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Improving oral bioavailability via self nanoemulsifying approach

Exemestane HCl (EXM) is a novel irreversible steroidal aromatase inhibitor for the adjuvant treatment of hormonally responsive breast cancer in post-menopausal women. Poor aqueous solubility of EXM is the biggest hurdle for the development of solid oral dosage forms. That's why the aim of the current study is to formulate the self-nano emulsifying drug delivery (SNEDDs) system to improve the bioavailability of EXM. SNEDDs were formulated using the water titration method. Based on Solubility studies, components of SNEDDs viz., Caprol Microexpress and Labrafac as oil phase, Tween 80 as a surfactant, and Triacetin as a co-surfactant were selected. Phase studies were performed using different ratio surfactant:co-surfactant (1:1, 1:2, 1:3, 2:1, 3:1). Results suggested that Tween 80: triacetin (1:2) and (1:3) ratio with Caprol Microexpress and Labrafac alone were given the highest area of nanoemulsion. Based on that 10 different formulations were formulated and further optimization was done based on Visual assessment, optical clarity, particle size, drug content, and viscosity. Results revealed F3, F7, and F8 batches were showing the lowest size 7.313 ± 1.44 nm, 6.379 ± 0.45 nm, and 14.67 ± 0.37 nm respectively with less than 1 min for self-emulsification time. Among SNEDDS formulations F7 had 1.7-, 1.1- and 1.33-time higher AUC in comparison to EXM suspension, F3, and F8 batch. It was concluded that EXM SNEDDS improves pharmacokinetic parameters which subsequently improve oral bioavailability. SNEDDS is a novel and commercially feasible approach to improving oral bioavailability of BCS class-IV drug EXM and has the potential to improve oral bioavailability and improve stability.

Recent Publications

1. Paliwal, H., Parihar, A., & Prajapati, B. G. (2022). Current State-of-the-Art and New Trends in Self-Assembled Nanocarriers as Drug Delivery Systems. *Front. Nanotechnol.* 4: 836674. doi: 10.3389/fnano.
2. Prajapati, B., Paliwal, H., & Patel, J. (2022). Pharmacokinetics of Nanoparticle Systems for Pulmonary Delivery. In *Pharmacokinetics and Pharmacodynamics of Nanoparticulate Drug Delivery Systems* (pp. 347-364). Springer, Cham.
3. Paliwal, H. P., Prajapati, B. G., Khunt, D., Shirisha, C., Patel, J. K., & Pathak, Y. V. (2022). Pharmacokinetic and Tissue Distribution Study of Solid Lipid Nanoparticles. In *Pharmacokinetics and Pharmacodynamics of Nanoparticulate Drug Delivery Systems* (pp. 245-260). Springer, Cham.
4. Prajapati, B. G., Patel, H. P., & Patel, J. K. (2022). Nanoparticle Pharmacokinetic Profiling In Vivo Using Magnetic Resonance Imaging. In *Pharmacokinetics and Pharmacodynamics of Nanoparticulate Drug Delivery Systems* (pp. 399-416). Springer, Cham.

Biography

Bhupendra Prajapati works as a Professor in the Department of Pharmaceutics, Shree S.K.Patel College of Pharmaceutical Education and Research, Ganpat University, North Gujarat, India. He did his Ph.D. from Hemchandracharya North Gujarat University, Patan. He did his PG and UG from M.S.University, of Baroda. He has 19 years of experience in academic/industry (17+2). He has published more than 60 publications. the i10-index index is 33. He has been awarded by AICTE Young Teacher (2013), Distinguished Associate Professor in TechNExt India 2017 by CSI, Mumbai, and President award of Staff Excellence in Research (2019) and Capacity Building (2020) by Ganpat University for the consecutive year 2021 and 2022 respectively. His two patents were published and Three applications were submitted to the Indian Patent Office in the field of NDDS.

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