

Preparation and In vitro Characterization of Nanoparticle Hydrogel for Wound Healing

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Abstract : The aim of the present study was to develop and evaluate mupirocin loaded nanoparticle incorporated into hydrogel as an infected wound healer. Incorporated Nanoparticle in hydrogel provides a barrier that effectively prevents the contamination of the wound and further progression of infection to deeper tissues. Hydrogel creates moist healing environment on wound space with good fluid absorbance. Nanoparticles were prepared by double emulsion solvent evaporation method using different ratios of PLGA polymer and the hydrogels was developed using sodium alginate and gelatin. Further prepared nanoparticles were then incorporated into the hydrogels. The formulations were characterized by FT-IR and DSC for drug and polymer compatibility and surface morphology was studied by TEM. Nanoparticle hydrogel were evaluated for their size, shape, encapsulation efficiency and for in vitro studies. The FT-IR and DSC confirmed the absence of any drug polymer interaction. The average size of Nanoparticle was found to be in range of 208.21-412.33 nm and shape was found to be spherical. The maximum encapsulation efficiency was found to be 69.03%. The in vitro release profile of Nanoparticle incorporated hydrogel formulation was found to give sustained release of drug. Antimicrobial activity testing confirmed that encapsulated drug preserve its effectiveness. The stability study confirmed that the formulation prepared were stable. Present study complements our finding that mupirocin loaded Nanoparticle incorporated into hydrogel has the potential to be an effective and safe novel addition for the release of mupirocin in sustained manner, which may be a better option for the management of wound. These finding also supports the progression of antibiotic via hydrogel delivery system is a novel topical dosage form for the management of wound.

Keywords : hydrogel, nanoparticle, PLGA, wound healing

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