

INTISARI

Klorheksidin merupakan agen antibakteri yang dapat berikatan dengan regio bermuatan negatif pada bakteri, sehingga mengakibatkan gangguan kontrol osmotik dan metabolisme membran sel serta enzim. Senyawa apatit berpori seperti membran gelatin-karbonat apatit cocok digunakan sebagai *drug delivery system* (DDS) karena bersifat biokompatibel, memiliki ukuran pori yang dapat diatur untuk mengontrol laju pelepasan obat, dan kemampuan pori-pori tersebut untuk memuat berbagai agen antimikroba tanpa mengubah sifatnya. Tujuan penelitian ini adalah untuk mengetahui efektivitas daya antibakteri membran klorheksidin-gelatin-karbonat apatit terhadap bakteri periodontopatik *Fusobacterium nucleatum*.

Subjek dalam penelitian ini adalah bakteri *F. nucleatum* dengan konsentrasi 1.5×10^8 CFU/mL yang diinokulasi dalam media *Mueller Hinton Agar* (MHA) pada cawan petri. Uji antibakteri dilakukan dengan metode difusi cakram sebanyak tiga replikasi. Sampel penelitian yaitu membran klorheksidin-gelatin-karbonat apatit, membran gelatin-karbonat apatit, dan *chlorhexidine chip* diletakkan di atas media MHA dan diinkubasi selama 24 jam pada suhu 37^0 dalam kondisi anaerob. Zona hambat pertumbuhan *F. nucleatum* yang terbentuk diukur menggunakan jangka sorong. Hasil penelitian dianalisis menggunakan uji *One-Way* ANOVA.

Rerata diameter zona hambat yang membran klorheksidin-gelatin karbonat-apatit sebesar $18,18 \pm 0,18$ mm; *chlorhexidine chip* sebesar $15,13 \pm 0,08$ mm; dan membran gelatin-karbonat apatit sebesar 0,00 mm. Data yang diperoleh kemudian dianalisis dengan uji *One-Way* ANOVA dan menunjukkan nilai signifikansi 0,00 ($p < 0,05$) yang berarti bahwa membran klorheksidin-gelatin-karbonat apatit berpengaruh secara signifikan dalam menghambat pertumbuhan *F. nucleatum*. Analisis lanjutan dengan uji *Post-Hoc* LSD menunjukkan nilai signifikansi 0,00 ($p < 0,05$) antar ketiga kelompok perlakuan. Kesimpulan yang diperoleh dari hasil penelitian adalah membran klorheksidin-gelatin-karbonat apatit memiliki daya antibakteri yang efektif menghambat pertumbuhan bakteri periodontopatik *F. nucleatum*.

Kata kunci: *Fusobacterium nucleatum*; Daya Antibakteri; Difusi cakram;
Klorheksidin; Membran Gelatin-Karbonat Apatit

ABSTRACT

Chlorhexidine is an antibacterial agent that can bind to negatively charged regions of the bacteria, resulting in impaired osmotic control and metabolism of cell membranes and enzymes. Porous apatite compounds such as gelatin-carbonated apatite membranes are suitable for use as drug delivery systems (DDS) because its biocompatibility, its adjustable pore sizes to control the rate of drug release, and its ability to contain various antimicrobial agents without changing their antibacterial properties. The purpose of this study was to determine the antibacterial effectiveness of chlorhexidine-gelatin-carbonated apatite membrane against the periodontopathic bacteria *Fusobacterium nucleatum*.

The subjects in this study were *F. nucleatum* bacteria with a concentration of 1.5×10^8 CFU / mL which were inoculated in the Mueller Hinton Agar (MHA) medium in a petri dish. Antibacterial test was carried out using the *disk-diffusion* method for as many as three replications. This research samples were chlorhexidine-gelatin-carbonated apatite membrane, gelatin-carbonated apatite membrane, and *chlorhexidine chip* were placed on MHA media and incubated for 24 hours at 37°C under anaerobic conditions. The zone of growth inhibition of *F. nucleatum* formed was measured using calipers. The results of the study were analyzed using the One-Way ANOVA test.

The mean inhibition zone diameter of the chlorhexidine-gelatin-carbonated apatite membrane was 18.18 ± 0.18 mm; *chlorhexidine chip* 15.13 ± 0.08 mm; and gelatin-carbonated apatite membrane 0,00 mm. The data obtained were analyzed with the One-Way ANOVA test and showed a significance value of 0.00 ($p < 0.05$) which means that the chlorhexidine-gelatin-carbonated apatite membrane significantly influenced the growth of *F. nucleatum*. Further analysis with the Post-Hoc LSD test showed a significance value of 0.00 ($p < 0.05$) between the three treatment groups. The conclusion obtained from the research is that the chlorhexidine-gelatin-carbonated apatite membrane has an effective antibacterial activity to inhibits the growth of periodontopathic bacteria *F. nucleatum*.

Keywords: *Fusobacterium nucleatum*; Antibacterial Activity; Disk- Diffusion; Chlorhexidine; Gelatin-Carbonated Apatite Membrane