

Enhanced Wound Healing Efficacy of Cordycepin-Melittin Nanoconjugate in Excised Wounds of Diabetic Rats

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Abstract : Diabetic foot ulcers are the foremost global healthcare burden. Hyperglycemia in diabetics is incriminating in impeding wound healing and it can allow for more severe medical issues. The study was intended to establish a nanoconjugate of cordycepin-melittin (COR-MEL) and evaluate its healing effects in wounded diabetic rats. Diabetes induced by injecting streptozotocin intraperitoneally (50 mg/kg, body weight). Therefore, animals were classified into various groups; diabetic untreated, vehicle-treated, COR alone, MEL alone, and COR-MEL nanoconjugate treated, respectively. Animals with diabetes were exposed to excision and treated with Vehicle, COR, MEL, or COR-MEL nanoconjugate topically. After 14 days, the wounded skin was sliced and subjected to histological and biochemical assessments. The formulated nanoconjugate has a particle size of 253.5 ± 17.4 nm by a polydispersity index of 0.36 ± 0.05 , and a zeta potential of 1.72 ± 0.3 mV. The study demonstrated an accelerated wound contraction in COR-MEL-treated diabetic rats, which was further validated by histological analysis. The nanoconjugate further exhibited antioxidant activities by inhibiting the accumulation of malondialdehyde and exhaustion of superoxide dismutase and glutathione peroxidase enzymatic activities. The nanoconjugate further demonstrated an enhanced anti-inflammatory activity by retarding the expression of proinflammatory cytokines (IL-6 and TNF- α). Additionally, the nanoconjugate exhibits a strong expression of growth factors (TGF- β 1, VEGF-A, and PDGFR- β), indicating enrichment of proliferation. Likewise, nanoconjugate increased the concentration of hydroxyproline as well as the mRNA expression of collagen, type I, alpha 1. Thus, it is concluded that the nanoconjugate possesses a potent wound-healing activity in diabetic rats via antioxidant, anti-inflammatory, and pro-angiogenetic mechanisms.

Keywords : diabetic wounds, cordycepin, melittin, nanoconjugate, wound healing

Conference Title : ICCPDD 2023 : International Conference on Clinical Pharmacy and Drug Development

Conference Location : Jeddah, Saudi Arabia

Conference Dates : February 20-21, 2023