

## Emulgel formulation of naproxen and evaluation of its percutaneous permeation

J. Shokri\*, J. Shokri, Y. Javadzadeh, H. Hamishekar, P. Karamzadeh, P. Shahlavi

*Pharmacy Faculty of Tabriz University of Medical Sciences, Tabriz, Iran*

**Background and Aims:** Delivery of drugs promises many advantages over oral or intravenous administration. This is a simple and noninvasive way for drug delivery and causes less systemic toxicity of drugs compared with other routes of drug administration. The aim of this study is the evaluation of transdermal absorption of naproxen from emulgel-based formulations compared with simple hydro-alcoholic based formulation and the effects of some penetration enhancers on the absorption of the drug from emulgel bases.

**Methods:** Carbopol934, Hydroxypropylmethyl cellulose (HPMC) and pluronic F127 were used as gelling agents. Physical stability studies were performed using various formulations with different organic and aqueous phase ratios for 2 months at 40, 25 and 4 °C. Sodium lauryl sulphate [SLS] (anionic surfactant), Myrj 52 (nonionic surfactant) and Benzalkonium chloride (cationic surfactant) with different percentages (0.25, 0.5 and 1% w/v) were used as skin penetration enhancers in the selected emulgel based formulations. Transdermal absorption of the drug from formulations was tested with the standard Franz diffusion cell equipment and full thickness rat skin. The drug concentrations in samples were analyzed with HPLC in 271 nm.

**Results:** Percutaneous absorption of the drug from selected emulgel-based formulation was significantly higher than simple gel especially in the initial times (15 and 30 min). All of used penetration enhancers with all concentrations except of SLS with 1% w/v did not show any enhancement in absorption of the drug. A direct relationship was seen between the drug absorption and concentration of SLS in the formulations.

**Conclusion:** Emulgel base considerably enhances percutaneous absorption of naproxen compared with simple hydro-alcoholic gel formulation and thus strongly recommended for topical naproxen formulations. Surfactants are not considered as penetration enhancers for naproxen from emulgels made with pluronic F127 as a nonionic surfactant type gelling agent. Among the various groups of surfactants, only anionic types with high concentrations (1% w/v and above) can slightly improve penetration of naproxen especially in the initial sampling times (<30 min).

**Keywords:** Naproxen; Emulgel formulation; Percutaneous absorption; Penetration enhancers; Surfactants