# Perbandingan Efek Antimikroba Cuka Apel Malang (Malus Pumilla Mill) berbagai Konsentrasi terhadap Biofilm Enterococcus faecalis dan Candida albicans = Comparison of Antimicrobial Effects of Malang Apple Vinegar (Malus Pumila Mill) in Various Concentration on Enterococcus faecalis and Candida albicans Biofilm

Hana Tania Rahmaputri, author



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Abstrak

Latar Belakang: E. faecalis dan C. albicans adalah mikroorganisme di saluran akar yang mampu bertahan hidup meski sudah dilakukan perawatan saluran akar. Penggunaan larutan irigasi sintetik saat perawatan saluran akar efektif dalam mengeliminasi mikroorganisme di saluran akar namun terbukti toksik terdapat sel punca mesenkim di periapikal. Cuka apel mengandung zat aktif seperti asam organik, flavonoid, fenol, tanin yang bersifat antimikroba dan menghambat pertumbuhan mikroba, namun terbukti tidak toksik bagi sel punca. Tujuan penelitian ini adalah untuk membandingkan efek antimikroba larutan cuka apel berbagai konsentrasi terhadap biofilm E. faecalis dan C. albicans. Metode: Dilakukan paparan larutan cuka apel 0,63%, 1,25%, dan 2,5%, serta kontrol positif NaOCl 2,5% dan kontrol negatif pada biofilm E. faecalis dan C. albicans. Kemudian dilakukan evaluasi efek antimikroba dengan uji hitung koloni dan nilai viabilitas dengan metode MTT Assay. Hasil: Terdapat perbedaan bermakna jumlah koloni dan nilai viabilitas biofilm E. faecalis ($p<0,05$) dan biofilm C. albicans ($p<0,05$) antara seluruh konsentrasi larutan cuka apel, kontrol positif, dan kontrol negatif, dengan efek antimikroba larutan cuka apel tertinggi pada konsentrasi 2,5% dan terendah pada konsentrasi 0,63%. Kesimpulan: Larutan cuka apel 2,5% memiliki kemampuan antimikroba dengan nilai viabilitas dan jumlah koloni hampir sebanding dengan kontrol positif NaOCl 2,5%, sehingga larutan cuka apel dapat dipertimbangkan untuk dijadikan alternatif larutan irigasi saluran akar.
.....Background: E. faecalis and C. albicans are microorganisms in root canals that are able to survive even after root canal treatment. The use of synthetic irrigation solutions during root canal treatment is effective in eliminating microorganisms in the root canal but has been shown to be toxic to periapical mesenchymal stem cells. Apple vinegar contains active substances such as organic acids, flavonoids, phenols, tannins which are antimicrobial and inhibit microbial growth, but have been proven not to be toxic to stem cells. The aim of this study was to compare the antimicrobial effects of apple vinegar solutions of various concentrations on E. faecalis and C. albicans biofilms. Method: Exposure to 0.63%, 1.25% and 2.5% apple vinegar solutions, as well as 2.5% NaOCl positive control and negative control on E. faecalis and C. albicans biofilms were carried out. Then the antimicrobial effect was evaluated using the colony count test and viability value using the MTT Assay method. Result: There were significant differences in the number of colonies and viability values of E. faecalis biofilm ($p<0.05$) and C. albicans biofilm ($p<0.05$) between all concentrations of apple vinegar solution, positive control and negative control, with the antimicrobial effect of the apple vinegar solution were highest at a concentration of 2.5% and lowest at a concentration of 0.63%. Conclusion: The 2.5% apple vinegar solution has antimicrobial ability with viability values and colony numbers almost comparable to the 2.5% NaOCl as positive control, so 2,5% apple vinegar solution can be considered as an alternative root canal irrigation solution.