Nanoliposomal Topical Formulation for Increasing Safety and Combating Microbial Drug Resistance in Leprosy

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Abstract:

The aim of the present investigation was to develop and evaluate nanoliposomal topical spray for the improved treatment of leprosy. Dapsone and chaulmoogra oil can improve the leprosy condition if given in the form of nanoliposomal topical spray dosage form. Nanoliposomes were prepared using solvent injection method. The nanoliposomes dispersion was converted in the topical spray using simple dispersion method. Nanoliposomal topical simple spray was evaluated for particle size, percent drug entrapment efficiency, surface morphology, pH, drying test, volume per spray, area of film, *in-vitro* drug release study and stability study. Optimization parameters were done by 3^2 factorial design using design expert software 11.0.0 FTIR study shows that neither drug decomposition nor drug-excipients and excipient-excipient interactions occurred in the formulation. Analytical method was performed using UV spectroscopy. Nanoliposome was successfully prepared by optimizing Drug: Lipid ratio (1:7) and HSPC: Cholesterol ratio (7:3). Nanoliposomal topical spray prepared by lyophilized method. Nanoliposomal spray was prepared by using powder of nanoliposomes (100mg), PVP K 30 (10%), PEG 6000 (6%), Menthol (0.05%),

Propylene Glycol (3%), Ethanol (36.5%) and distilled water (Q.S.). Particle size and percent drug entrapment were found before lyophilized and after lyophilized, 18.01 ± 0.21 nm and 87.71 ± 0.12% respectively. Transmission electron microscopy study indicates that the vesicles were found to be in spherical shape. Drying time, volume per spray, area of film and dose uniformity were found to be 280 Sec ± 0.002, 0.16ml ±0.021, 155.57 ± 0.012 cm^2 and 0.15ml ± 0.0012 ml respectively which show good spray conditions on the leprosy affected area. *In-vitro* drug release of optimized batch was found to be 95.76 ± 0.32 % up to 24 hr. Stability study shows that dapsone and chaulmoogra oil loaded nanoliposomal topical spray was stable at accelerated condition up to 1 month. The present study demonstrated that, the nanoliposomal topical spray was efficient to improve the outer membrane permeability to combact microbial drug resistance and increasing safety in leprosy treatment.

Keywords: Leprosy; Dapsone; Chaulmoogra Oil; Nanoliposomal topical spray; 3^2 Factorial Design; Lyophilization.