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The effect of terpene concentrations on the skin penetration of diclofenac sodium

A Nokhodchi [1], K Sharabiani [2], M R Rashidi [2], T Ghafourian [3]

Affiliations

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Abstract

Terpenes and sesquiterpenes have been suggested as promising non-toxic, non-irritating transdermal penetration enhancers. This investigation aimed to study the effect of terpene concentration on the transdermal absorption of diclofenac sodium from ethanol:glycerin:phosphate buffer solution (60:10:30). Therefore, enhancing effects of various terpenes (menthone, limonenoxide, carvone, nerolidol and farnsol) with different concentrations (0.25, 0.5, 1, 1.5 and 2.5%, v/v) on the permeation of diclofenac sodium were evaluated using Franz diffusion cells fitted with rat skin. Furthermore, solubility of diclofenac sodium in the vehicle in presence of different concentrations of terpenes was determined. The results showed that despite the negligible effect of terpenes on the drug solubility, there was a profound skin penetration enhancement effect, although the terpene enhancers varied in their ability to enhance the flux of diclofenac sodium. The results showed that at the highest concentration of terpene (2.5%, v/v) the rank order of enhancement effect for diclofenac sodium was nerolidol>farnesol>carvone>methone>limonenoxide, whereas at the low concentration of 0.25% the rank order was farnesol>carvone>nerolidol>menthone>limonenoxide. No direct relationship existed between terpene concentration and the permeation rate. The most outstanding penetration enhancer was nerolidol, providing an almost 198-fold increase in permeability coefficient of diclofenac sodium, followed by farnesol with a 78-fold increase.

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