

Antimicrobial and controlled release studies of a novel nystatin conjugated iron oxide nanocomposite

ABSTRACT

Nystatin is a tetraene diene polyene antibiotic showing a broad spectrum of antifungal activity. In the present study, we prepared a nystatin nanocomposite (Nyst-CS-MNP) by loading nystatin (Nyst) on chitosan (CS) coated magnetic nanoparticles (MNPs). The magnetic nanocomposites were characterized by X-ray powder diffraction (XRD), Fourier transform infrared spectroscopy (FT-IR), thermogravimetry analysis (TGA), vibrating sample magnetometer (VSM), and scanning electron microscopy (SEM). The XRD results showed that the MNPs and nanocomposite are pure magnetite. The FTIR analysis confirmed the binding of CS on the surface of the MNPs and also the loading of Nyst in the nanocomposite. The Nyst drug loading was estimated using UV-Vis instrumentation and showing a 14.9% loading in the nanocomposite. The TEM size image of the MNPs, CS-MNP, and Nyst-CS-MNP was 13, 11, and 8 nm, respectively. The release profile of the Nyst drug from the nanocomposite followed a pseudo-second-order kinetic model. The antimicrobial activity of the as-synthesized Nyst and Nyst-CS-MNP nanocomposite was evaluated using an agar diffusion method and showed enhanced antifungal activity against *Candida albicans*. In this manner, this study introduces a novel nanocomposite that can decrease fungus activity on-demand for numerous medical applications.

Keyword: Nystatin; Nanocomposite; Antimicrobial