Biocompatibility of Biodentine with Periodontal Ligament Stem Cells: In vitro study.

Abstract

Biodentine is a tricalcium silicate-based cement material that has a great impact on different biological processes, compared to other biomaterials. Therefore, we aimed to investigate the biocompatibility of Biodentine with stem cells derived from periodontal ligament (PDLSCs), by determining cell proliferation, cytotoxicity, migration, adhesion and mineralization potential. PDLSCs were treated with Biodentine™ extract at different concentrations; 20, 2, 0.2 and 0.02mg/ml. Cells cultured without Biodentine™ were used as a blank control. The proliferation potential of PDLSCs was evaluated by MTT viability analysis for 6 days. Cytotoxicity assay was performed after 72 hrs by using AnnexinV. Migration potential was investigated by wound healing and transwell migration assays at both cellular and molecular levels. The expression levels of chemokines CXCR4, MCP-1 and adhesion molecules FGF-2, FN, VCAM and ICAM-1 were measured by qPCR. The communication potentials of these cells were determined by Adhesion assay. In addition, mineralization potential was evaluated by measuring the expression levels of osteogenic markers; ALP, OCN, OPN and Collagen type1 by qPCR. Our results showed significant increase in the proliferation of PDLSCs at low concentrations of Biodentine™ (2, 0.2 and 0.02mg/ml) while higher concentration (20mg/ml) exhibited cytotoxic effect on the cells. Moreover 2mg/ml Biodentine™ showed a significant increase in the migration, adhesion and mineralization potentials of the derived cells among all concentrations and when compared to the blank control.Our findings suggest that 2mg/ml of Biodentine™ is the most biocompatible concentration with PDLSCs, showing a high stimulatory effect on the biological processes.

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