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Radiation-induced graft copolymerization of N-vinyl imidazole onto moringa gum polysaccharide for making hydrogels for biomedical applications

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Abstract

Keeping in view the importance of polysaccharide gum in the pharmaceuitical formulations, in the present work, exploration of the potential of the moringa gum in hydrogel formation for drug delivery applications has been carried out. The gum based hydrogels were prepared via radiation induced graft-copolymerization of N-vinyl imidazole onto the gum. The polymers were characterized by cryo-SEM, AFM, FTIR, ^{13}C-NMR spectroscopy and swelling studies. Some properties of the polymers such as blood compatibility, antioxidant activity, and mucoadhesion and gel strength were also determined along with the evaluation of the drug release profile of an antibiotic drug levofloxacin. The slow release of drug was observed without burst effect from the drug loaded hydrogels. Release of the drug followed non-Fickian diffusion mechanism and release profile was best fitted in in Hixson-Crowell kinetic model. Cryo-SEM showed the porous nature of the hydrogels and AFM analysis confirmed the surface roughness. The polymers were found to be non-haemolytic mucoadhesive and antioxidant in nature with pore size = 12.09 nm and crosslinking density = 9.13×10^{-5} molcm^{-3}. These results indicated that these pure and sterile polymers can be proposed as a gastrointestinal drug delivery system.

Keywords: Moringa gum, N-vinylimidazole, hydrogels, levofloxacin, drug delivery.