Meloxicam Formulations for Transdermal Delivery: Hydrogels Versus Organogels

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Abstract:

The objective of this work was to evaluate the efficacy and suitability of different organogel formulations as transdermal delivery systems of meloxicam (MX) compared to hydrogel formulations. Hydrogels and hydroalcoholic gels were prepared using either carbopol 940 or pluronic F-127 as gelling agents. The organogels used glyceryl monostearate (GMS), a glyceryl fatty acid ester as organogelator in view of the good skin tolerability of this group of organogelators. The liquid phase was oleic acid, Mygiol 812 or Labrasol. In vitro drug release through cellophane membrane was studied. The effect of some formulation variables (organogelator concentration, type of liquid phase, drug concentration and method of drug incorporation) on the release patterns of meloxicam (MX) from different organogels was investigated. In vitro skin permeation through excised rat skin in phosphate buffer (pH 7.4) was carried out. The in vivo skin penetration was evaluated by measuring the anti-inflammatory effect in rats by the paw edema test. The highest drug release was obtained from Mygiol 812 organogel, Labrasol organogel and hydroalcoholic pluronic gel. The results revealed an inverse correlation between the drug release rate and organogelator concentration and direct correlation between the drug release rate and the initial drug concentration. The release rate of the drug was dependent on the nature of the gel's liquid component (which influences drug solubility), but not on the method of drug incorporation. Permeation across rat skin showed that Mygiol 812 and Labrasol organogels were superior to hydrogels and hydroalcoholic gels. The anti-inflammatory activity of the drug in different formulations was studied using carragenan-induced rat paw edema method. The results showed an excellent anti-inflammatory activity for the tested formulations, but the anti-inflammatory activity of organogels was significantly higher than that of hydroalcoholic gel. Histopathological examination of rat skin treated with the selected formulations showed normal skin histology. These findings suggest that these organogels could be effective vehicles for transdermal delivery of meloxicam.

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