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A novel nasal almotriptan loaded solid lipid nanoparticles in mucoadhesive in situ gel formulation for brain targeting: Preparation, characterization and in vivo evaluation

Youssef, N.A.H.A.[a], Kassem, A.A.[b], Farid, R.M.[a,b], Ismail, F.A.[b], EL-Massik, M.A.E.[b], Boraie, N.A.[b]

[a] Department of Pharmaceutics, Faculty of Pharmacy and Drug Manufacturing, Pharos University in Alexandria, Alexandria, Egypt

[b] Department of Pharmaceutics, Faculty of Pharmacy, University of Alexandria, Alexandria, Egypt

Abstract:

This work aimed at designing efficient safe delivery system for intranasal (IN) brain targeting of the water soluble anti- migraine drug Almotriptan malate (ALM). Solid lipid nanoparticles (SLNs) were prepared by w/o/w double emulsion-solvent evaporation method. Selection of the optimized SLNs formula was based on evaluating particle size (PS), poly dispersity index (PDI) and entrapment efficiency (%EE). Optimized formula exhibited acceptable ranges; PS of 207.9 nm, PDI of 0.41 and %EE of 50.81%. Poloxamer 407 (Plx) at different concentrations (16%, 18%, 20% w/v), with different mucoadhesive polymers (Carbopol-974P, Na alginate, Na-CMC) were evaluated for gelling time and temperature, pH and mucoadhesion. The chosen mucoadhesive in-situ gel formula; 18% Plx 407 based-0.75%w/v Na-CMC, showed acceptable results, so that the optimized SLNs formula was further dispersed in it and evaluated for in vitro release, stability, in vivo and pharmacokinetics studies. Biomarkers' evaluation and histopathological examination were also investigated. Results revealed rapid ALM brain delivery of the optimized formula; Brain/blood ratios at 10 min. for NF (SLNs based IN in-situ gel), ND (Free ALM IN in situ gel) and ALM i.v. (ALM IV solution) were 0.89, 0.19 and 0.31, respectively. Toxicological results confirmed the safety of NF for nasal administration. The achieved out comings are encouraging for further clinical trials of the developed system in humans in future research.

Reference: