ABSTRACT

NUR AISYAH NUZULIA. Study of Biphasic Calcium Phosphate Ceramics and HA-Chitosan Composite Implanted into Sheep’s Bone. Under direction of AKHIRUDDIN MADDU and KIAGUS DAHLAN.

Biphasic Calcium Phosphate (BCP) biomaterials are recognized as biodegradable, bioresorbable, and osteoconductive material and, therefore, it is suitable for filling bone defects to aid regeneration process of new bone tissue. This study aimed to synthesize BCP ceramics by precipitation method and observe bone growth using BCP ceramics and HA-Chitosan composite implanted into sheep’s bone. BCP ceramics was prepared by precipitation of Na₃HPO₄·2H₂O which was dropped by CaCl₂·2H₂O at temperature 70°C with various molar ratios and various volume of solution. Molar ratio of Ca and P was varied approximately 0.2M:0.2M and 0.334M:0.2M while various volume of solution was 50 ml and 100 ml. BCP ceramics was formed which was indicated by mass of precipitate and the result showed that sample with greater molarity of Ca was resulting in bigger mass precipitate. It showed that higher molarity of Ca/P tends to be more mass precipitate. The X-Ray Diffraction results showed that BCP 100 ml with molar ratio Ca/P about 0.334M:0.2M had the expected characteristics of implant material for in vivo experiment into sheep’s bone. Moreover, it showed the consistency of sample which indicates that it was a reproducible biomaterial. This result was also supported by Fourier Transform Infrared (FTIR) and Scanning Electron Microscopy (SEM) characterization. In vivo study of BCP ceramics and HA-Chitosan composite showed that bone recovery without bone graft (control) was more complete than that with BCP and HA-Chitosan bone grafts. Based on pathological evaluation, the results indicated that BCP ceramics was biodegradable and bioresorbable but less osteoconductive. In the contrary, HA-chitosan composite was not biodegradable and bioresorbable but more osteoconductive. Moreover, BCP bone graft was more readily resorbed by the body than HA-Chitosan. Resorption of HA-Chitosan bone graft was very slow but new tissue growth was faster than that of BCP bone graft. In contrary, resorption of BCP bone graft was very fast but new tissue growth was very slow.

Keywords: Hydroxyapatite, Tricalcium Phosphate, HA-Chitosan, In Vivo Evaluation