

Development and Optimization of a Brain-Targeted Intranasal Nano Delivery System for Enhanced Delivery of an Antipsychotic Drug in Schizophrenia

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Abstract

An antipsychotic drug is commonly used to treat schizophrenia and other psychiatric disorders. However, its clinical efficacy is restricted by poor aqueous solubility, low oral bioavailability, extensive first-pass hepatic metabolism and limited brain availability due to the blood-brain barrier. The present study aims to develop and optimize a brain-targeted intranasal nano delivery system for an antipsychotic drug to enhance brain delivery and therapeutic efficacy in the management of schizophrenia. The nano delivery system was prepared by the solvent evaporation method followed by probe sonication using suitable stabilizers and surfactants. Statistical design of experiments was used to optimize the formulation to achieve desired critical quality attributes such as particle size, zeta potential and drug content. The optimized formulation exhibited nanosized particles with uniform distribution, good colloidal stability, high drug incorporation and suitable aerodynamic properties for nasal delivery. Solid-state characterization confirmed reduced crystallinity and improved physicochemical properties of the drug in the developed nano delivery system. Aerodynamic evaluation showed appropriate nasal deposition properties. In conclusion, the developed intranasal nano delivery system showed excellent potential as an efficient brain-targeted delivery platform for an antipsychotic drug, with the potential to improve bioavailability, reduce systemic exposure and enhance therapeutic effects in the management of schizophrenia.

Keywords

Antipsychotic drug, Brain-targeted delivery, Intranasal delivery, Nano delivery system, Schizophrenia, Blood-brain barrier, Nasal drug delivery, Nanotechnology, Bioavailability, Brain targeting.