Upaya Penurunan Kadar Kadmium (Cd) Dalam Koral Goniopora sp. Sebagai Kandidat Bone graft Menggunakan EDTA Sebagai Chelating agent (Studi In Vitro) = An Effort to Reduce Cadmium Levels in Goniopora sp. Coral as Canditate of Bone graft Applying EDTA as Chelating Agent (In Vitro Study)

Hutapea, Roberto Anmessyo, author

Abstrak

Latar belakang: Koral Goniopora sp merupakan bahan alami yang bersifat osteokonduktif sehingga berpotensi digunakan untuk subtitusi tulang. Namun demikian, bahan tersebut masih mengandung logam berat terutama kadmium (Cd) sebagai pencemar dengan kadar menurut Chusnul,dkk (2013) sekitar 25.23 mg/kg (ppm).1 Sesuai dengan nilai provisional tolerable daily intake (PTDI), nilai ambang asupan Cd yang masih dapat diterima adalah 1.00 µg/Kg BB/hari.2 Dengan memperhitungkan kadar dan PTDI kadmium serta bobot badan diasumsikan 60 kg, maka penggunaan maksimum koral Goniopora sp hanya 1 gram untuk satu kali penggunaan.1 Untuk meningkatkan kuantitas koral tersebut dalam satu kali penggunaan, maka perlu dilakukan upaya penurunan kadar Cd dalam koral tersebut. Ethilen diamine tetra acetic acid (EDTA) merupakan zat pengkelat yang bersifat selektif terhadap berbagai ion logam dalam membentuk kompleks melalui pengaturan pH.3 Pencucian dan perlakuan koral Goniopora sp dengan larutan EDTA yang didapar pada pH tertentu, diharapkan mampu menurunkan kadar Cd dalam koral tersebut.
Tujuan: Menurunkan kadar Cd dalam koral Goniopora sp secara selektif sehingga tidak mempengaruhi komposisi mineral alami dalam koral tersebut menggunakan ethylenediamine tetraacetic acid (EDTA) sebagai chelating agent.
Metode: Kadar Cd dalam sampel koral Goniopora sp sebelum perlakuan ditentukan untuk mendapatkan kadar base line Cd. Selanjutnya koral tersebut diberi perlakuan melalui perendaman dan pengadukan dalam larutan EDTA yang didapar dengan dapar fosfat pada pH 7.0 dan 7.5. Perlakuan tersebut dilakukan sampai 10 hari dan setiap dua hari dilakukan pengambilan sampel koral. Setelah pencucian dengan air dan pengeringan, dilakukan penentuan kadar Cd dalam sampel koral dan hasilnya ditampilkan sebagai profil kadar kadmium terhadap waktu perlakuan. Selain Cd, dilakukan juga penentuan kadar kalsium (Ca) sebagai marker komponen utama koral Goniopora sp. Penentuan kadar Cd dan dan Ca dilakukan menggunakan metode atomic absorption spectrometry (AAS).
Hasil: Tidak terdapat perbedaan kadar Cd yang bermakna dalam koral Goniopora sp sebelum dan sesudah perlakuan dengan EDTA.
Kesimpulan: Perlakuan koral Goniopora sp dengan EDTA pada kondisi percobaan yang dilakukan belum mampu menurunkan kadar Cd pada koral tersebut.
.....Background: Goniopora sp. coral is a natural material showing osteocondutive properties and hence potential to be applied as bone substitution. However, according to Chusnul,et.al (2013) this material still contains heavy metals as contaminant especially that of cadmium (Cd) at concentration level of around 25.23 ppm. 1 Based on its provisional tolerable daily intake (PTDI), maximum acceptable daily intake of Cd is 1.00 µg/Kg BW/day.2 Taking into account the concentration level and PTDI value of Cd as well as body weight assumed to be 60 kg, maximum application of Goniopora sp coral is only 1 g for one

application.1 To increase the quantity of this coral for one application, an effort to reduce the concentration of Cd in this coral should be carried out. Ethilen diamine tetra acetic acid (EDTA) is a chelating agent able to form complex with various metals selectively by means of pH adjustment.3 Washing and treatment of Goniopora sp coral with EDTA solution buffered at certain pH are expected to reduce Cd concentration in this coral.

Aim: To reduce the levels of Cd in Goniopora sp coral selectively applying ethylenediamine tetraacetic acid (EDTA) as chelating agent so that natural composition of minerals in this coral were not significantly affected.

Methods: Concentration of Cd in pretreatment Goniopora sp coral sample was determined to obtain base line concentration of Cd. The coral was then treated by means of immersing and stirring in EDTA solutions buffered with phosphate buffer at pH of 7.0 and 7.5. The treatment was conducted up to 10 days in which every two days a probe of coral samples was collected. After washing with water and drying, Cd concentrations in those samples were subsequently determined and the results were displayed as Cd concentrations profile as function of treatment time. In addition to Cd, concentration of calcium (Ca) as marker of main component of Goniopora sp coral was also determined. Determination of Cd and Ca concentrations were conducted by means of atomic absorption spectrometry (AAS) method.

Result: No significant difference in Cd concentrations was observed before and after treatment with EDTA.

Conclusion: Treatment of Goniopora sp coral with EDTA under experimental conditions was still not able to reduce Cd concentration in this coral