

## ABSTRACT

## MATRIX COPOSITE BOVINE HYDROXYAPATITE –GELATIN EFFECTIVITY for GENTAMICIN DELIVERY SYSTEM and REGERATION BONE DEFECT

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Bovine hydroxyapatite and gelatin (BHA-GEL) were used as bone regeration and a biodegradable delivery system for the administration of gentamicin sulfate (GEN) in prevention and treatment infection of bone defects, were synthesized. The materials, which ovoid bone infection, are exclusively composed of gentamicin sulfate; bioactive bovine hydroxyapatite and gelatin were manufacture as pellet of the mixed components and characterized in vitro. Cross-linking reaction was required to control the water penetration, swelling and release of gentamicin from the pellet. In vitro gentamicin release from the pellet at conditions of pH and temperature body were studied for 4 weeks and the sample was able to inhibit of *Staphylococcus aureus* and *Escherichia coli* growth, both in surrounding liquid and on matrix surface. The BHA-GEL-GEN cross-linking with glutaraldehyde (GA) were nontoxic to human osteoblasts and promote their proliferation. The results indicate that BHA-GEL-GEN with GA non-toxic and self-friendly- is promising biomaterial of significantly prolonged antibacterial activity.

Keywords: bovine hydroxyapatite; gelatin; gentamicin; gluraldehyde; drug delivery system; bone filler, bidegradable.

## ABSTRAK

Efektivitas Matriks Komposit *Bovine Hydroxyapatite*-Gelatin sebagai Sistem Penghantaran Gentamisin dan Regenerasi *Bone Defect*

*Bovine hydroxyapatite* (BHA) dan gelatin (GEL) digunakan sebagai pengisi tulang dan sistem penghantaran gentamisin sulfat (GEN) yang bersifat biodegradabel, untuk mencegah dan pengobati infeksi pada defek tulang. Karakteristik secara in vitro dari campuran material bioaktif BHA-GEL dan GEN yang digunakan untuk menghindari infeksi tulang dibuat dalam bentuk pelet. Reaksi *cross-link* diperlukan untuk mengatur penetrasi air, mekarnya (swelling) dan pelepasan gentamisin dari pelet. Pelepasan gentamisin secara in vitro dari pelet dilakukan pada kondisi pH dan temperatur tubuh selama 4 minggu, dan filtrat yang diperoleh mampu menghambat pertumbuhan bakteri pada peletnya. Hasil uji toksisitas BHA-GEL-GEN dengan glutaraldehid (GA) juga menunjukkan tidak toksik pada *human osteoblasts* dan memacu proliferasi / ramah terhadap sel sekitarnya. Dengan demikian dapat disimpulkan bahwa BHA-GEL-GEN-GA tidak toksik dan ramah terhadap sel serta dapat memperpanjang aktivitas antibakteri sehingga dapat dipromosikan.

Kata kunci: *bovine hydroxyapatite*; gelatin; gentamisin; gluraldehid; Sistem penghantaran obat (SPO); pengisi tulang, bidegradabel