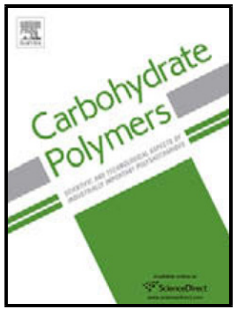

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Hydrogel formation by radiation induced crosslinked copolymerization of acrylamide onto moringa gum for use in drug delivery applications

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Highlights

- Cryo-SEM showed the porous nature of the hydrogels.
- Release profile of the levofloxacin occurred through non-Fickian diffusion mechanism.
- Release profile was best fitted in Korsmeyer-Peppas model.
- Hydrogels were found to be biocompatible, antioxidant and mucoadhesive in nature.
- Radiation crosslinked hydrogels were pure and sterile.

Abstract

Keeping in view the importance of polysaccharides gum in designing drug delivery systems, the present work is the exploration of the potential of the moringa gum in hydrogel formation via radiation induced crosslinking method for drug delivery applications. These 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, mucoadhesion and gel strength were also determined along with the evaluation of 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 drug occurred through non-Fickian diffusion mechanism and release profile best fitted in Korsmeyer-Peppas kinetic model. Cryo-SEM showed the porous nature of the hydrogels. The polymers were found to be mucoadhesive and antioxidant in nature. These results indicated that these pure and sterile polymers can be proposed as gastrointestinal drug delivery system.

Keywords: Moringa gum, acrylamide, levofloxacin, grafting, colon drug delivery.

1 Introduction

Recently, polysaccharide based hydrogels have been found to offer an attractive potential as a carrier in drug delivery applications (Kulkarni, Moinuddin, Patil-Sen, Littlefield, & Hood , 2015). Various polysaccharides, such as pollulan, alginate, cellulose, glucomannan, gum arabic and locust bean gum, have been used in designing colon specific drug delivery system (Jain, Gupta, & Jain, 2007). The composition of the hydrogels and crosslinking density of the hydrogels influence the release rate of the drug from the drug loaded hydrogels (Andrianov & Payne, 1998; Tomić, Mićić, Filipović, & Suljovrujić, 2007). In one research report, as the guar gum content increased, the rate of drug release decreased considerably from the guar gum-poly(acrylic acid) based hydrogels prepared for intestinal delivery of dexamethasone . The release of drug was also prolonged in its action (Pal, Pandey & Sen, 2018). The slow release rate of drug has been observed from the sesbania gum-poly(acrylamide) based hydrogel of higher degree of crosslinking than that of hydrogel having lower degree of crosslinking (Das, & Subuddhi, 2015). Radiation induced crosslinking is well recognized method for the synthesis of the pure and sterile hydrogels (Shi,