

An Investigation and Characterization on Alginate Hydrogel Dressing Loaded with Metronidazole Prepared by Combined Inotropic Gelation and Freeze-Thawing Cycles for Controlled Release

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- Omar Sarheed (1) Email author (sarheed78@gmail.com)
- Bazigha K. Abdul Rasool (2)
- Eman Abu-Gharbieh (3)
- Uday Sajad Aziz (4)

1. Department of Pharmaceutics, RAK College of Pharmaceutical Sciences, RAK Medical and Health Sciences University, , Ras AlKhaimah, UAE
2. Department of Pharmaceutics, Dubai Pharmacy College, , Dubai, UAE
3. Department of Pharmacology & Therapeutics, Dubai Pharmacy College, , Dubai, UAE
4. Department of Pharmaceutics, College of Pharmacy, University of Basra, , Basra, Iraq

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Abstract

The purpose of this study was to investigate the effect of combined Ca^{2+} cross-linking and freeze-thawing cycle method on metronidazole (model drug) drug release and prepare a wound film dressing with improved swelling property. The hydrogel films were prepared with sodium alginate (SA) using the freeze-thawing method alone or in combination with ionotropic gelation with CaCl_2 . The gel properties such as morphology, swelling, film thickness, and content uniformity and *in vitro* dissolution profiles using Franz diffusion cell were investigated. The cross-linking process was confirmed by differential scanning calorimetry (DSC) and Fourier transform infrared (FTIR) spectroscopy. *In vitro* protein adsorption test, *in vivo* wound-healing test, and histopathology were also performed. The hydrogel (F2) composed of 6% sodium alginate and 1% metronidazole prepared by combined Ca^{2+} cross-linking and freeze-thawing cycles showed good swelling. This will help to provide moist environment at the wound site. With the *in vivo* wound-healing and histological studies, F2 was found to improve the wound-healing effect compared with the hydrogel without the drug, and the conventional product.

KEY WORDS

alginate Ca²⁺ cross-linking freeze-thawing swelling wound dressing

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Notes

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