

Formulation and Evaluation of Microemulsion Based Hydrogel for Topical Drug Delivery of Ketoconazole

Submitted By:

Ankitkumar J Patel
Enrolment No. 112140808009

Supervised By

Dr. Naazneen Surti,
M.Pharm. Ph.D
Associate
Professor

Parul institute of Pharmacy & Research

Abstract

The aim of this work was to develop a microemulsion based hydrogel (MBH) formulation for topical drug delivery of ketoconazole with an objective to increase the solubility of Ketoconazole which is an azole antifungal agent. The study was also undertaken to overcome the drawbacks associated with oral drug delivery systems such as poor solubility of drugs, drug degradation in gastric environment, hepatic first pass metabolism and gastrointestinal irritation. Selection of oil was done on the HLB value and solubility. Capmul MCM EP, tween 80 and isopropyl alcohol (IPA) were selected as oil, surfactant and co-surfactant respectively for preparation of microemulsion. Pseudoternary phase diagrams were constructed at various tween 80 and IPA ratios. The 2:1 ratio represented greater area of microemulsification. Microemulsions were prepared by water titration method. The prepared microemulsion was optimized on the basis of droplet size, zeta potential and drug release. The optimized microemulsion was further evaluated for % transmittance, pH, viscosity, conductivity, drug content and stability study.

The HPMC (Hydroxy Propyl Methyl Cellulose) K100M (1.5% w/v) was slowly mixed with optimized microemulsion under stirring for the preparation of MBH. The developed MBH contained Ketoconazole (1% w/w), Capmul MCM EP (6.25% w/w), tween 80 and isopropyl alcohol (40% w/w, 2:1), Water (53.75 % w/w) and HPMC K100M (1.5% w/v). The optimized MBH was evaluated for viscosity, spreadability, drug content, skin irritancy and skin permeability. The mechanism of drug release from MBH was observed to follow zero order kinetics on the basis of R^2 value (Regression Coefficient) of various mathematical kinetics models. The antifungal activity of MBH was compared with marketed Ketoconazole cream and it was found that the zone of inhibition for MBH was found to be comparable with marketed cream. Thus, the MBH was successfully formulated for topical delivery to treat fungal skin infections.