

## Development of Essential Oil-Loaded Gelatin Hydrogels for Use as Antibacterial Wound Dressing

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**Abstract :** In this work, biomaterial wound dressings was developed based on gelatin containing herbal substances (essential oil), a substance from the plant *Eupatorium adenophorum* Spreng (Crofton weed) that used as traditional wound healers. Gelatin hydrogel was prepared from a 10 wt-% gelatin solution. The oil in water (o/w) emulsion *Eupatorium adenophorum* of essential oil were prepared and used Pluronic F68 as a surfactant. The 10, 20, and 30 % v/v emulsion were mixed with gelatin solution and cast into film. These hydrogels were tested for their gel fraction, swelling and weight loss behavior. With an increase in the emulsion concentration the emulsion-loaded in hydrogels, the gel fraction were decreased due to the crosslink density, while the swelling and weight loss behavior were increased with an increasing in the emulsion content. The potential to use the emulsion-containing gelatin hydrogels as wound dressing was assessed on investigation the release characteristics of the as-loaded hydrogels. The *E. adenophorum* essential oil was first identified the chemical composition by using GC-MS analysis. The principal components of the oil were p-cymene (16.23%), bornyl acetate (11.84%), and amorpho-4, 7(11)-diene (10.51%). The hydrogel wound dressing containing essential oil was then characterized for their antibacterial activity against Gram-positive and Gram-negative in order to elucidate their potential for use as antibacterial wound dressings by using agar disk diffusion methods. The result showed that *E. adenophorum* essential oil and the emulsion-loaded gelatin hydrogel inhibited the growth of the test pathogens, *Staphylococcus aureus* and *Staphylococcus epidermidis* and increased with increasing the initial amount of essential oil in the hydrogels which confirmed their application as antibacterial wound dressings. Furthermore, the potential use of these wound dressings was further assessed in terms of the indirect cytotoxicity, in vitro attachment and proliferation of dermal human fibroblasts cultured in the hydrogel wound dressings.

**Keywords :** hydrogel, antibacterial wound dressing, *Eupatorium adenophorum* essential oil, gelatin

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