

ABSTRACT

**THE BALANCE OF BONE RESORPTION AND FORMATION
POST IMPLANTATION OF DEMINERALIZED DENTINE
MATERIAL MEMBRANE AS A GUIDED BONE
REGENERATION**

Background: GBR is a procedure to present a barrier to large bone defects that function to increase osteogenesis by preventing non-osteogenic cells (fibroblasts and epithelial cells), increasing angiogenesis, maintaining clot balance, accumulating growth factors, and stabilizing bone graft due to pressure. Dentin cattle are known to have similar chemical composition with human bones (70% hydroxyapatite, 20% organic matrix, especially collagen type 1, and 10% water). **Purpose:** To determine the balance of bone resorption and formation post implantation of Demineralized Dentine Material Membrane (DDMM) as Guided Bone Regeneration (GBR) in the critical size defect of mandibular bone in *Rattus norvegicus* rats. **Material and Methods:** 90 male *Rattus norvegicus* rats weight 250-300 grams and 2-3 months old were divided into 2 control groups (K) and 3 treatment groups (P). Critical mandibular bone defect 5x5 mm was made, then in group K (-) without implanted GBR membrane and group K (+) were implanted BPCM. In the treatment group DDMM implantation was carried out in the P1 group; DDMM group and grafts in the P2 group; and BPCM and graft in the P3 group. On 7th, 14th and 21st after implantation, the tissue was taken, then staining using Haematoxylin-eosin (HE) to see fibroblasts, osteoclasts, and collagen density. **Results:** The number of fibroblasts decrease, the number of osteoclasts and collagen density increase on 7th, 14th and 21st after implantation of DDMM implantation in critical size mandibular bone defects. **Conclusion:** The balance of bone resorption and formation after DDMM implantation as GBR on the critical size defect of mandibular bone in *Rattus Norvegicus* rats was characterized by a decrease in the number of fibroblasts, an increase in osteoclasts and collagen density.

Keywords: Fibroblast, osteoclast, collagen, DDMM, GBR

ABSTRAK

**KESEIMBANGAN RESORPSI DAN FORMASI TULANG
PASCA IMPLANTASI *DEMINERALIZED DENTINE
MATERIAL MEMBRANE* SEBAGAI *GUIDED BONE
REGENERATION***

Latar Belakang: GBR merupakan prosedur pemberian membran *barrier* pada defek tulang besar yang berfungsi untuk meningkatkan osteogenesis dengan mencegah migrasi sel non-osteogenik (fibroblas dan sel epitel), meningkatkan angiogenesis, menjaga keseimbangan *clot*, akumulasi faktor pertumbuhan, dan stabilisasi *bone graft* akibat tekanan. Dentin *bovine* diketahui memiliki persamaan komposisi kimia dengan tulang manusia (70% hidroksiapatit, 20% matriks organik terutama kolagen tipe 1, dan 10% air). **Tujuan:** Untuk mengetahui keseimbangan resorpsi dan formasi tulang pasca implantasi *Demineralized Dentine Material Membrane* (DDMM) sebagai *Guided Bone Regeneration* (GBR) pada *critical size defect* tulang mandibula tikus *Rattus norvegicus*. **Metode:** Tikus *Rattus norvegicus* jantan sebanyak 90 ekor dengan berat 250-300 gram dan umur 2-3 bulan dibagi menjadi 2 kelompok kontrol (K) dan 3 kelompok perlakuan (P). *Critical size defect* tulang mandibula tikus yang berukuran 5x5 mm pada kelompok K(-) tanpa diberikan membran GBR dan kelompok K(+) diimplantasi BPCM. Pada kelompok perlakuan P1 diimplantasi DDMM, kelompok P2 diimplantasi DDMM dan *graft*; dan kelompok P3 diimplantasi BPCM dan *graft*. Pada hari ke-7, 14 dan 21 pasca implantasi jaringan diambil, lalu dilakukan pewarnaan Hematoksin-eosin (HE) untuk melihat fibroblas, osteoklas, dan kepadatan kolagen. **Hasil:** Terdapat penurunan jumlah fibroblas, peningkatan jumlah osteoklas dan kepadatan kolagen di hari ke-7,14, dan 21 pasca implantasi DDMM pada defek tulang mandibula. **Kesimpulan:** Keseimbangan resorpsi dan formasi tulang pasca implantasi DDMM sebagai GBR pada *critical size defect* tulang mandibula tikus *Rattus Norvegicus* ditandai terjadinya penurunan jumlah fibroblas, peningkatan osteoklas dan kepadatan kolagen.

Kata Kunci: Fibroblas, osteoklas, kolagen, DDMM, GBR