Cisplatin-loaded graphene oxide/chitosan/hydroxyapatite composite as a promising tool for osteosarcoma-affected bone regeneration

ABSTRACT

Presently, tissue engineering approaches have been focused toward finding new potential scaffolds with osteoconductivity on bone-disease-affected cells. This work focused on the cisplatin (CDDP)-loaded graphene oxide (GO)/hydroxyapatite (HAP)/chitosan (CS) composite for enhancing the growth of osteoblast cells and prevent the development of osteosarcoma cells. The prepared composites were characterized for the confirmation of composite formation using Fourier transform infrared spectroscopy, scanning electron microscopy, transmission electron microscopy, and X-ray diffraction techniques. A flowerlike morphology was observed for the GO/HAP/CS-3/CDDP composite. UV−vis spectroscopy was used to observe the controlled release of CDDP from the GO/HAP/CS-3/CDDP composite, and 67.34% of CDDP was released from the composite over a time period of 10 days. The GO/HAP/CS-3/CDDP nanocomposites showed higher viability in comparison with GO/HAP/CS-3 on MG63 osteoblast-like cells and higher cytotoxicity against cancer cells (A549). The synthesized composite was found to show enhanced proliferative, adhesive, and osteoinductive effects on the alkaline phosphatase activity of osteoblast-like cells. Our results suggested that the CDDP-loaded GO/HAP/CS-3 nanocomposite has an immense prospective as a bone tissue replacement in the bone-cancer-affected tissues.