

INTISARI

Latar Belakang: *Porphyromonas gingivalis* merupakan bakteri patogen dominan di rongga mulut yang terkait dengan gingivitis. Minyak atsiri jahe gajah memiliki sifat antibakteri, sedangkan kitosan berperan sebagai penghantar obat dan meningkatkan bioavailabilitas bahan aktif. **Tujuan:** Mengetahui pengaruh formulasi *nanospray* kombinasi minyak atsiri jahe dan kitosan dalam menghambat pertumbuhan *P. gingivalis* ATCC 33277 serta uji viabilitas terhadap sel HGF. **Metode:** Penelitian berupa quasi-eksperimental *in vitro* pada kelompok *nanospray* dengan konsentrasi minyak atsiri jahe gajah 7,5%, 12,5%, dan 17,5% yang dikombinasikan dengan kitosan 1%, serta kontrol negatif (kitosan 1%) dan kontrol positif (Alocclair *spray*). Aktivitas antibakteri diuji menggunakan metode difusi agar pada media MHA dengan 5 kali replikasi. Diameter zona hambat diukur menggunakan jangka sorong, sedangkan uji MTT dilakukan untuk viabilitas sel HGF pada 24, 48, dan 72 jam. Data dianalisis menggunakan *One Way* ANOVA dilanjutkan uji post-hoc (LSD), korelasi *Spearman*, dan regresi linear pada tingkat signifikansi 95%. **Hasil:** Semua formulasi *nanospray* memenuhi standar nanoemulsi dan sediaan oral *spray*. Diameter zona hambat tertinggi pada kelompok *nanospray* 17,5% (17,87 mm), diikuti kontrol positif (17,08 mm), 12,5% (12,91 mm), 7,5% (10,69 mm), dan kontrol negatif (9,38 mm). Viabilitas sel tertinggi ditemukan pada kelompok 7,5%, dan terendah pada 17,5%. Semua kelompok *nanospray* signifikan menghambat *P. gingivalis* ($p < 0,05$), tetapi peningkatan konsentrasi minyak atsiri jahe gajah menurunkan viabilitas sel HGF. **Kesimpulan:** *Nanospray* kombinasi minyak atsiri jahe gajah 12,5% dan kitosan 1% menunjukkan efektivitas antibakteri optimal dengan viabilitas sel di atas 70%.

Kata kunci: jahe gajah, kitosan, minyak atsiri, *nanospray*, *Porphyromonas gingivalis*, viabilitas sel.

ABSTRACT

Background: *Porphyromonas gingivalis* is a dominant periodontal pathogen in the oral cavity associated with gingivitis. Elephant ginger essential oil exhibits antibacterial properties, while chitosan acts as a drug delivery and enhances the active ingredient's bioavailability. **Objective:** Analyzing the effectiveness of nanospray formulations combining elephant ginger essential oil and chitosan in inhibiting *P. gingivalis* ATCC 33277 growth and evaluate the effect of increasing essential oil concentration on HGF cell viability. **Methods:** Quasi-experimental *in vitro* study included groups of nanospray formulations with elephant ginger essential oil at 7.5%, 12.5%, and 17.5% concentrations combined with 1% chitosan, negative control (1% chitosan) and a positive control (Alocclair spray). Antibacterial activity test using an agar diffusion method on MHA with five replications, inhibition zone diameters measured with calipers. MTT assay tested HGF cell viability at 24, 48, and 72 hours. Data were analyzed with One-way ANOVA, followed by post-hoc LSD tests, Spearman correlation, and linear regression. Data analyzed using One Way ANOVA followed by post-hoc test (LSD), Spearman correlation, and linear regression at 95% significance level. **Result:** All nanospray formulations met nanoemulsion and oral spray standards. The highest inhibition zone diameter was observed in the 17.5% nanospray group (17.87 mm), followed by positive control (17.08 mm), 12.5% (12.91 mm), 7.5% (10.69 mm), and negative control (9.38 mm). The highest cell viability was in the 7.5% group, with the lowest in the 17.5% group. All nanosprays significantly inhibited *P. gingivalis* ($p < 0.05$); however, increasing essential oil concentration, reduced HGF cell viability. **Conclusion:** Nanospray combination 12,5% elephant ginger essential oil and 1% chitosan showed optimal antibacterial effectiveness while maintaining cell viability above 70%.

Keywords: chitosan, elephant ginger, essential oil, nanospray, *Porphyromonas gingivalis*, cell viability.