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PVA-PEG physically cross-linked hydrogel film as a wound dressing: experimental design and optimization

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Abstract

The development of hydrogel films as wound healing dressings is of a great interest owing to their biological tissue-like nature. Polyvinyl alcohol/polyethylene glycol (PVA/PEG) hydrogels loaded with asiaticoside, a standardized rich fraction of *Centella asiatica*, were successfully developed using the freeze-thaw method. Response surface methodology with Box-Behnken experimental design was employed to optimize the hydrogels. The hydrogels were characterized and optimized by gel fraction, swelling behavior, water vapor transmission rate and mechanical strength. The formulation with 8% PVA, 5% PEG 400 and five consecutive freeze-thaw cycles was selected as the optimized formulation and was further characterized by its drug release, rheological study, morphology, cytotoxicity and microbial studies. The optimized formulation showed more than 90% drug release at 12 hours. The rheological properties exhibited that the formulation has viscoelastic behavior and remains stable upon storage. Cell culture studies confirmed the biocompatible nature of the optimized hydrogel formulation. In the microbial limit tests, the optimized hydrogel showed no microbial growth. The developed optimized PVA/PEG hydrogel using freeze-thaw method was swellable, elastic, safe, and it can be considered as a promising new wound dressing formulation.

Keywords

Author Keywords: [Hydrogel film](#); [wound dressing](#); [PVA](#); [PEG](#); [freeze-thaw](#); [experimental design](#); [asiaticoside](#)KeyWords Plus: [DRUG-DELIVERY](#); [MEMBRANES](#); [PEPTIDE](#)

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