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Tissue engineering solutions to enhance osseointegration process of the dental implants

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Implants are often modified by coating with calcium phosphate materials like fluorapatite to enhance bone anchorage to the implants (osseointegration). Platelet-rich plasma (PRP) also used in implant applications as it contains high concentrations of growth factors essential for rapid wound healing. The purpose of this study was to investigate the effect of FA coatings and PRP combination on osteoblast cell adhesion, growth and proliferation. Stainless steel discs were coated with FA crystals using a hydrothermal method. The coatings were characterized using scanning electron microscopy (SEM) and X-ray energy dispersive spectrometry (EDS). PRP was obtained from blood donors. Cell attachment and growth of G292 osteosarcoma cell line on FA coated discs +/- PRP gel or its extract (PRP releasate) were investigated using SEM/confocal microscope and DNA content quantification at 1, 3 and 7 days. At the microscopic level, FA crystals showed two different growth patterns on the stainless steel discs; disorganised on upper disc surfaces and organised on under surfaces. No significant difference was found between the chemical compositions of the two coatings. Both FA coatings supported the initial adhesion and attachment of the cells. However, organised coatings promoted a greater cellular proliferation compared to the disorganized coatings ($P < 0.05$). PRP gel enhanced significant cell growth on both surfaces ($P < 0.001$). Furthermore, adding PRP releasate to the cell culture induced a significant increase in DNA content compared to the control ($P < 0.05$). In conclusion, this study suggests that PRP can enhance the biocompatibility of FA coated implants.

Biography

Aseel Al-Jaboori has completed her MSc in Prosthetic Dentistry from the University of Baghdad, School of Dentistry. She is currently a PhD student at the University of Leeds School of Dentistry, UK..

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