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Dextran based herbal nanobiocomposite membranes for scar free wound healing

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Abstract

Dextran based bionanocomposite membranes encapsulating clove oil (CO) and sandalwood oil (SO) that are capable of preventing infection due to their inherent virtue of antibacterial activity and modifying the wound healing cascade for accelerated scar free healing, were developed. A facile solvent casting technique was used to fabricate dextran/nanosoy/glycerol/chitosan (DNG/Ch) nanocomposite membranes followed by subsequent addition of CO and SO to obtain DNG/Ch/CO and DNG/Ch/SO herbal nanodressings. Dressings exhibited >98% antibacterial activity against both Staphylococcus aureus *(S.aureus)* and Escherichia coli *(E.coli)* at extremely low loadings of 5% and 10% for CO and SO, respectively. This encapsulation strategy allowed controlled diffusion of EO over a period of 72 h which was measured in terms of drug efficacy using bacterial reduction count test and serial plate transfer disk diffusion test (SPTDDT). Swelling behavior and mechanical properties were also examined. Bacterial adherence study was performed to demonstrate the efficiency of dressings for arresting microbial invasion. *In vivo* wound healing studies were conducted using male swiss albino mice of BALB/c strain and DNG/Ch/CO dressings exhibited complete healing within 14 days with remarkable efficacy in scar prevention. Histological analysis revealed that CO and SO treatment led to deposition of ordered collagen along with fibroblast migration.

Keywords: Dextran; Wound dressings; Scar preventive

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