

Chitosan Functionalized Intranasal Nanoemulsions of Iloperidone for Improved Brain Delivery–Development, in Vitro and in Vivo Studies



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This research work focuses on development of Iloperidone nanoemulsions; functionalized with chitosan for intranasal delivery for improving brain targeting efficiency. Iloperidone nanoemulsions were optimized by response surface methodology using DESIGN EXPERT software version 13. Iloperidone nasal nanoemulsions were prepared using spontaneous emulsification and ultrasonication method. These nanoemulsions could be surface functionalized with 0.4% w/v of chitosan. Iloperidone nasal nanoemulsions showed negative zeta potential (-22.5 ± 0.1 mV) while chitosan functionalized Iloperidone nasal nanoemulsions presented positive zeta potential ($+25.5 \pm 0.4$ mV) confirming coating of nanoemulsion droplets by chitosan. The in vitro release of Iloperidone using dialysis membrane (molecular weight cut off 14kD) in 100 ml, Simulated Nasal Fluid, pH 6.4, $32 \pm 2^\circ\text{C}$, 75 rpm from the nasal nanoemulsions and chitosan functionalized nasal nanoemulsions was $90.41 \pm 2.34\%$ and $72.02 \pm 0.53\%$ respectively at the end of 8 hours. The ex vivo permeation of Iloperidone using excised sheep nasal mucosa in 12 ml, Simulated Nasal Fluid, pH 6.4, $32 \pm 2^\circ\text{C}$, 50 rpm from nasal nanoemulsions and chitosan functionalized nasal nanoemulsions was $70.84 \pm 0.21\%$ and $47.25 \pm 0.12\%$ respectively at the end of 8 hours. Results of in vivo pharmacodynamic studies performed on male Wistar rats showed that chitosan functionalized nasal nanoemulsions of Iloperidone showed improved effects in Wistar rats (Fig. 1–3). This can be contributed to the nano size and improved mucoadhesive characteristics of the developed intranasal Iloperidone formulations.

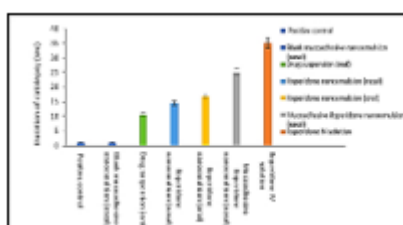


Fig 1: Catalepsy test

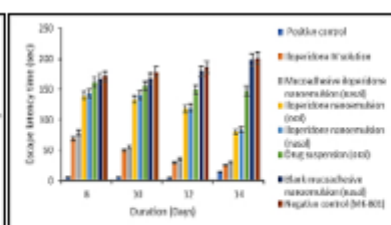


Fig 2: Morris water maze test

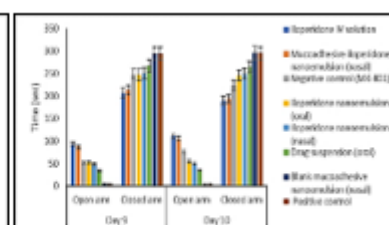


Fig 3: Elevated plus-maze model

These results indicate potential of developed formulations in improving brain delivery of Iloperidone for managing schizophrenia.

Biography:

Niserga Sawant is a second-year PhD student at C. U. Shah College of Pharmacy, SNDT Women's University. She received a bachelor's degree in Pharmacy and Master's degree in Pharmaceutics from C. U. Shah College of Pharmacy, SNDT Women's University, Mumbai, India. She received research fellowship from Rajiv Gandhi Science and Technology Commission. She is interested in designing and development of "nanodrug delivery systems".