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Formulation and Ex Vivo Evaluation of Solid Lipid Nanoparticles Based Hydrogel for Intranasal Drug Delivery

Authors : Pramod Jagtap, Kisan Jadhav, Neha Dand

Abstract : Risperidone (RISP) is an antipsychotic agent and has low water solubility and nontargeted delivery results in numerous side effects. Hence, an attempt was made to develop SLNs hydrogel for intranasal delivery of RISP to achieve maximum bioavailability and reduction of side effects. RISP loaded SLNs composed of 1.65% (w/v) lipid mass were produced by high shear homogenization (HSH) coupled ultrasound (US) method using glyceryl monostearate (GMS) or Imwitor 900K (solid lipid). The particles were loaded with 0.2% (w/v) of the RISP & surface-tailored with a 2.02% (w/v) non-ionic surfactant Tween® 80. Optimization was done using 32 factorial design using Design Expert® software. The prepared SLNs dispersion incorporated into Polycarbophil AA1 hydrogel (0.5% w/v). The final gel formulation was evaluated for entrapment efficiency, particle size, rheological properties, X ray diffraction, in vitro diffusion, ex vivo permeation using sheep nasal mucosa and histopathological studies for nasocilliary toxicity. The entrapment efficiency of optimized SLNs was found to be 76 ± 2 %, polydispersity index <0.3., particle size 278 ± 5 nm. This optimized batch was incorporated into hydrogel. The pH was found to be 6.4 ± 0.14. The rheological behaviour of hydrogel formulation revealed no thixotropic behaviour. In histopathology study, there was no nasocilliary toxicity observed in nasal mucosa after ex vivo permeation. X-ray diffraction data shows drug was in amorphous form. Ex vivo permeation study shows controlled release profile of drug.

Keywords : ex vivo, particle size, risperidone, solid lipid nanoparticles
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