

## Design, Preparation and Evaluation of Meloxicam Transdermal Patches using Flaxseed/Coriander Oils as Penetration Enhancers

Sajid RAZA<sup>1</sup>, Muhammad AKHLAQ<sup>1\*</sup>, Hashmat ULLAH<sup>1</sup>, Aisha SIDDIQUA<sup>2</sup>,  
Muhammad Z. DANISH<sup>3</sup>, Muhammad AKRAM<sup>4</sup>, Abid HUSSAIN<sup>5</sup>,  
Fahad Said KHAN<sup>5</sup>, & Shumaila KAUSAR<sup>6</sup>

<sup>1</sup> Department of Pharmaceutics, Faculty of Pharmacy, Gomal University, DIK, KP, Pakistan

<sup>2</sup> Gomal Center for Biochemistry and Biotechnology, Gomal University, DIK, KP, Pakistan

<sup>3</sup> University College of Pharmacy, The University of Punjab, Lahore, Pakistan

<sup>4</sup> Department of Eastern Medicine, Directorate of Medical Sciences,  
Government College University Faisalabad, Pakistan

<sup>5</sup> Faculty of Medical and Health Sciences, The University of Poonch, Rawalakot, Azad Jammu and Kashmir

<sup>6</sup> Department of Microbiology, Faculty of Life Sciences, University of Central Punjab, Lahore, Pakistan

**SUMMARY.** Transdermal drug delivery patch is important for input of suitable drug at significant level to maintain plasma concentration for therapeutic efficacy. The present study discovered formulation and evaluation of transdermal patches using chitosan and thiolated chitosan, EC and PVP, Eudragit and PVP polymers in different ratios. Flaxseed oil and coriander oil were used as penetration enhancers in different concentrations (1, 2, 3, 4, 5, and 10%). Physicochemical properties the patches were evaluated for and in-vitro drug release. It was decided that amongst the formulations, FMLXE23, FLMXE35 and FMLXE47 which have 5% of flaxseed oil having maximum flux through rabbit skin while formulation FMLXE30, FMLXE42 and FMLXE54 containing 10% of coriander oil showed maximum flux. The drug mechanism was non-Fickian. The polymers used in the formulations have controlled the release pattern in transdermal patches. Flaxseed oil showed maximum flux at concentration 5% and coriander oil displayed maximum flux at 10% concentration.

**RESUMEN.** El parche de administración transdérmica de fármacos es importante para la entrada de un fármaco adecuado a un nivel significativo para mantener la concentración plasmática de eficacia terapéutica. El presente estudio describe la formulación y evaluación de parches transdérmicos utilizando quitosano y quitosano tiolado, EC y PVP, Eudragit y polímeros de PVP en diferentes proporciones. El aceite de linaza y el aceite de cilantro se usaron como potenciadores de la penetración en diferentes concentraciones (1, 2, 3, 4, 5 y 10%). Se evaluaron las propiedades fisicoquímicas de los parches y la liberación de fármaco *in vitro*. Se comprobó que entre las formulaciones, FMLXE23, FLMXE35 y FMLXE47, que tienen un 5% de aceite de linaza, tienen un flujo máximo a través de la piel de conejo, mientras que la formulación FMLXE30, FMLXE42 y FMLXE54 que contiene 10% de aceite de cilantro mostró un flujo máximo. El mecanismo de la droga no era Fickiano. Los polímeros utilizados en las formulaciones han controlado el patrón de liberación en parches transdérmicos. El aceite de linaza mostró un flujo máximo a una concentración del 5% y el aceite de cilantro mostró un flujo máximo a una concentración del 10%.

**KEY WORDS:** meloxicam, patch, permeation enhancer, pharmacokinetics, polymer, transdermal.

\* Author to whom correspondence should be addressed. E-mail: dr.akhlaq@gu.edu.pk