

Optimization of Ibuprofen Therapeutic System for Enhanced Transdermal Delivery: A Quality by Design Approach

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SUMMARY. The purpose of present study was to develop and evaluate microemulsion based gel (MEBG) formulation for transdermal delivery of a poorly, water soluble drug ibuprofen. Pseudoternary phase diagrams were developed for microemulsions composed of oil (oleic acid), Smix (Labrasol and ethanol) and water. Microemulsion was optimized using Box Behnken design (BBD), the independent variables selected were oil, Smix and water; dependent variables were cumulative amount permeated across Rabbit skin in 24 h (Q_{24}), flux, and lag time. Optimized microemulsion of ibuprofen was added to gel base of carbomer 940 to formulate MEBG. It was found stable and safe after subjected to stability and skin irritation studies, respectively. It showed significant skin permeation and %inhibition of edema when compared with control gel. MEBG of ibuprofen was formulated and optimized using BBD and could provide an effective treatment in the management of rheumatoid arthritis.

RESUMEN. El propósito del presente estudio fue desarrollar y evaluar la formulación de gel a base de microemulsión (MEBG) para el suministro transdérmico de ibuprofeno, un fármaco pobremente soluble en agua. Se desarrollaron diagramas de fase pseudoternarios para microemulsiones compuestas de aceite (ácido oleico), Smix (Labrasol y etanol) y agua. La microemulsión se optimizó utilizando el diseño Box Behnken (BBD), las variables independientes seleccionadas fueron aceite, Smix y agua; las variables dependientes fueron la cantidad acumulativa impregnada en la piel del conejo en 24 h (Q_{24}), flujo y tiempo de retraso. Se añadió microemulsión optimizada de ibuprofeno a la base de gel del carbómero 940 para formular MEBG. Se encontró estable y seguro después de someterse a estudios de estabilidad e irritación de la piel, respectivamente. Mostró una permeación cutánea significativa y un% de inhibición del edema en comparación con el gel de control. MEBG de ibuprofeno fue formulado y optimizado utilizando BBD y podría proporcionar un tratamiento efectivo en el tratamiento de la artritis reumatoide.

KEY WORDS: anti-inflammatory study, BBD, ibuprofen, *in vitro* study, MEBG.

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