

## INTISARI

Terapi regeneratif periodontal menggunakan *bone graft* penting untuk mengembalikan fungsi jaringan periodontal. Cangkang kerang simping (*Amusium pleuronectes*) berpotensi sebagai sumber kalsium untuk sintesis *bone graft*. Gel kitosan (CS) kombinasi karbonat hidroksiapatit (CHA) disintesis untuk regenerasi defek periodontal yang sempit dan irregular. Tujuan penelitian untuk sintesis, karakterisasi, dan analisis pengaruh karbonat hidroksiapatit cangkang kerang simping kombinasi kitosan (CS/CHA) pada sel osteoblas dan fibroblas.

Penelitian eksperimental laboratoris dilaksanakan dalam dua tahap. Penelitian tahap pertama yaitu sintesis CS/CHA dan karakterisasi fisikokimia berbagai konsentrasi CS/CHA meliputi struktur (SEM), gugus fungsional (FTIR), kristalinitas (XRD), viskositas, kadar kalsium (SSA), dan injektabilitas. Tahap kedua yaitu biokompatibilitas (MTT), migrasi (*scratch assay*), dan ekspresi kolagen tipe 1 (imunofluoresens) sel osteoblas dan fibroblas. Data biokompatibilitas dan migrasi dianalisis menggunakan SPSS 26.0.

Gel CS/CHA menunjukkan hasil evaluasi SEM tampak CHA tersebar merata pada matriks CS, spektra XRD menunjukkan puncak khas CHA, dan hasil spektra FTIR positif gugus fungsional CS/CHA. Gel CS/CHA memiliki kadar kalsium >1000 ppm dan injektabilitas baik. Hasil *One-way Anova* menunjukkan perbedaan signifikan viabilitas antar konsentrasi CS/CHA ( $p < 0,05$ ). Hasil uji t independen menunjukkan tidak ada perbedaan signifikan viabilitas antara durasi inkubasi 24 dan 48 jam ( $p > 0,05$ ). Hasil uji t independen menunjukkan tidak ada perbedaan signifikan migrasi antara kontrol dan CS/CHA ( $p > 0,05$ ). Hasil identifikasi protein kolagen tipe 1 menunjukkan ekspresi lebih tinggi pada kelompok CS/CHA. Disimpulkan bahwa hasil sintesis gel karbonat hidroksiapatit cangkang kerang simping kombinasi kitosan memiliki karakteristik fisikokimia baik dan biokompatibel pada sel osteoblas dan fibroblas. Gel CS/CHA berpotensi mempercepat proses penyembuhan sehingga berkontribusi pada proses regenerasi periodontal.

**Kata Kunci:** Gel kitosan-karbonat hidroksiapatit, Karbonat hidroksiapatit cangkang kerang simping, Kitosan, Terapi regeneratif periodontal.

## ABSTRACT

*Periodontal regenerative therapy using bone graft is essential to restore periodontal function. Simping shells (Amusium pleuronectes) are a source of calcium for bone graft synthesis. Chitosan (CS) gel combined with carbonated-hydroxyapatite (CHA) synthesized to regenerate periodontal defects. The aim of the study was to synthesize, characterize, and analyze CS/CHA effect to osteoblast and fibroblast cells.*

*The laboratory experimental research was conducted in two stages. The first stage was the synthesis and physicochemical characterization of CS/CHA various concentrations, including structure (SEM), functional groups (FTIR), cristallinity (XRD), viscosity, calcium content (AAS), and injectability. The second stage was biocompatibility (MTT), migration (scratch assay), and collagen type 1 (immunofluorescence) from osteoblast and fibroblast cells. Biocompatibility and migration data were analyzed using SPSS 26.0.*

*The CS/CHA gel structural evaluation showed that CHA was evenly distributed in the CS matrix, XRD spectra showed typical CHA peak, and FTIR spectra showed functional groups of CHA. Calcium content in the CS/CHA was >1000ppm and CS/CHA had a good injectability. One-way Anova test showed significant differences viability between CS/CHA concentrations ( $p < 0,05$ ). Independent t-test showed no significant differences viability between incubation 24 and 48 h ( $p > 0.05$ ). Independent t-test showed no significant differences migration between control and CS/CHA groups ( $p > 0.05$ ). Collagen type 1 identification showed higher expression in the CS/CHA group. In conclusion, carbonated-hydroxyapatite from simping shell combined with chitosan has good physicochemical characteristics and biocompatible to osteoblast and fibroblast cells. CS/CHA gel has the potential to accelerate the healing process thus contributing to the periodontal regeneration process.*

**Keywords:** *Simping shell carbonated-hydroxyapatite, Chitosan, Chitosan/Carbonated-hydroxyapatite gel, Periodontal regenerative therapy.*