

INTISARI

Enterococcus faecalis adalah bakteri Gram positif predominan yang ditemukan di dalam saluran akar dengan kasus periodontitis apikalis akibat kegagalan saluran akar. Bakteri *E. faecalis* banyak ditemukan persisten pasca disinfeksi dan preparasi saluran akar yang kurang baik. *Eco enzyme* kulit nanas mengandung bromelain, flavonoid, tanin, oksalat, dan saponin, asam asetat, dan enzim hidrolitik seperti protease, amilase, dan lipase yang dapat mendestruksi biofilm *E. faecalis*. Penelitian ini bertujuan untuk mengetahui pengaruh *eco enzyme* kulit nanas terhadap destruksi biofilm *E. faecalis* ATCC 29212.

Uji destruksi biofilm *E. faecalis* menggunakan metode *microtiter plate*. Biofilm dibuat dengan menginkubasi bakteri *E. faecalis* di dalam media BHI-B selama 24 jam. Setelah biofilm terbentuk, tiap-tiap *well* ditambahkan larutan *eco enzyme* kulit nanas dengan konsentrasi 5,21%, 10,42%, 20,83%, dan 41,68%, NaOCl 2,5% (kontrol positif), serta PBS (kontrol negatif). Setelah diinkubasi selama 24 jam, biofilm dicuci dengan PBS lalu diwarnai dengan kristal violet 0,1% dan dibaca *optical density*-nya menggunakan microplate reader ($\lambda = 450 \text{ nm}$).

Uji *one-way* ANOVA menunjukkan bahwa terdapat perbedaan persentase destruksi biofilm *E. faecalis* yang signifikan ($p < 0,05$) antar kelompok. Hal ini menunjukkan bahwa *eco enzyme* kulit nanas dapat mendestruksi biofilm *E. faecalis*. Uji *Post-Hoc* LSD menunjukkan bahwa menunjukkan adanya perbedaan persentase destruksi biofilm *E. faecalis* yang signifikan antara kelompok *eco enzyme* konsentrasi 5,21% dengan kelompok perlakuan yang lain ($p < 0,05$). Sedangkan *Eco enzyme* konsentrasi 10,42%, 20,83%, dan 41,68% tidak memiliki perbedaan yang signifikan antar kelompok ($p > 0,05$) yang menunjukkan bahwa ketiga konsentrasi tersebut memiliki kemampuan yang setara dalam mendestruksi biofilm *E. faecalis*. Disimpulkan bahwa *eco enzyme* kulit dapat mendestruksi biofilm *E. faecalis* dan konsentrasi 10,42% merupakan konsentrasi *eco enzyme* kulit nanas yang efektif untuk mendestruksi biofilm *E. faecalis* ATCC 29212.

Kata Kunci: *Eco enzyme*, *eco enzyme* kulit nanas, destruksi biofilm, *Enterococcus faecalis*.

ABSTRACT

Enterococcus faecalis is a Gram positive bacteria that predominantly found in root canal with apical periodontitis due to root canal treatment failure. *E. faecalis* is often found persistently in root canals after disinfection and poor root canal preparation. Pineapple peel eco enzyme contains bromelain, flavonoids, tannins, oxalates and saponins, acetic acid and hydrolytic enzymes such as protease, amylase and lipase which can destroy *E. faecalis* biofilms. This study aimed to determine the effect of pineapple peel eco enzyme on the destruction of *E. faecalis* ATCC 29212 biofilm.

This study use microtiter plate method to run a biofilm test. Biofilms were made by incubating *E. faecalis* bacteria in BHI-B media for 24 hours. After biofilms were formed, each well was added with pineapple peel eco enzyme solution with concentrations of 5.21%, 10.42%, 20.83%, and 41.68%, 2.5% NaOCl (positive control), and PBS (negative control). After the incubation for 24 hours, biofilms were washed with PBS then stained with 0.1% crystal violet. The optical density was read using a microplate reader ($\lambda = 450 \text{ nm}$).

The one-way ANOVA test showed that there was a significant difference in the percentage of *E. faecalis* biofilm destruction ($p < 0.05$) among groups. This showed that pineapple peel eco enzyme could destroy *E. faecalis* biofilm. The Post-Hoc LSD test showed that there was a significant difference in the percentage of *E. faecalis* biofilm destruction between the 5.21% eco enzyme concentration group and the other treatment groups ($p < 0.05$). Meanwhile, Eco enzyme concentrations of 10.42%, 20.83% and 41.68% did not have significant differences between groups ($p > 0.05$), indicating that these three concentrations had equivalent abilities in destroying *E. faecalis* biofilms. It was concluded that pineapple peel eco enzyme can destroy *E. faecalis* biofilms and a concentration of 10.42% is an effective pineapple peel eco enzyme concentration for destroying *E. faecalis* ATCC 29212 biofilms.

Keywords: Eco enzyme, pineapple peel eco enzyme, biofilm destruction, *Enterococcus faecalis*.