

Perubahan Kadar Kalsium Email dengan Model Biofilm Streptococcus Dual Species setelah Paparan Ekstrak Etanol Temulawak = The Change of Calcium Content on Enamel with Streptococcus Dual Species Biofilm Model after Exposed to Ethanol Extract of Temulawak

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Abstrak

Latar Belakang: Temulawak adalah tanaman obat unggulan Indonesia. Pertumbuhan *S. mutans* dan *S. sanguinis* yang berperan dalam pembentukan biofilm pada permukaan email gigi, dapat dihambat oleh ekstrak temulawak. pH kritis biofilm (5.5) dapat mempengaruhi pelepasan ion kalsium email gigi. Xanthorrhizol dalam temulawak diketahui dapat mempertahankan pH netral model biofilm in vitro selama 4 jam.

Tujuan: Menganalisis perubahan pH model biofilm Streptococcus dual species dalam variasi waktu serta pengaruh paparan ekstrak etanol temulawak terhadap kadar kalsium email permukaan gigi dengan biofilm Streptococcus dual species.

Metode: Model biofilm dibuat pada 6-well plate yang telah dilapisi oleh saliva, kemudian ditambahkan *S. Mutans* dan *S. sanguinis* (1:1) dan diinkubasi dalam rentang waktu 1-24 jam, lalu pH diukur dengan menggunakan pH indikator. Selanjutnya model biofilm Streptococcus dual species 16 dan 20 jam dibuat pada spesimen email gigi, kemudian dipaparkan ekstrak etanol temulawak (15%) selama 4 jam dan kadar kalsium diukur dengan alat Energy Dispersive X-ray (EDX). Uji beda dilakukan dengan Mann Whitney dan t-test (independent sample).

Hasil: Model biofilm Streptococcus dual species dapat mencapai pH kritis mulai jam ke 14 dan bertahan sampai jam ke 24. Terdapat perbedaan rerata kadar kalsium (Wt%) antara kelompok kontrol dengan kelompok perlakuan, tetapi perbedaan tersebut secara statistik tidak bermakna ($p > 0.005$). Perbedaan rerata kadar kalsium (Wt%) antara kelompok perlakuan biofilm 16 jam ($27,52 \pm 0.89$) dan 20 jam ($24,92 \pm 0.85$) secara statistik bermakna ($p < 0.005$).

Kesimpulan: Model biofilm Streptococcus dual species dapat mencapai pH kritis setelah 14 jam. Paparan ekstrak etanol temulawak tidak mempengaruhi secara signifikan kadar kalsium permukaan email gigi dengan biofilm Streptococcus dual species. Namun, paparan ekstrak etanol temulawak pada kematangan biofilm berbeda, menghasilkan perbedaan kadar kalsium permukaan email gigi.

.....Background: Java turmeric is Indonesian medicinal plants. Growth of *S. mutans* and *S. sanguinis* that play a role in biofilm formation on the enamel surface, could be inhibited by java turmeric extract. Biofilms critical pH (5.5) could affect the release of calcium ions enamel. Xanthorrhizol in java turmeric are known to maintain a neutral pH in vitro biofilm models for 4 hours.

Objective: To analyze the changes in pH Streptococcus dual species biofilm models in variations exposure

time as well as the influence of ethanol extract of java turmeric on tooth surfaces enamel calcium levels with Streptococcus dual species biofilms.

Methods: Biofilm model was made in 6-well plate that had been coated with saliva, then added *S. Mutans* and *S. sanguinis* (1:1) and incubated in a span of 1-24 hours, and pH was measured by using a pH indicator. Furthermore Streptococcus dual species biofilm models 16 and 20 hours were made on specimens of enamel, then presented ethanol java turmeric extract (15%) for 4 h and calcium levels were measured by Energy Dispersive X-ray (EDX). Different test performed by Mann Whitney and t-test (independent samples).

Results: Streptococcus dual species biofilm model could reach critical pH ranging to 14 hours and last up to 24 hours. There are differences in the mean levels of calcium (Wt%) between the control group and treatment group, but the difference was not statistically significant ($p > 0.005$). Mean difference levels of calcium (Wt%) between treatment groups biofilms 16 hours (27.52 ± 0.89) and 20 hours (24.92 ± 0.85) was statistically significant ($p < 0.005$).

Conclusion: Streptococcus dual species biofilm model could reach a critical pH after 14 hours. Exposure to ethanol extract of java turmeric did not affect significantly the level of calcium in the enamel surface Streptococcus dual species biofilms. However, exposure of turmeric extract on different maturity of biofilm, produced difference in the calcium level of enamel surface.