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## Radiation Fabrication of Xanthan - based Wound dressing hydrogels embedded ZnO nanoparticles: *In vitro* Evaluation

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### Abstract

Depending on the biocompatibility of Xanthan, polyvinyl alcohol and the antibacterial efficiency of zinc oxide nanoparticles (ZnO), a series of (Xanthan-polyvinyl alcohol)/ZnO nanocomposite hydrogels were prepared as wound dressing using eco-friendliness <sup>60</sup>Co  $\gamma$ -ray irradiation facility. ZnO nanoparticles were characterized using X-ray diffraction, UV-vis spectroscopy, transmission electron microscopy and energy dispersive X-ray analysis. The size of ZnO nanoparticles was ranged between 15–25 nm. The presence of ZnO nanoparticles reconstructed the internal structure of the hydrogel network which aid in a homogenous porous structure as indicated by scanning electron micrographs. Such adequate porosity along with the presence of ZnO nanoparticles controls the fluid uptake ability, water retention and water vapor transmission rate. The fluid uptake ability in pseudo-extracellular fluid and water ranged between (554-664%) and (1281-1603%), respectively. After exposure to air for 6 hours, ZnO dressings kept about 50-65% of their water content which makes them more suitable for moderate exudating wounds. Water vapor transmission rate ranged between (167-184) (g/(m<sup>2</sup>h) which is sufficient to keep wound's surface moist. ZnO dressings show an efficient microbial barrier potency and profound antimicrobial activity against *Staphylococcus aureus*, *Escherichia coli* and *Candida albicans*. *In vitro* cytotoxicity and haemolytic potency evaluation showed their biocompatibility.

**Key words:** Gamma irradiation; Xanthan; ZnO nanocomposites; wound dressing; Biocompatibility

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