth of candida in samples irrigated with chlorhexidine gluconate followed by clotrimazole as final rinse

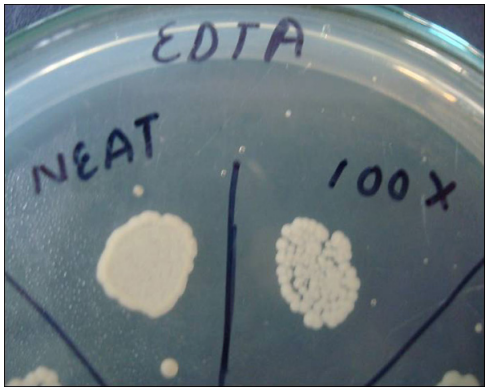

Fig. 24: Plates showing growth of candida in samples irrigated with ethylene diamine tetraacetic acid

Fig. 25: Plates showing growth of candida in samples irrigated with ethylene diamine tetraacetic acid followed by clotrimazole as final rinse

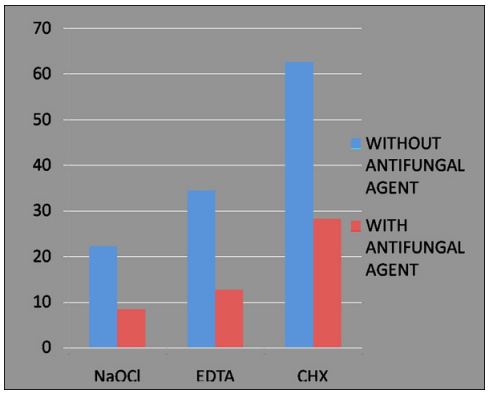

Fig. 26: Graph depicting colonies of candida in each group in the units of 1000 colony forming units per milliliter NaOCl stands for sodium hypochlorite EDTA stands for ethylene diamine tetraacetic acid CHX stands for chlorhexidine gluconate

Conclusions

Clotrimazole, a substituted imidazole, is a commonly used antifungal in both medical and dental practice. It is one of a family of azoles ans is useful in treating systemic mycoses. A poorly functioning immune system might increase the risk of fungal infection in root canal system. Therefore, disinfection of root canal system during cleaning and shaping procedures should incorporate an antifungal agent to target fungi specifically in immunocompromised patients like for example diabetics.

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Abbreviations

EDTA: Ethylene Diamine Tetraacetic Acid
NaOCl: Sodium hypochlorite
CHX: Chlorhexidine gluconate

This Poster was submitted by Prof. Dr. Mrs. K. K. Wadhwani.

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