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ABSTRACT

Inflammation is a complex physiological response to harmful stimuli, and while essential for healing, its chronic dysregulation can contribute to numerous disorders. Conventional anti-inflammatory treatments, particularly non-steroidal anti-inflammatory drugs (NSAIDs), often suffer from limitations such as gastrointestinal toxicity, low skin penetration, and systemic side effects. Linalool, a naturally occurring monoterpene alcohol, possesses notable anti-inflammatory, analgesic, and antioxidant properties. However, its topical use is hindered by high volatility, poor aqueous solubility, and limited skin retention.

To overcome these challenges, this research focused on developing and evaluating a linalool-loaded niosomal gel for improved topical delivery. Niosomes, non-ionic surfactant-based vesicular carriers, were formulated using Span 60 and cholesterol via the thin film hydration method. These were then incorporated into a carbopol-based gel to enhance viscosity and skin applicability. The prepared formulations were assessed for particle size, zeta potential, entrapment efficiency, spreadability, viscosity, pH, and stability. Among the four formulations studied, Formulation 2 exhibited optimal performance with an entrapment efficiency of 70.5%, viscosity of 14,500 cps, and favorable spread ability and pH. Stability studies confirmed the physical integrity of the gel over time.

The study demonstrates that linalool-loaded niosomal gel offers a promising alternative to conventional anti-inflammatory treatments by enhancing drug stability, skin permeation, and localized therapeutic action while minimizing systemic exposure. This formulation may pave the way for the development of safer and more effective topical therapies.