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(54) Title of the invention : NANOEMULSION FORMULATION OF TEA TREE AND ROSEMARY ESSENTIAL OILS FOR ENHANCED ANTI-ACNE BIOACTIVITY AND TRANSDERMAL DELIVERY

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(57) Abstract :

The present invention relates to a nanoemulsion-based topical delivery system comprising tea tree essential oil (TTO) and rosemary essential oil (RMO) individually formulated with Tween 80 as surfactant and propylene glycol as co-surfactant in a 1:1 Smix ratio, prepared by the aqueous phase titration method guided by pseudo-ternary phase diagrams. Nine formulation batches each of TTO-loaded (TM1-TM9) and RMO-loaded (RM1-RM9) nanoemulsions were developed and characterized for globule size, zeta potential, PDI, pH, viscosity, encapsulation efficiency, and freeze-thaw stability. The optimized formulations TM6 and RM6 demonstrated globule sizes of 18.67 nm and 18.09 nm, encapsulation efficiencies exceeding 90%, and substantially enhanced ex-vivo transdermal permeation of 1,8-cineole with enhancement ratios of 3.79 and 3.69 respectively. In vitro anti-acne activity against Staphylococcus epidermidis and Propionibacterium acnes showed maximum zones of inhibition of 21.8 mm and 21.6 mm for TM6 and RM6. Transmission electron microscopy confirmed spherical nanodroplet morphology. An HPLC method with r2 = 0.995 was validated for 1,8-cineole quantification. The invention offers a safe, stable, and effective nanopharmaceutical platform for the topical management of acne vulgaris

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