Title : Development of a novel composite hydrogel as a material used in topical wound dressing.

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ABSTRACT

Carboxymethylcellulose sodium (CMC) is a highly water-soluble anionic polymer that appears as a white, odorless solid. It is biologically safe and acts as an effective water-retaining agent, demonstrating potential for application as a wound dressing. However, forming CMC into wound dressing films presents several limitations because the material is hard, brittle, difficult to shape, and lacks mechanical flexibility. To overcome the brittleness and lack of mechanical flexibility of the base polymer (CMC), this study incorporated poly(vinyl alcohol) (PVA) to improve the mechanical properties of CMC by determining the optimal amount of PVA. Citric acid (CA) was also added to serve as a cross-linking agent to enhance stability and prevent the material from dissolving in water during testing or application. The results showed that the optimal mixing ratio provided the material with good mechanical properties, making it easy to form into non-brittle films. Furthermore, the drug release capability was modified by adding anionic clay (AC) and layered material (LM) in various proportions to create composite hydrogel sheets. This study analyzed the physical, chemical, and morphological properties, revealing that the developed composite hydrogel sheets exhibited effective swelling performance as well as the ability to absorb and release a simulated drug. The experimental results indicate the feasibility of applying these composite hydrogel sheets as wound dressings.

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