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Advantages of nanovesicles over conventional topical drug delivery to treat acne

Ashvi Sanjay Jain

Acne vulgaris is a widespread inflammatory, pilosebaceous disease that affects more than 80% of adolescents. It is mainly identified when inflammation of the hair bulb and the surrounding sebaceous gland occurs. Acne often leaves scars that last a lifetime and produces a negative impact on the quality of a person’s life by leading to depression, anxiety, etc. Though various strategies have been employed to treat acne depending on the severity of the disease, conventional treatments have revealed several side effects, such as local irritation or even serious collateral effects. Interestingly, nanocarriers or lipid nanovesicles have displayed the ability to deliver drugs over the past decade. This method seems promising in overcoming toxicity and enhancing the therapeutic efficacy compared to conventional therapies.
The deformable nanovesicles are one of the finest solutions for targeted drug delivery deep into the skin layers. One of the major limitations of conventional topical delivery is the inability of several drugs to cross the stratum corneum. The stratum corneum is the major barrier that the drugs need to cross so that the treatment proves to be efficacious. However, this hindrance in drug permeation reduces the efficacy of the formulation drastically. Several studies in the field of nanomedicine show that nano-based formulations can overcome the limits of this barrier without making alterations to the functional and physiological features of our skin. The studies investigating the safety of topical treatment demonstrate that some of the well-known lipid-based nanocarriers, namely niosomes, ethosomes, transfersomes (ultra deformable), etc. cause only rapidly reversible alterations in our stratum corneum.
In a study reported for transepidermal water loss (TEWL), a major sign of the skin barrier integrity was monitored in vitro after the topical application of the above-stated nanovesicles. An initial change of values was observed due to the interaction between the drug delivery system, the skin membranes and the barrier. However, the original TEWL values were restored only within 72 hours of incubation. This experiment concluded that the interaction at the beginning between the drug carrier and the skin components took place which allowed the topical delivery of drugs. These were irreversible modifications and in fact, the drug carriers analysed in that experiment are among the widely-utilised drug delivery systems today. Further investigations continue to explore more and more ways to treat acne to let people live a cheerful and vibrant life without any anxiety.

Keywords: Acne, Nanovesicles, Stratum corneum, Skin barrier, Topical delivery

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