Research in Pharmaceutical Sciences, 2012;7(5)
School of Pharmacy and Pharmaceutical Sciences
Isfahan University of Medical Sciences
Proceeding of 13th Iranian Pharmaceutical Sciences Congress

Synthesis of novel porous silica- apatite composite powder by sol – gel method

S.M. Latifi[1,*], M.H. Fathi[1], J. Varshosaz[2]

[1]Biomaterials Group, Department of Materials Engineering , Isfahan University of Technology, Isfahan, Iran
[2]Faculty of Pharmacy and Pharmaceutical Sciences, Isfahan University of Medical Sciences, Isfahan, Iran

Background and Aims: Controlled drug delivery applications have expanded rapidly with advances in biomedical sciences as well as developments in new materials and technologies. Hydroxyapatite and silica are two biocompatible biomaterials with wide range of biomedical applications. The aim of this research was to prepare new multifunctional porous silica -apatite composite powder.
Methods: Silica -apatite composite powder was prepared using a sol–gel method at 600°C with phosphoric pentoxide and calcium nitrate tetrahydrate as a source of hydroxyapatite, also tetraethylorthosilicate and methyltriethoxisilane as a source of silica. X-ray diffraction (XRD), scanning electron microscopy (SEM) and Fourier transform infrared spectroscopy (FTIR) techniques were used for characterization and evaluation of the phase composition and morphology of the product.
Results: The results indicated the presence of apatite phase and amorphous silica phase in composite powder. The highly porous structure of composite powder indicated the uniform distribiution of apatite phase in the silica -apatite composite powder.
Conclusions: In this study, an easy synthesis way for making a multifunctional and osteoconductive highly porous silica -apatite composite powder without surfactant is presented. This composite is thought to be suitable as bone filler material, where a implant with a localized, controlled drug release is preferred.

Keywords: Silica; Apatite; Composite powder; Porous; Drug release