

# Studi In Vitro Efek Antimikroba Mikroenkapsulasi Ekstrak Propolis Stingless Bee Indonesia terhadap Bakteri Staphylococcus Epidermidis = In Vitro Study of the Antimicrobial Effect of Microencapsulated Propolis Extract from Indonesian Stingless Bees against Staphylococcus Epidermidis Bacteria

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## Abstrak

Latar Belakang Pengobatan acne vulgaris menggunakan antibiotik eritromisin dan klindamisin memiliki risiko terjadinya resistensi antibiotik sehingga dibutuhkan pengobatan alternatif yaitu propolis. Propolis memiliki berbagai zat aktif seperti flavonoid yang dapat berperan sebagai antimikroba terhadap bakteri. Mikroenkapsulasi propolis merupakan metode pengolahan untuk meningkatkan solubilitas dan stabilitas propolis. Saat ini belum diketahui mengenai efek antimikroba mikroenkapsulasi ekstrak propolis stingless bee Indonesia (*Tetragonula sapiens*) terhadap bakteri *Staphylococcus epidermidis* secara in vitro. Metode Uji broth microdilution dilakukan untuk melihat efek antimikroba dari mikroenkapsulasi ekstrak propolis *Tetragonula sapiens*, wax ekstrak propolis *Tetragonula sapiens*, serta kontrol positif berupa antibiotik klindamisin terhadap bakteri *Staphylococcus epidermidis* ATCC 12228. Hasil Didapatkan nilai Minimal Inhibitory Concentration (MIC) terhadap bakteri *S. epidermidis* dari uji broth microdilution. MIC90 dari dari mikroenkapsulasi ekstrak propolis *Tetragonula sapiens* adalah 512 g/mL. Pada sampel wax ekstrak propolis *Tetragonula sapiens* belum ditemukan nilai MIC90, namun terdapat MIC50 yaitu pada konsentrasi 10.000 g/mL. MIC90 untuk klindamisin adalah 2 g/mL. Kesimpulan Mikroenkapsulasi ekstrak propolis *Tetragonula sapiens* memiliki efek antimikroba terhadap bakteri *S. epidermidis* pada konsentrasi 512 g/mL. Kemampuan menghambat pertumbuhan bakteri mikroenkapsulasi ekstrak propolis *Tetragonula sapiens* lebih baik dibandingkan dengan ekstrak propolis *Tetragonula sapiens* dalam bentuk wax ditandai dengan nilai MIC yang lebih rendah pada mikroenkapsulasi ekstrak propolis. Daya hambat dari mikroenkapsulasi ekstrak propolis *Tetragonula sapiens* tidak sebaik terapi standar antibiotik klindamisin, namun mikroenkapsulasi ekstrak propolis *Tetragonula sapiens* memiliki potensi sebagai antimikroba *S. epidermidis*.

.....Introduction Treatment of acne vulgaris using the antibiotics erythromycin and clindamycin carries a risk of antibiotic resistance, so alternative treatment is needed, such as propolis. Propolis has various active compounds such as flavonoids which can act as antimicrobials against bacteria. Propolis microencapsulation is a processing method to increase the solubility and stability of propolis. Currently, it is not known about the in vitro antimicrobial effect of microencapsulated Indonesian stingless bee (*Tetragonula sapiens*) propolis extract against *Staphylococcus epidermidis*. Method The broth microdilution test was carried out to see the antimicrobial effect of microencapsulation of *Tetragonula sapiens* propolis extract, *Tetragonula sapiens* propolis extract wax, as well as a positive control in the form of the antibiotic clindamycin against the bacteria *Staphylococcus epidermidis* ATCC 12228. Results The Minimum Inhibitory Concentration (MIC) value was obtained for *S. epidermidis* bacteria from the broth microdilution test. The MIC90 of microencapsulated *Tetragonula sapiens* propolis extract is 512 g/mL. In the *Tetragonula sapiens* propolis extract wax sample, no MIC90 value was found, but there is an MIC50 at 10,000 g/mL. The MIC90 for clindamycin is 2 g/mL. Conclusion Microencapsulation of *Tetragonula sapiens* propolis extract has an

antimicrobial effect against *S. epidermidis* bacteria at a concentration of 512 g/mL. The ability to inhibit bacterial growth of microencapsulated *Tetragonula sapiens* propolis extract is better compared to *Tetragonula sapiens* propolis extract in wax form, indicated by the lower MIC value in microencapsulated propolis extract. The inhibitory power of microencapsulated *Tetragonula sapiens* propolis extract is not as good as standard antibiotic clindamycin therapy however, microencapsulated *Tetragonula sapiens* propolis extract has potential as an antimicrobial for *S. epidermidis*.