bacteriostatic effect. At higher concentrations, chlorhexidine is bactericidal because of precipitation or coagulation of the cytoplasm, probably caused by protein cross-linking. The bacteriostatic effect of chlorhexidine is considered to be more important, because the bound chlorhexidine molecule is slowly released for up to 24 hours, as the concentration decreases. It has shown to have a low tissue toxicity compared to sodium hypochlorite. But the activity of chlorhexidine is dependent on pH, and is greatly reduced in the presence of organic matter. Recovery of *E. faecalis* in fewer occasions have failed to satisfy its role as an appropriate irrigant.

Doxycycline is a broad spectrum antimicrobial, primarily bacteriostatic, inhibits bacterial protein synthesis by binding to and interfering with ribosomes. Once inside the cell bind reversibly to the 30S subunit of the bacterial ribosome, blocking the binding of aminoacyl-tRNA to the acceptor site on the mRNA-ribosome complex. This prevents addition of aminoacids to the growing peptide. Doxycycline is an effective irritant against *Enterococcus faecalis*. Stabholz et al. has shown that the substantivity of tetracyclines lasts for more than 12 days as compared to chlorhexidine. Tetracyclines are bacteriostatic in nature, this property may be advantageous because in the absence of bacterial cell lysis, antigenic by-products such as endotoxin are not released. Tetracyclines also have many unique properties other than their antimicrobial effect such as the inhibition of mammalian collagenases which prevents tissue breakdown, and the inhibition of elastic cells which results in anti-resorptive activity. A further benefit of doxycycline is that prolonged treatment with the drug does not facilitate bacterial mutation to generate tetracycline-resistant microorganisms.

Doxycycline was combined either with sodium hypochlorite or chlorhexidine to obtain additional synergistic antimicrobial effect, as well as to obtain the desirable properties of both the irrigants. The particular concentration of experimental irrigants have been selected because of their antimicrobial efficacy even at lower concentrations.

The Agar diffusion test was used in our study, because this test is routinely and reliably used by most clinicians to test the sensitivity of drugs in the treatment of various infections. This method has been used in the past by researchers to test the antimicrobial efficacy of the irrigants against *Enterococcus faecalis*. A disadvantage of the agar diffusion test is that the result of this method does not depend only on the toxicity of the material for the particular microorganism, but is also highly influenced by the diffusibility of the material across the medium.

The results of the present study showed that, Group E (DOXY + CHX) had the greatest antimicrobial effect. This is due to the synergistic antimicrobial action of doxycycline and chlorhexidine i.e. low pH, anti-collagenase action, inhibition of protein synthesis by passive diffusion through the bacterial cell wall, adsorption of the drug on the bacterial cell wall, leaching of the intracellular components and coagulating the cytoplasm. The results of our study supports the study conducted by Shahrrokhi et al. In their study the antimicrobial efficacy was evaluated when 0.2% chlorhexidine was added to MTAD against *E. faecalis*, and attributes doxycycline present in