

Design of novel injectable in-situ forming scaffolds for non-surgical treatment of periapical lesions: In-vitro and in-vivo evaluation.

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Abstract

Periapical lesions are considered one of the common pathological conditions affecting alveolar bone. The primary focus of this study was to investigate the effectiveness of formulating an injectable in-situ forming scaffold-loaded with risedronate (bone resorption inhibitor) and with lornoxicam (anti-inflammatory drug) for the non-surgical treatment of periapical lesions. The scaffolds were prepared using solvent-induced phase inversion technique. Two insoluble copolymers were investigated namely; PLGA (ester-terminal) and PLGA-A (acid-terminal), additionally, SAIB was added as a high viscosity water-insoluble carrier. The addition of porogenic agents like hydrolyzed collagen was also investigated. The prepared scaffolds were characterized by analyzing their in-vitro release, DSC and rheological properties, besides their morphological properties. The results showed that the scaffolds prepared using 30% (w/v) PLGA or combined PLGA: SAIB (1:1, w/w) with total polymer concentration of 30% (w/v) possessed the most sustained drug release profile. Selected scaffolds were tested for their therapeutic effect to study the effect of porogenic agent, anti-inflammatory drug and risedronate in periapical lesions induced in dogs' teeth. Results declared that the selected scaffolds succeeded in improving the inflammation and enhancing the formation of new bony regions confirming the success of the prepared scaffolds as an innovative approach in the treatment of bone defects.

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