

***SWELLING TEST AND WATER CONTENT PERCENTAGE OF CHITOSAN-
GELATINE CARBONATE APATITE SCAFFOLD BASED ON PADALARANG
LIMESTONE***

ABSTRACT

Background: Bone defects are still one of the most common health problems in dentistry. An aspect of tissue engineering that has been developed to assist the bone regeneration process is the scaffold. scaffold that used in this study is a 3D scaffold consists of chitosan-gelatin (K-G) and carbonate apatite (KA) based on Padalarang limestone. Combining these three ingredients will improve the properties of each material. K-G:KA scaffold will be tested for swelling ratio and WCP where the ability of swelling is useful for absorption of body fluids and transfer of nutrients. ***Purpose:*** This research aimed to determine the optimal variation of the composition ratio of carbonate apatite, gelatin, and chitosan for swelling ratio and WCP for scaffold manufacture. ***Method:*** Scaffold synthesized from chitosan, gelatin, and carbonate apatite with various K-G:KA ratios, that is 10:90, 20:80, 30:70, and 40:60, with freeze drying method. Swelling ratio and water content percentage (WCP) was investigated by immersing the scaffold in simulated body fluid (SBF) for a certain duration. ***Result:*** Swelling ratio obtained were 2.03, 2.95, 3.31, and 3.52 in 10:90, 20:80, 30:70, and 40:60 and there were significant differences in each treatment group. WCP values obtained were 65.08, 73.07, 75.69, and 77.00 in 10:90, 20:80, 30:70, and 40:60 and there were significant differences in each treatment group. ***Conclusion:*** K-G:KA scaffold in a ratio of 30:70 has an ideal swelling ratio and WCP.

Keywords: Carbonate apatite, chitosan, gelatine, scaffold, swelling ratio, WCP.

UJI *SWELLING* DAN PERSENTASE *WATER CONTENT SCAFFOLD* KITOSAN GELATIN KARBONAT APATIT BATU KAPUR PADALARANG

ABSTRAK

Latar Belakang: Defek pada tulang masih menjadi salah satu masalah kesehatan yang sering terjadi di bidang kedokteran gigi. Salah satu aspek rekayasa jaringan yang telah dikembangkan untuk membantu proses regenerasi tulang yaitu *scaffold*. *Scaffold* yang digunakan dalam penelitian ini merupakan *scaffold* 3D yang terdiri dari kitosan-gelatin (K-G) dan karbonat apatit (KA) batu kapur Padalarang. Penggabungan ketiga bahan tersebut akan meningkatkan sifat masing-masing. *Scaffold* K-G:KA akan diuji *swelling* dan WCP di mana kemampuan *swelling* berguna untuk penyerapan cairan tubuh dan transfer nutrisi. **Tujuan:** Mengetahui variasi perbandingan komposisi karbonat apatit, gelatin, dan kitosan yang optimal untuk nilai *swelling* dan WCP dalam pembuatan *scaffold*. **Metode:** *Scaffold* disintesis dari kitosan, gelatin, dan karbonat apatit batu kapur Padalarang dengan rasio K-G:KA 10:90, 20:80, 30:70, dan 40:60 dengan teknik *freeze drying*. *Scaffold* dilakukan uji *swelling* dan persentase *water content* (WCP) dengan merendam *scaffold* di dalam *simulated body fluid* (SBF) dalam durasi tertentu. **Hasil:** Nilai *swelling* didapatkan 2.03, 2.95, 3.31, dan 3.52 pada rasio 10:90, 20:80, 30:70, dan 40:60 dan terdapat perbedaan yang bermakna pada tiap kelompok perlakuan. Nilai WCP didapatkan 65.08%, 73.07%, 75.69%, dan 77.00% pada rasio 10:90, 20:80, 30:70, dan 40:60 dan terdapat perbedaan yang bermakna pada tiap kelompok perlakuan. **Simpulan:** *Scaffold* K-G:KA dengan rasio 30:70 memiliki nilai *swelling* dan WCP yang ideal.

Kata kunci: Karbonat apatit, kitosan, gelatin, *scaffold*, *swelling*, WCP.