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Enhanced Wound Healing with Sulfacetamide Sodium-Loaded Carboxymethyl Chitosan-Collagen Hydrogels

*^{#*1}Vimal Patel, ^{#1}Bhavesh Akbari, ²Milan Sabhadiya*

¹Department of Pharmaceutics, School of Pharmacy, P P Savani University, Kosamba, Surat, Gujarat, India

²Department of Pharmaceutics, Shree Dhanvantary Pharmacy College, Kim, Surat, Gujarat, India.

***Corresponding author:**

Dr. Vimal Patel, PhD, Associate Professor, Department of Pharmaceutics, School of Pharmacy, P P Savani University, Kosamba, Surat -394125, Gujarat, India.

Email Id: serviceheb@gmail.com

Abstract:

Hydrogels composed of carboxymethyl chitosan and collagen type I are well-established in skin drug delivery, particularly for wound healing applications. Hydrogels were formulated using cross-linker glutaraldehyde in various concentrations, identifying the optimal batch for incorporating the antibacterial agent sulfacetamide sodium. Multiple batches were prepared, and the final batch was selected based on gelling capacity, spreadability, and extrudability. The optimized hydrogels were evaluated for physical appearance, swelling index, pH, viscosity, drug content uniformity, and in-vitro drug release. The wound healing potential of the hydrogels was assessed through a skin irritation test and in vivo wound healing studies using an incision model on female Wistar Albino rats. The hydrogels facilitated wound healing in six to eight days, indicating their effectiveness. Stability tests conducted over thirty days revealed that storing the formulation at 4°C ±2°C maintained its efficacy better than at 30°C ±2°C.

Keywords:

Carboxymethyl chitosan, Collagen type I, Glutaraldehyde cross-linking, Sulfacetamide sodium, skin irritation study

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