

# Analisis Efek Cell-Free Spent Media Streptococcus Sanguinis Terhadap Interaksi Mixed Species Biofilm Streptococcus Mutans dan Candida Albicans = Analysis of the Effect Cell-Free Spent Media Streptococcus Sanguinis on the Interaction of Mixed Species Biofilm Streptococcus Mutans and Candida Albicans

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## Abstrak

Latar Belakang: Terdapat berbagai spesies bakteri yang berkoloni di dalam rongga mulut antara lain *S.mutans* merupakan bakteri penyebab utama karies gigi dan begitu pula *C.albicans*. Perkembangan kedua mikroorganisme ini saling berinteraksi berperan pada pembentukan karies gigi dan memiliki hubungan sinergisme. Terdapat *S.sanguinis* dapat pembentukan plak gigi mengakibatkan karies dan gingivitis. *S.sanguinis* memiliki efek antagonis terhadap *S.mutans*. Adapun hubungan *S.sanguinis* meningkatkan biomassa dan aktivitas metabolik pada biofilm *C.albicans*. Belum ada penelitian yang membuktikan apakah *S.sanguinis* dapat memberikan efek antagonis (menghambat) yang sama terhadap interaksi *S.mutans* dan *C.albicans* yang memiliki hubungan sinergistik. Dapat digunakan cell free-spent medium yang merupakan medium sisa hasil kultur bakteri yang telah disentrifugasi dan filter sehingga hanya tersisa produk ekskresi *S.sanguinis* sebagai intervensi untuk melihat pengaruh konsentrasi protein Streptococcus sanguinis terhadap dual-spesies *S.mutans* dan *C.albicans*.

Tujuan: Mengetahui efek cell-free spent media *S.sanguinis* terhadap interaksi mixed species biofilm *C.albicans* dan *S.mutans*.

Metode Digunakan uji Bradford untuk menetapkan total konsentrasi protein, uji Crystal Violet untuk menetapkan pembentukan massa biofilm, dan uji Total Plate Count untuk menetapkan viabilitas spesies. Masing-masing perlakuan dibedakan berdasarkan konsentrasi spent medium 100%, 10%, dan 1%, serta waktu inkubasi 3 jam, 24 jam, dan 48 jam.

Hasil: Analisis dari uji statistik terdapat perbedaan bermakna pada pembentukan massa biofilm dual-spesies *S. mutans* dan *C.albicans* berdasarkan konsentrasi protein dan waktu inkubasinya. Serta tidak terdapat perbedaan bermakna pada viabilitas biofilm *S.mutans* dan *C.albicans* berdasarkan konsentrasi protein dan waktu.

Kesimpulan: Konsentrasi protein dan waktu inkubasi dapat mempengaruhi pembentukan massa biofilm pada dual-spesies *S.mutans* dan *C.albicans*, yang didukung secara statistik karena terdapat perbedaan bermakna. Sedangkan pada uji viabilitas biofilm, baik berdasarkan konsentrasi protein maupun waktu inkubasi dapat mempengaruhi viabilitas biofilm *S.mutans* dan *C.albicans*, namun tidak didukung secara statistik karena tidak terdapat perbedaan bermakna. Terdapat efek cell-free spent media *S.sanguinis* yaitu menghambat pembentukan massa biofilm pada kombinasi biofilm *S.mutans* dan *C.albicans*.

.....Background: There are various species of bacteria that colonize in the oral cavity, including *S.mutans* is the main bacteria causing dental caries and *C.albicans*. The development of these two interacting microorganisms plays a role in the formation of dental caries and has a synergistic relationship. There is *S.sanguinis* bacteria forming dental plaque resulting in caries and gingivitis. *S.sanguinis* has an antagonistic effect against *S.mutans*. The relationship between *S.sanguinis* increased biomass and metabolic activity in

C.albicans biofilms. There has been no research that proves whether S.sanguinis can provide the same antagonistic effect on the interaction of S.mutans and C.albicans which has a synergistic relationship. Cell free-spent medium can be used which is the remaining medium from filtered bacterial culture so that only S.sanguinis excretion products remain as an intervention to see the effect of protein concentration.

S.sanguinis against dual-species S.mutans and C.albicans

Objective: To determine the effect of cell-free spent media S.sanguinis on the interaction of mixed species biofilm C.albicans and S.mutans.

Methods: The Bradford test was used to determine the total protein concentration, the Crystal Violet test to determine the mass formation of the biofilm, and the Total Plate Count test to determine the viability of the species. Each treatment was differentiated based on protein concentration spent medium 100%, 10%, and 1%, as well as incubation time of 3 hours, 24 hours, and 48 hours.

Results: From analysis statistic test there was a significant difference in the mass formation of dual-species S.mutans and C.albicans biofilms based on protein concentration and incubation time. And there was no significant difference in the viability of S.mutans and C.albicans biofilms based on protein concentration and incubation time.

Conclusion: Protein concentration and incubation time can affect the formation of biofilm mass in dual-species S.mutans and C.albicans, which is supported statistically because there is a significant difference. Meanwhile, the biofilm viability test, both based on protein concentration and incubation time, could affect the biofilm viability of S.mutans and C.albicans, but it was not statistically supported because there was no significant difference. There is an effect of cell-free spent media S.sanguinis which inhibits the formation of biofilm mass in the combination of S.mutans and C.albicans biofilms.