OP-14

Stem Cells Approach for Implant Therapy in Diabetes Model

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ABSTRACT

Objective of Investigation: Dental implant osseointegration in patients with hyperglycemic conditions was reported to be delayed so the restoration procedure must be postponed. Mesenchymal Stem Cells (MSCs) is a tissue engineering material that has the potential to treat various systemic diseases. Human Umbilical Cord Mesenchymal Stem Cells (hUCMSCs) is proven to improve bone microenvironment and have osteogenic potential. Their excellent capability can be a new approach for osseointegration acceleration. The purpose of this study was to determine the capability of hUCMSCs to accelerate dentalimplant osseointegration in hyperglycemic condition through angiogenesis and osteoblastogenesis. **Experimental methods used:** 28 Wistar rats were injected intraperitoneally with Streptozotocin 20mg/kg body weight for 5 days in a row to make the diabetic model. The treatment was carried out after fasting blood sugar levels > 300 mg/dl and waited 5 days for the glycation period. The source of stem cell is human umbilical cord which has been isolated and cultured until passage 6. The experimental animals were divided into 4 groups, namely the 2-week implant group (K1), the 4-week implant group (K2), the 2-week implant + hUCMSCs group (P1) and the 4-week implant + hUCMSCs group (P2). The variables examined were BIC (Bone Implant Contact), VEGF and Runx2 expression. Data were analyzed using Analysis of Variance (ANOVA). **Result :** BIC, VEGF and Runx2 expresssion was higher in treatment groups compared with control groups. The highest expression of VEGF and Runx2 occurred in the P1 and decreased in the P2 group. While for BIC in groups P1 and P2 remained high to maintain osseointegration. **Conclusion :** With the limitation of this study, stem cells was proven to accelerate the osseointegration of dental implants through osteoblastogenesis and angiogenesis in diabetes model.

Keywords: hUCMSCs, implant, diabetes, osseointegration, BIC