

INTISARI

Escherichia coli dapat mengkontaminasi rongga mulut melalui air yang digunakan selama perawatan gigi, dan berisiko bagi pasien imunitas rendah. Penggunaan *chlorhexidine* sebagai antiseptik standar memiliki efektivitas tinggi, namun penggunaannya jangka panjang berpotensi mengganggu keseimbangan mikrobioma oral. Diperlukan alternatif obat kumur berbahan alami yang aman dan tetap efektif. 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 *Escherichia coli*.

Penelitian ini merupakan eksperimen laboratoris secara *in vitro* dengan metode difusi cakram. Uji antibakteri dilakukan terhadap *Escherichia coli* ATCC 25922 dengan tiga kelompok: kontrol negatif (kitosan 1%), kontrol positif (*chlorhexidine* 0,2%), dan kelompok perlakuan nanoemulsi kombinasi. Setiap kelompok dilakukan pengulangan lima kali. Zona hambat diukur menggunakan jangka sorong ketelitian 0,001 mm. Rata-rata diameter zona hambat yang diperoleh adalah 6,346 mm pada kontrol negatif, 10,475 mm pada kelompok perlakuan, dan 15,751 mm pada kontrol positif.

Hasil analisis *One-Way ANOVA* menunjukkan adanya pengaruh nanoemulsi kombinasi asam asetat buah kedondong 1%, kitosan 1%, dan minyak atsiri jahe merah 0,5% terhadap pertumbuhan *Escherichia coli*. Uji *Post-Hoc LSD* menunjukkan terdapat signifikansi selisih rerata antar kelompok perlakuan ($p < 0,05$). Kesimpulan dari penelitian ini adalah bahwa nanoemulsi kombinasi asam asetat buah kedondong 1%, kitosan 1%, dan minyak atsiri jahe merah 0,5% berpengaruh dalam menghambat pertumbuhan *Escherichia coli*.

Kata kunci: *Escherichia coli*, asam asetat kedondong, kitosan, minyak atsiri jahe merah, zona hambat.

ABSTRACT

Escherichia coli can contaminate the oral cavity through water used during dental procedures, which may be harmful especially for patients with low immunity. Although chlorhexidine is the standard antiseptic and is highly effective, long-term use may disturb the balance of the oral microbiome. Therefore, a natural and safe mouthwash alternative is needed. This study aimed to determine the effect of a nanoemulsion combining kedondong fruit acetic acid (*Spondias dulcis*), chitosan, and red ginger essential oil (*Zingiber officinale* var. *rubrum*) on the inhibition zone of *Escherichia coli*.

This research was an *in vitro* laboratory experiment using the disc diffusion method. Antibacterial testing was carried out against *Escherichia coli* ATCC 25922 with three groups: a negative control (1% chitosan), a positive control (0.2% chlorhexidine), and the nanoemulsion treatment. Each group was tested five times. Inhibition zones were measured using a caliper with 0,001 mm precision. The mean inhibition zone diameters were 6,346 mm for the negative control, 10,475 mm for the treatment group, and 15,751 mm for the positive control.

One-way ANOVA showed a significant effect of the nanoemulsion containing 1% kedondong fruit acetic acid, 1% chitosan, and 0,5% red ginger essential oil on the growth of *Escherichia coli* ($p = 0,001$). Post-hoc LSD analysis confirmed significant differences among all groups ($p < 0,05$). In conclusion, the nanoemulsion combination of 1% kedondong fruit acetic acid, 1% chitosan, and 0,5% red ginger essential oil was effective in inhibiting the growth of *Escherichia coli*, indicating its potential as a natural mouthwash alternative in dental practice.

Keywords: *Escherichia coli*, kedondong acetic acid, chitosan, red ginger essential oil, inhibition zone.