

عنوان مقاله:

Characterization and Investigation of Antibacterial Activity of Injectable Hydroxyapatite-Alginate Hydrogel

محل انتشار:

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خلاصه مقاله:

Introduction: Bone replacement materials used for void filling and healing the bone injuries with antibacterial characteristics is of interest to many researchers. The main inorganic material in human and animal bones makes calcium phosphate suitable to interact with neighboring bones and enhances the healing process. A few drawbacks of using neat Ca/P powder such as low solubility and its brittle nature makes it difficult to manipulate. Therefore, the composition of these bio-ceramics with biopolymers makes an ideal injectable mixture with proper mechanical properties. In this study a hybrid composite of sodium alginate (SA) and calcium phosphate was prepared and its antibacterial characteristics were investigated. **Materials and Methods:** In this study, hydrogel composites of SA/brushite and SA/hydroxyapatite (HA) were fabricated with different fabrication methods as well as the final compositions. The filler properties of these hybrid composites were investigated using X-ray diffraction (XRD), Fourier transform infrared (FTIR) and scanning electron microscopy (SEM). Also, to determine the antibacterial effects, the minimal inhibitory concentration (MIC) and minimal bactericidal concentration (MBC) were assessed on two strands of microorganisms including *Escherichia coli* and *Streptococcus agalactiae* which are known as causative agents for biofilm formation on implant surfaces. **Results:** Findings reveal that calcium phosphate in the form of brushite in combination with alginate and carboxy-methyl-cellulose (CMC) has intrinsic antibacterial efficiency in concentrations lower than 250 µg/mL. **Conclusions:** The composition of SA/brushite with CMC carrier is a promising injectable filler .with antibacterial properties which could be used to treat bone injuries and orthopedic applications

کلمات کلیدی:

antibacterial, bone filler, Hydroxyapatite, Scaffold, alginate, Brushite

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