

Protective effects of stem cells from human exfoliated deciduous teeth derived conditioned medium on osteoarthritic chondrocytes

ABSTRACT

Treatment of osteoarthritis (OA) is still a major clinical challenge due to the limited inherent healing capacity of cartilage. Recent studies utilising stem cells suggest that the therapeutic benefits of these cells are mediated through the paracrine mechanism of bioactive molecules. The present study evaluates the regenerative effect of stem cells from human exfoliated deciduous teeth (SHED) conditioned medium (CM) on OA chondrocytes. The CM was collected after the SHED were cultured in serum-free medium (SFM) for 48 or 72 h and the cells were characterised by the expression of MSC and pluripotency markers. Chondrocytes were stimulated with interleukin-1 β and treated with the CM. Subsequently, the expression of aggrecan, collagen type 2 (COL 2), matrix metalloproteinase-13 (MMP-13), nuclear factor-kB (NF-kB) and the level of inflammatory and anti-inflammatory markers were evaluated. SHED expressed mesenchymal stromal cell surface proteins but were negative for haematopoietic markers. SHED also showed protein expression of NANOG, OCT4 and SOX2 with differential subcellular localisation. Treatment of OA chondrocytes with CM enhanced anti-inflammation compared to control cells treated with SFM. Furthermore, the expression of MMP-13 and NF-kB was significantly downregulated in stimulated chondrocytes incubated in CM. The study also revealed that CM increased the expression of aggrecan and COL 2 in OA chondrocytes compared to SFM control. Both CM regenerate extracellular matrix proteins and mitigate increased MMP-13 expression through inhibition of NF-kB in OA chondrocytes due to the presence of bioactive molecules. The study underscores the potential of CM for OA treatment.