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The fabrication of a nano fiber wound dressing for diabetic wound healing

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Background: Diabetic foot ulcer as a chronic wound is a major problem. Matrix metalloproteinase (MMP-2) and pro-inflammatory cytokines such as (IL-1b and TGF-b) are increased in chronic wound. Doxycycline inhibits MMPs and pro-inflammatory cytokines in different ways. Chitosan is a natural polymer that enhances the process of wound healing. PVA is a synthetic, non-toxic and biodegradable polymer that increases the mechanical properties of chitosan. Less is known about the effects of nanofiber wound dressing containing Doxycycline, chitosan and PVA.

Objective: The purpose of this study was to fabricate and treat diabetic ulcer in rat models.

Methods: Four wound dressing with formulation (C/PVA-C/PVA/DOX 1%, C/PVA/DOX 1%, Genipin 1%- C/PVA/DOX 1%, Genipin 0.05%) was designed. Each wound dressing was evaluated by antimicrobial test, water vapor transmission rate (WVTR), FTIR, SEM, water absorption, release test and cytotoxicity test. 45 male rats were randomly selected and divided into three groups (A: diabetic-C/PVA/DOX 1% wound dressing, B: diabetic-C/PVA/wound dressing and C: non diabetic-not received wound dressing). Each group divided into three sub groups (n=5). In anesthetic condition a full thickness with diameter of 15 mm was excised from the dorsal area of skin. For assessment the rate of wound contraction and healing digital photography was taken during the study. In days of 3, 7 and 14 the rats were euthanized and samples were obtained from the wound for evaluating histopathology.

Results: Our results showed that the C/PVA/DOX 1% has better function compared to other formulations *in vitro* tests. In addition in vivo tests rats wound healing were faster with C/PVA/DOX 1%.

Biography

Habibi I is a medical doctor(MD) graduated from the Shahid Beheshti University of Medical Sciences, Tehran, Iran. His fields of interest are researching on wound care in diabetic foot ulcer, burning and fabricating topical products such as ointment, cream, hydrogel and scaffold for wound healing. He has one iranian patent for treatment of keloid and hyper trophic scars titled "The topical formulation for the treatment of keloids and hypertrophic scars" and another iranian patent for skin pain assesment in microneuropathies titled "Digital device for pain assessment in human". He is also working on two research projects regarding Diabetic Wound Healing and Keloid Treatment. He had published an ISI article about Glioma diagnosis in 2016 titled "Predictive and prognostic value of TLR9 and NFKBIA gene expression as potential biomarkers for human glioma diagnosis".

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