Eudragit È-S100 Coated PLGA Nanoparticles for Colon Targeting of Etoricoxib: Optimization and Pharmacokinetic Assessments in Healthy Human Volunteers

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Abstract

Aim: Etoricoxib is a selective inhibitor of COX-2 enzyme. It is proposed as a potent anti-inflammatory drug intended for the control of irritable bowel syndrome. The current work aimed at developing etoricoxib-loaded nanoparticles for colon-targeting.
Materials and methods: PLGA nanoparticles were developed via nano-spray drying technique. The D-optimal design was adopted for the investigation of the influence of i) DL-lactide-coglycolide (PLGA) concentration, ii) polyvinylpyrrolidone K30 (PVP K30) concentration and iii) lactide:glycolide ratio in the copolymer chain on the yield%, the encapsulation efficiency (EE%), particle size (PS) and percentage of drug release after 2h (P2h), 4h (P4h) and 12h (P12h). To promote colon targeting of the systems, the best achieved system (M14) was either directly coated with poly (methacrylic acid-co-methyl methacrylate) [EudragitÈ-S100] or loaded into hard gelatin capsules and the capsules were coated with poly(methacrylic acid-co-methyl methacrylate) (E-M14C). The pharmacokinetic parameters of etoricoxib following oral administration of E-M14C in healthy volunteers were assessed relative to commercial etoricoxib tablets.
Results: M14 system was prepared using PLGA (0.5% w/v) at a lactide:glycolide ratio of 100:0, in the presence of PVP K30 (2% w/v). M14 system was nano-spherical particles of 488 nm size possessing promising yield% (63.5%) and EE% (91.2%). The percentage drug released after 2, 4 and 12 hours were 43.41%, 47.34 and 64.96%, respectively. Following M14-loading into hard gelatin capsules and coating with poly(methacrylic acid-co-methyl methacrylate) [Eudragit-S100], the respective P2h, P4h and P12h were 10.1%, 28.60% and 65.45%. Significant ($p < 0.05$) differences between the pharmacokinetic parameter of E-M14C in comparison with the commercial product were revealed with a delay in Tmax (from 2.5h to 6h), a prolongation in MRT0-Ð (from 24.4h to 34.7h) and an increase in the relative oral bioavailability (4.23 folds).
Conclusion: E-M14C is a potential system for possible colon targeting of etoricoxib.

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