

ABSTRACT

Background: Bovine Hydroxyapatite (BHA) is a bone graft material derived from bovine bone that has been deproteinated. BHA contains 93% hydroxyapatite ($\text{Ca}_{10}(\text{PO}_4)_6(\text{OH})_2$) and 7% β -tricalcium phosphate ($\text{Ca}_3(\text{PO}_4)_2$, β -TCP) is a good component of osteoconductors but does not have organic components. BHA is osteoconduction, the deficiency of BHA is difficult to degrade. As an alternative to overcome BHA deficiencies, research is being carried out on Demineralized Freeze Dried Bovine Bone Xenograft (DFDBBX). DFDBBX is a bone marrow material derived from bovine bones, which undergoes a process of demineralization with cooling, so that the components of the bone matrix will be left behind. In osteoblastic differentiation, Bone Morphogenetic Protein (BMP) will play a role in activating osteogenic processes related to the expression of the Runt-related Transcription factor 2 (RUNX2) gene which will play a role in the process of osteoblast differentiation and stimulate the formation of Alkaline Phosphatase (ALP). **Objective:** To determine the potential of osteogenic induction through the expression of the RUNX2 and ALP genes on Rat Adipose-Derived Mesenchymal Stem Cells (Rat ADMSC) after soaking the conditioned medium DFDBBX and BHA. **Method:** Rat ADMSC were divided into 4 groups which were 2.5% DFDBBX conditioned medium, 2.5% BHA medium conditioned, positive control (osteogenic medium), and negative control group (α MEM medium) in multiplate. Observation of RUNX-2 and ALP genes expression was carried out after 2, 7 and 14 days using Polymerase Chain Reaction examination. Qualitative data is presented in table form. **Result:** RUNX2 and ALP gene expression was obtained on Rat ADMSC with culture medium using DFDBBX conditioned medium and BHA conditioned medium. **Conclusion:** Demineralized Freeze Dried Bovine Bone Xenograft (DFDBBX) and Bovine Hydroxyapatite (BHA) has the osteoinductive potential in the process of osteogenesis through the expression of Runt-Related Transcription factor 2 (RUNX2) and Alkaline Phosphatase (ALP) genes.

Keywords: Demineralized Freeze Dried Bovine Bone Xenograft, Bovine Hydroxyapatite, Runt-Related Transcription Factor-2, Alkaline Phosphatase, Rat Adipose Derived Mesenchymal Stem Cell.