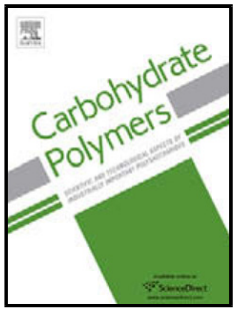

Title: A novel pH-responsive hydrogel based on carboxymethyl cellulose/2-hydroxyethyl acrylate for transdermal delivery of naringenin

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A novel pH-responsive hydrogel based on carboxymethyl cellulose/2-hydroxyethyl acrylate for transdermal delivery of naringenin

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Highlights:

- Hydrogels composed of carboxymethyl cellulose and 2-hydroxyethyl acrylate were synthesized.
- The degree of grafting and crosslinking influenced on system properties.
- Swelling behavior and *in vitro* drug release of cl-CMC-g-pHEA were pH-responsive.
- Skin permeation of naringenin from the cl-CMC-g-pHEA hydrogel system was improved.

Abstract

In this study, a pH-responsive hydrogel (cl-CMC-g-pHEA), based on carboxymethyl cellulose/2-hydroxyethyl acrylate, was prepared. Its physicochemical properties and applicability as a transdermal delivery system for naringenin (NRG) were investigated. The hydrogel was synthesized via radical polymerization; its structure was analyzed by FT-IR and ^{1}H NMR. The water loss amount was measured by using thermogravimetric analysis; a porous 3D network structure was confirmed by SEM. All hydrogels showed greater swelling ratio at pH 7.5 and 8.5 than at pH 5.5. Rheological and texture analyses indicated a stable gel network and that grafting and crosslinking density influenced the mechanical properties of the hydrogel. The release behavior of NRG from the hydrogel could be explained by the Fickian diffusion mechanism. The hydrogel system enhanced transdermal delivery of NRG. Therefore, this novel pH-responsive cl-CMC-g-pHEA hydrogel may be useful as a transdermal delivery system for NRG and has potential applications in the treatment of atopic dermatitis.