



Enhanced Penetration of Sinomenine Formulations Following Skin Pretreatment with a Polymer Microneedle Patch

Shanshan QIAN¹, Yulin CHEN¹, Shuangying GUI^{*1,2},
Jian WANG^{3,4}, Youjun ZHOU¹, & Lei CHEN¹

¹ Department of Pharmacy, Anhui University of Chinese Medicine,

² Anhui Engineering Research Center for Chinese Medicine Preparation,

³ Anhui Key Laboratory of Modern Chinese Medicine & Materia,

⁴ Anhui "115" Xin'an Traditional Chinese Medicine Research & Development Innovation Team,
45 Shihe Road, Hefei, 230031, P.R. China

SUMMARY. The purpose of the present work is to demonstrate the enhanced percutaneous absorption of sinomenine gel (SG) and sinomenine microemulsion-based gel (SMBG) following skin pretreatment with a polymer microneedle patch, respectively. Microneedle patches were casting molded from polyvinyl alcohol (PVA) and chondroitin sulfate (CS). SG and SMBG were prepared as model drugs of transdermal absorption experiment. To assess drug percutaneous absorption, the plasma of rabbits were collected and analyzed to determine sinomenine concentration using HPLC analysis. SG and SMBG applied topically *in vivo* showed 199 and 243% increase in the bioavailability and the C_{max} values were significantly improved when the microneedle patches were used to pretreat the skin prior to applying the drugs. Microneedles were used to damage the stratum corneum, thus improving permeability of drugs. It provides a new and efficient transdermal drug delivery technology for sinomenine and has a broad prospect of application.

RESUMEN. El propósito del presente trabajo es demostrar la absorción percutánea mejorada de gel de sinomenina (SG) y gel a base de microemulsión de sinomenina (SMBG) después de un pretratamiento de la piel con un parche de microagujas de polímero, respectivamente. Parches de microagujas se moldearon por fundición a partir de alcohol polivinílico (PVA) y sulfato de condroitina (CS). SG y SMBG se prepararon como fármacos modelo del experimento de absorción transdérmica. Para evaluar la absorción percutánea de medicamentos, plasma de conejos fueron recogidas y analizadas para determinar la concentración de sinomenina usando HPLC. SG y SMBG aplicadas tópicamente *in vivo* mostraron 199 y 243% de aumento en la biodisponibilidad y los valores de C_{max} mejoraron significativamente cuando se utilizaron los parches de microagujas para tratar previamente la piel antes de aplicar los fármacos. Las microagujas se utilizaron para dañar el estrato córneo, mejorando así la permeabilidad de los fármacos. Se proporciona una nueva y eficiente tecnología de administración transdérmica de fármacos para sinomenina, que tiene amplias perspectivas de aplicación.

KEY WORDS: PVA, Polymer microneedles, Rabbits, Sinomenine, Transdermal drug delivery.

* Author to whom correspondence should be addressed. E-mail: guishy0520@126.com