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Design and Characterization of Titanium Dioxide Nanoparticles Utilizing Green Synthesis Technique for Diabetic Wound

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The current investigation aimed to design and synthesis titanium dioxide nanoparticles (TiO₂.NPs) utilizing leaf extract of Ocimum sanctum for the better management of diabetic wounds. The developed Nano particulate system of average size 130.3 nm with polydispersity index 0.237 and zeta potential -11.5 mV was uniformly dispersed into chitosan gel (2% w/v) for topical application in a diabetic wound. The energy dispersive X-ray (EDX) analysis of the developed Nano particulate system exhibited strong signals of TiO₂ with an intense absorption spectrum at 4-5 KeV. The streptozotocin (55 mg/kg) was used to induce diabetic wounds in Wistar rats to evaluate the wound healing efficacy of the developed formulation system compared to the marketed formulation (1% silver sulfadiazine cream). It was observed that the developed topical formulation containing TiO₂.NPs have a significant ($p < 0.05$) early epithelization time (10.25 ± 0.5 days) compared to the control group (19.5 ± 0.57 days) without treatment. Furthermore, histopathological investigation of the developed formulation system after wound healing (21 days) reveals improved histological development (like keratinization, hair follicles, blood vessels, and formation of granulation tissue) of skin tissue compared to the control group without treatment. The present study provided a proof-of-concept to further improve the healing efficacy of chitosan gel in combination with TiO₂.NPs for diabetic wounds.

Keywords: Nanoparticles, Ocimum sanctum (Basel) leaf, chitosan gel, diabetic wound

Biography

Ali Alasiri, assistant professor at department of pharmaceutics, Najran University, KSA. Had my PHD from UK De Montfort University in pharmaceutical formulation.

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