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Topical Emulgel as a Promising Carrier for Hydrophobic Drugs: A Comprehensive Review

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Abstract: *Topical drug delivery systems offer numerous advantages, including localized drug action, reduced systemic side effects, and improved patient compliance. Among these, emulgels have gained significant attention as a promising carrier for hydrophobic drugs by combining the benefits of emulsions and gels. Emulgels enhance drug solubility, permeability, and bioavailability, making them suitable for dermatological, transdermal, and cosmeceutical applications. The formulation of emulgels involves oil-in-water (O/W) or water-in-oil (W/O) emulsions incorporated into a gel matrix using gelling agents such as carbopol, xanthan gum, or HPMC. The mechanism of drug release primarily depends on diffusion, emulsion droplet size, and viscosity, facilitating sustained drug delivery and prolonged retention on the skin. Emulgels have been successfully employed in antifungal, anti-inflammatory, analgesic, wound healing, and cosmetic formulations, offering a non-greasy, patient-friendly alternative to traditional creams and ointments. However, challenges such as stability concerns, large-scale production, and regulatory approval need to be addressed. Recent advancements in nanoemulgels, bio-based polymers, and hybrid drug delivery systems have expanded the potential of emulgels in transdermal and systemic applications. This review provides a comprehensive overview of formulation aspects, drug release mechanisms, applications, evaluation techniques, challenges, and future perspectives of emulgels as an advanced carrier for hydrophobic drugs.*

Keywords: Emulgel, hydrophobic drugs, topical drug delivery, bioavailability, permeability, nanoemulgel, dermatological therapy

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