*Latin American Journal of Pharmacy*
(formerly *Acta Farmacéutica Bonaerense)*
*Lat. Am. J. Pharm.* **34** (5): 1022-9 (2015)

Regular article
Received: September 18, 2014
Revised version: March 30, 2015
Accepted: March 31, 2015

# Transdermal Diclofenac Potassium Gels: Natural Penetration Enhancers, Can Be Effective?

Abid HUSSAIN [1], Gul M. KHAN [2], Nauman R. KHAN [4] *, Amjad KHAN [3], Saif ur REHMAN [1], Hafiz M. ASIF [5], Muhammad AKRAM [5], & Yusuf ALI 6 [6]

[1] *Department of Pharmacy, Poonch University Rawalakot, AJ&K, Pakistan.*
[2] *Department of Pharmaceutics &* [3] *Department of Biotechnology, Quaid-e-Azam University Islamabad, Pakistan.*
[4] *Department of Pharmaceutics, Faculty of Pharmacy Gomal University D.I.Khan, Pakistan.*
[5] *Department of Eastern Medicine and Surgery, Faculty of medical and health sciences, Poonch University Rawalakot, AJ&K, Pakistan.*
[6] *Faculty Medical and Health Sciences, Poonch University, Rawalakot, AJ&K, Pakistan.*

***SUMMARY*. The aim of the current study was to develop the novel Diclofenac Potassium (DP) gel formulations to show sustained release of the model drug used. Turpentine oil and olive oil were used as penetration enhancers to investigate the permeation enhancing capability of DP. 1.5% w/v diclofenac potassium gels were developed with carboxypolymethylene with and without penetration enhancer. Enhancers were incorporated in increasing concentration, *i.e.* 1, 2, 3, 4, 5, and 10% of the total gel formulation. Gels were evaluated on physical basis for pH, viscosity, spreadability, extrudability, smoothness and appearance. To study the *in vitro* and *ex vivo* permeation potential of formulated DP gels, Franz diffusion cell was used, using silicon membrane and excised rabbit abdominal skin. Flux, permeability coefficient ($K_p$), lag time and enhancement ratios of DP were measured over 24 h and compared with control formulation. Diclofenac Potassium gel with 10% turpentine oil showed maximum flux 159.65 $\mu$g/cm$^2$/h while 10% olive oil showed flux of 147.33 $\mu$g/cm$^2$/h through rabbit skin.**

*RESUMEN*. El objetivo del presente estudio fue desarrollar formulaciones novedosas de gel de diclofenac potásico (DP) para lograr una liberación sostenida del fármaco modelo utilizado. Se utilizaron aceite de trementina y aceite de oliva como potenciadores de la penetración para investigar la capacidad de mejorar la permeación de geles de DP. Los geles de DP al 1.5% w/v se desarrollaron con carboxipolimetileno con y sin potenciador de la penetración. Los potenciadores se incorporaron en concentración creciente,es decir, 1, 2, 3, 4, 5 y 10% de la formulación total de gel. Los geles fueron evaluados para pH, viscosidad, extensibilidad, capacidad de extrusión, suavidad y apariencia. Para estudiar el potencial de permeación de geles DP *in vitro* y *ex vivo,* se utilizó la célula de difusión de Franz, usando membrana siliconada y piel abdominal de conejo. El flujo, el coeficiente de permeabilidad ($K_p$) y las relaciones de tiempo de DP se midieron durante 24 h y se compararon con la formulación control. El gel de diclofenac de potasio con un 10% de aceite de trementina mostró un flujo máximo 159,65 g/cm$^2$/h, mientras que el que contiene 10% de aceite de oliva mostró un flujo de 147,33 g/cm$^2$/h en piel de conejo.

*KEY WORDS:* Diclofenac potassium, Turpentine oil, Olive oil and Transdermal.

* Author to whom correspondence should be addressed. *E-mail:* naumanpharma@gail.com



ISSN 0326 2383 (printed ed.)
ISSN 2362-3853 (on line ed.)