

Research paper

Development and optimization of chitosan coated nanoemulgel of telmisartan for intranasal delivery: A comparative study

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Abstract

Dementia is a degenerative brain disease, which is associated with severe cognitive impairments, where angiotensin receptor blockers (e.g., telmisartan) shown to attenuate demented conditions. The objective of this study is to formulate and characterize telmisartan mucoadhesive nanoemulgel (TMNEG) for intranasal delivery. TMNEG was developed using Sefsol 218 and oleic acid (oil_{mix}), Tween 20 (surfactant) and Transcutol P (co-surfactant), followed by incorporation of different concentrations of chitosan solution. The droplet-size, size-distribution, zeta potential, pH and viscosity were evaluated for the TMNEG formulations. Later, mucoadhesive property, *in vitro* release pattern along with the mechanism of release and *ex vivo* permeation through goat nasal mucosa of the TMNEGs were evaluated. Photon correlation spectroscopy and thermodynamic stability studies had shown that optimized TMNEG formulation had a nanometric droplet size and acceptable pH. Drug release studies revealed that overall release in optimized TMNEG ($57.45 \pm 5.90\%$) is lower than optimized telmisartan nanoemulsion ($71.71 \pm 5.32\%$) within the time frame of 12 h, showing a delayed-release contributed by the chitosan coating. The higher release rate was found in both low and medium molecular weight chitosan-coated nanoemulgel at a concentration of 0.5% and 1.0% as compared to TMNEGs with high molecular weight chitosan. The *in vitro* release kinetic profile followed first-order reaction and Higuchi model with non-Fickian diffusion. Coating of nanoemulsion droplets with chitosan had shown to improve the mucoadhesive property, which further improved the permeation through goat nasal mucosa. Taking into consideration of mucoadhesive characteristics, extended drug release and improved *ex vivo* permeation, the developed TMNEG provides a potential platform for the delivery of telmisartan via intranasal route.