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(57) Abstract :
029] The present invention relates to the formulation and development of an essential oil-based nanoemulgel designed for enhanced anti-inflammatory and antifungal effects, specifically targeting vaginal candidiasis. The invention involves the extraction, characterization, and incorporation of essential oils—such as clove, tea tree, eucalyptus, or lavender oil—into a nanoemulsion system stabilized by nonionic surfactants (Tween 20 or Tween 80). The optimized nanoemulsion exhibits droplet sizes below 200 nm, zeta potentials between -15 mV and -20 mV, and encapsulation efficiency above 97%, ensuring colloidal and thermodynamic stability. Upon incorporation into a carbopol 940-based gel matrix, the resulting nanoemulgel demonstrates ideal viscosity, spreadability, and a physiological pH (5.5–7.2), suitable for vaginal and topical application. In vitro studies confirm sustained drug release following first-order kinetics, with approximately 40% release within 3 hours. Biological evaluations show significant anti-inflammatory activity (protein denaturation inhibition 51–57%) and potent antifungal action against Candida albicans (inhibition zones up to 16 mm). The invention thus provides a stable, biocompatible, and natural nanoemulgel system that enhances the therapeutic potential of essential oils, offering a safe and effective alternative for treating fungal and inflammatory infections. Accompanied Drawing [FIGS. 1-2]

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