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(57) Abstract :
The present invention relates to a nanoemulsion-based drug delivery system for significantly enhanced oral bioavailability of poorly water-soluble active pharmaceutical ingredients belonging to BCS Class II and Class IV. The nanoemulsion comprises an oil-in-water dispersion with mean droplet diameters of 20 to 200 nanometres, formulated using pharmaceutically acceptable medium-chain triglycerides as the oil phase, a combination of polysorbate 80 and Vitamin E TPGS as surfactants, and polyethylene glycol 400 as co-surfactant, with the active pharmaceutical ingredient solubilised in the oil phase. The ultra-small droplet size provides a markedly increased interfacial surface area for drug absorption, while Vitamin E TPGS synergistically inhibits intestinal P-glycoprotein efflux transporters. Lymphatic drug uptake facilitated by the nanoemulsion further circumvents hepatic first-pass metabolism. An optional mucoadhesive polymer component prolongs gastrointestinal residence time. In vitro drug release studies demonstrate greater than 83 percent drug release within six hours compared to 22 percent for conventional suspension.

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