107Chlorhexidine-releasing composite hydrogel for the prevention and control of bacterial infections

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Extended Abstract

The emergence of bacterial infections following the implantation of biomaterialbased bone implants has substantially impacted patients' quality of life and placed a strain on healthcare systems [1,2]. Biomaterials loaded with antibiotics have been used as vehicles for the local delivery of antimicrobial agents to prevent, control and treat implant-related infections (IRIs) [3-5]. However, antibiotic resistance is an acute concern to the global community, being required an alternative antimicrobial agent to control and treat IRIs, particularly those caused by antibiotic-resistant bacteria. Chlorhexidine (CHX) has been described as a good candidate for the development of multifunctional approaches based on anti-infective biomaterials and drug-delivery systems that do not encourage microbial evolution, similar to antibiotic resistance [5-7]. This antiseptic has a wide-spectrum antibacterial activity, acting against Gramnegative and Gram-positive bacteria, bacterial spores, lipophilic viruses, yeast, and dermatophytes [8]. In addition to low drug resistance, CHX presents good soft tissue tolerability, hence being used in biomedical applications like controlled drug delivery in dental medicine [1]. Therefore, the present work intends to develop CHX-loaded alginate-nanohydroxyapatite composite hydrogels to prevent local tissue infections and, simultaneously, to promote bone tissue regeneration. A physicochemical (swelling, FTIR, SEM) and biological (halo of inhibition test) characterization of the materials was performed. The obtained results showed that the materials have a porous structure with good swelling behaviour and their functional groups were identified; the halo of inhibition test showed that the process of production did not affect the CHX's bioactivity. At the end of this work, a multifunctional biomaterial integrating osteogenic and antibacterial functions is expected to support bone cells' osteogenic functions and prevent bacterial colonization.

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