

INTISARI

Kontaminasi *Enterococcus faecalis* pada *dental unit waterline* (DUWL) dapat meningkatkan risiko infeksi nosokomial dalam praktik kedokteran gigi. *Chlorhexidine* sebagai disinfektan standar memiliki efektivitas tinggi, namun penggunaan jangka panjang berpotensi mengganggu keseimbangan mikrobiota oral. Penelitian ini bertujuan mengetahui pengaruh nanoemulsi kombinasi asam asetat buah kedondong (*Spondias dulcis*), kitosan, dan minyak atsiri jahe merah (*Zingiber officinale* var. *rubrum*) terhadap zona hambat pertumbuhan *E. faecalis* sebagai alternatif disinfektan berbahan alami.

Penelitian eksperimental laboratoris *in vitro* menggunakan metode difusi agar. Nanoemulsi diformulasikan dari asam asetat kedondong 1%, kitosan 1%, minyak atsiri jahe merah 0,5%, dan *Tween* 80 melalui homogenisasi dan ultrasonikasi menghasilkan ukuran droplet 688,6 nm. Pengujian aktivitas antibakteri terhadap *E. faecalis* ATCC 29212 menggunakan tiga kelompok, kontrol negatif (kitosan 1%), kontrol positif (*chlorhexidine* 0,2%), dan nanoemulsi dengan lima kali pengulangan. Diameter zona hambat diukur menggunakan jangka sorong ketelitian 0,01 mm setelah inkubasi 24 jam suhu 37°C. Analisis data menggunakan *One-Way ANOVA* dan *Post-Hoc* LSD.

Hasil analisis *One-Way ANOVA* dan *Post-Hoc* LSD menunjukkan perbedaan signifikan antar kelompok ($p < 0,05$). Nanoemulsi memiliki zona hambat signifikan lebih besar dibanding kontrol negatif ($p < 0,05$), namun lebih rendah dibanding kontrol positif ($p < 0,05$). Kesimpulan penelitian ini adalah nanoemulsi kombinasi asam asetat buah kedondong, kitosan, dan minyak atsiri jahe merah berpengaruh terhadap diameter zona hambat pertumbuhan *Enterococcus faecalis*.

Kata kunci: nanoemulsi, asam asetat kedondong, kitosan, minyak atsiri jahe merah, *Enterococcus faecalis*, zona hambat.

ABSTRACT

Contamination of Enterococcus faecalis in dental unit waterlines (DUWL) increases the risk of nosocomial infections in dental practice. Chlorhexidine, as a standard disinfectant, demonstrates high effectiveness, however long-term use may potentially disrupt oral microbiota balance. This study aims to determine the effect of nanoemulsion combining acetic acid from kedondong fruit (Spondias dulcis), chitosan, and red ginger essential oil (Zingiber officinale var. rubrum) on the inhibition zone of E. faecalis growth as a natural-based disinfectant alternative.

This in vitro experimental laboratory study employed the agar diffusion method. The nanoemulsion was formulated from 1% kedondong acetic acid, 1% chitosan, 0.5% red ginger essential oil, and Tween 80 through homogenization and ultrasonication, yielding a droplet size of 688.6 nm. Antibacterial activity testing against E. faecalis ATCC 29212 utilized three groups: negative control (1% chitosan), positive control (0.2% chlorhexidine), and nanoemulsion, with five replications. The inhibition zone diameter was measured using a vernier caliper with 0.01 mm precision after 24-hour incubation at 37°C. Data analysis employed One-Way ANOVA and Post-Hoc LSD tests.

Results of One-Way ANOVA and Post-Hoc LSD test analysis demonstrated significant differences among groups ($p < 0.05$). The nanoemulsion exhibited a significantly larger inhibition zone compared to the negative control ($p < 0.05$), but lower than the positive control ($p < 0.05$). The conclusion of this study is that the nanoemulsion combining kedondong fruit acetic acid, chitosan, and red ginger essential oil influences the inhibition zone diameter of Enterococcus faecalis growth.

Keywords: nanoemulsion, kedondong acetic acid, chitosan, red ginger essential oil, Enterococcus faecalis, inhibition zone