Angiogenic effect of platelet-rich concentrates on dental pulp stem cells in inflamed microenvironment.

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Abstract

OBJECTIVE: In this study, we aimed to determine the suitable concentrations of human platelet lysate (HPL) and platelet-rich plasma (PRP) for maintaining the in vitro proliferative and angiogenic potential of inflamed dental pulp stem cells.

MATERIALS AND METHODS: Lipopolysaccharide (LPS)-induced inflamed dental pulp-derived stem cells (iDPSCs) were treated with different concentrations of HPL and PRP (10% and 20%) followed by determination of viability using Alamar Blue assay. Expression of angiogenesis-, adhesion-, and inflammation-regulating genes was also analyzed using RT-qPCR array. Furthermore, expression of growth factors at protein level in the cell culture microenvironment was measured using multiplex assay.

RESULTS: Viability of iDPSCs was significantly (p < 0.05) higher in 20% HPL-supplemented media compared to iDPSCs. Expression of 10 out of 12 selected angiogenic genes, four out of seven adhesion molecules, and seven out of nine cytokine-producing genes were significantly (p < 0.05) higher in cells maintained in 20% HPL-supplemented media compared to that in FBS-supplemented media. Furthermore, expression of all the selected growth factors was significantly higher (p < 0.05) in the supernatants from 20% HPL media at 12 and 24 h post-incubation.

CONCLUSION: This study suggests that 20% HPL could be optimum to stimulate angiogenesis-related factors in iDPSCs while maintaining their viability.

CLINICAL RELEVANCE: This data may suggest the potential use of 20% HPL for expanding DPSCs scheduled for clinical trials for regenerative therapies including dental pulp regeneration.

KEYWORDS: Cytokines; Growth factors; Platelet lysate; Platelet-rich plasma; Viability

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