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Hyaluronic acid / Na-alginate films As topical bioactive wound dressings

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Abstract

The current work was focused on formulation of new topical bioactive hyaluronic acid (HA)/Na-alginate (SA) films crosslinked with Ca^{2+} , Zn^{2+} , or Cu^{2+} metal cations. The antibacterial as well as some physico-mechanical properties of such crosslinked films such as gel fraction, swelling, tensile strength, stiffness, SEM, and water vapor permeability were discussed. Moreover, to enhance the antibacterial properties of the HA/SA/ Ca^{2+} film, sulfadiazine (SD) alone or in combination with silver nanoparticles (AgNPs) as bioactive agents were incorporated in the formulation of that film. The in vitro releasing of sulfadiazine from such loaded film at different pH values was studied. The results obtained confirmed that among the above formulated films, the HA/SA/ Ca^{2+} /SD/Ag-NPs bio-film has the highest antibacterial activity. In addition, the above prepared films were screened as topical bioactive wound dressings for albino rats. The results indicated that both HA/SA/ Ca^{2+} /SD and HA/SA/ Ca^{2+} /SD/AgNPs films are effective dressings for restoring the homeostasis skin tissue of such rats to the normal control after 14 days, but the latter film was the best.

Keywords: Hyaluronic, Sodium alginate, Films, Wound Healing, Topical

1. Introduction

Skin is the largest and most visible human organs; it is a first line defense of the body, in addition to its basic work as a barrier to shocks, bugs of microbes. Recovery from surface wounds throughout life is one of the most important considerations for maintaining public health, especially for diabetes patients [1]. Because skin is one of the most important organs related to the preservation of the public health of the individual, which prevents the entry of bacteria and foreign bodies to the blood, so in cases of

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