

Pengaruh konsentrasi alginat terhadap ukuran pori dan porositas scaffold hidroksiapatit/alginat dengan atau tanpa kitosan = The influence of alginate concentration on pore size and porosity of hydroxyapatite alginate scaffolds with or without chitosan / Lalita El Milla

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Abstrak

ABSTRAK

Latar Belakang: Pada rekayasa jaringan tulang dibutuhkan scaffold dengan ukuran pori dan porositas yang besar. Ukuran pori dan porositas scaffold hidroksiapatit/alginat dapat dipengaruhi konsentrasi alginat yang digunakan. Kitosan yang ditambahkan pada scaffold hidroksiapatit/alginat diketahui dapat meningkatkan perlekatan sel dan memberi sifat antimikrobia. Namun penambahan kitosan dapat mempengaruhi ukuran pori dan porositas scaffold. Tujuan: Untuk mengetahui apakah penggunaan alginat konsentrasi yang rendah dalam scaffold hidroksiapatit/alginat dengan atau tanpa kitosan dapat meningkatkan ukuran pori dan porositas scaffold. Metode: Karakterisasi hidroksiapatit dengan analisis X-Ray Diffraction XRD dan Fourier transform infrared spectroscopy FTIR. Karakterisasi alginat, kitosan dan scaffold dengan analisis FTIR. Menganalisis ukuran poriscaffold dengan Scanning Electron Microscope SEM dan menghitung porositas dengan metode liquid displacement, hasil dianalisis dengan One-Way ANOVA dan diikuti uji Post Hoc Tukey HSD. Hasil: Ketiga bahan teridentifikasi sebagai hidroksiapatit, alginat dan kitosan. Spektrum FTIR menunjukkan adanya interaksi kimia di dalam scaffold. Didapatkan pula bahwa terdapat perbedaan bermakna pada ukuran pori dan porositas antara scaffold hidroksiapatit/alginat 1 dan scaffold hidroksiapatit/alginat 3 dengan atau tanpa Kitosan. Kesimpulan: Penggunaan konsentrasi alginat 1 dapat memperbesar ukuran pori dan porositas pada scaffold hidroksiapatit/alginat dan scaffold hidroksiapatit/alginat/kitosan dan penggunaan kitosan dapat memperkecil ukuran pori serta memperbesar porositas scaffold hidroksiapatit/alginat.

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ABSTRACT

Background large pore size and high porosity were required in bone tissue engineering scaffolds. The pore size and porosity of hydroxyapatite alginate scaffolds can be influenced by the concentration of alginate. Chitosan added to the hydroxyapatite alginate scaffolds is known to increase cell attachment and provide antimicrobial properties. However the addition of chitosan may affect the pore size and porosity of the scaffolds. Purpose To determine whether the use of low alginate concentrations in hydroxyapatite alginate scaffolds with or without chitosan can increase the pore size and porosity of the scaffolds. Methods hydroxyapatite was identified using X Ray Diffraction XRD and Fourier transform infrared spectroscopy FTIR analysis. Alginate, chitosan and scaffolds were characterized using FTIR analysis. The pore size of the scaffold was analyzed using Scanning Electron Microscope SEM and the porosity was calculated using liquid displacement method and the result was analyzed by One Way ANOVA and Tukey HSD Post Hoc Test. Results The three ingredients were identified as hydroxyapatite, alginate and chitosan. FTIR spectra indicated the presence of chemical interactions in the scaffolds. Statistical analysis

was showed that there were significant differences in pore size and porosity of hydroxyapatite alginate 1 scaffolds and hydroxyapatite alginate 3 scaffolds with or without chitosan. Conclusion Alginate 1 can enlarge the pore size and porosity of the hydroxyapatite alginate and hydroxyapatite alginate chitosan scaffolds, and chitosan can reduce pore size and increase the porosity of the hydroxyapatite alginate scaffolds.