NANOPARTICLES BASED FORMULATION OF SILVER SULPHADIAZINE FOR TREATMENT OF BURN WOUND

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Abstract:

The aim of the present investigation was to prepare and evaluate of nanoparticles based formulation of silver sulphadiazine for treatment of burn wound and targeting towards the bacterial infection and mucoadhesion can be achieved by using hyaluronic acid. Silver sulphadiazine (SSD) can improve the infectious condition if given in the form of nanoparticles based formulation. Fourier transform infrared spectroscopy (FTIR) had employed to study drug-excipients incompatibility. Optimization of formulation parameter was done by Box Behnken Design (BBD) using Design Expert software. Nanoparticles based formulation of silver sulphadiazine was evaluated for particle size, percent drug entrapment, zeta potential, *in-vitro* drug release study surface morphology, antimicrobial study, skin irritation study, *in vivo* wound healing study and stability study. FTIR study shows that neither drug decomposition nor drug-excipients and excipient-excipient interactions occurred in the formulation. Nanoparticles based formulation of silver sulphadiazine was successfully prepared using chitosan, hyaluronic acid and sodium tripolyphosphate. Particle size, zeta potential and percent drug entrapment were found to be 371.1 nm, +24.6 mV and 92.53±0.92 % respectively for optimized batch. Transmission electron microscopy study indicates that the particles were found to be in spherical shape. I*n-vitro* drug release of optimized batch was found to be 90.72±0.46 % up to 12 hrs. Antimicrobial study shows that silver sulphadiazine posses most promising antimicrobial activity and it is as effective as silver sulphadiazine marketed formulation. Skin irritation study shows that formulation was not irritated to the skin.

In vivo wound healing study shows that nanoparticles based formulation posses good wound healing activity as marketed formulation. Stability study indicates that formulation containing silver sulphadiazine nanoparticles was stable at 4-8 ± 2°C/45 ±5% RH (Refrigerator; RF) and 25 ± 2°C/ 65 ± 5% RH (Room temperature; RT). The present study demonstrated that, nanoparticles based formulation for treatment of burn wound hold great potential for treating bacterial infection in burn wound.

***Keywords*:** Bacterial Infection Targeting; Burn Wound; Hyaluronic Acid; Silver Sulphadiazine; SSDNPs based formulation; Box Behnken Design; Lyophilization.