Kashish Aziz et al., J Pharm Drug Deliv Res 2016, 5:5
http://dx.doi.org/10.4172/2325-9604.C1.006

Tacrolimus loaded transdermal therapeutic system: Formulation optimization, *ex vivo* skin permeation and *in vivo* anti-arthritic potential

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Context: Inhibition of T-cell activation resulting in suppression of inflammation, therefore, in the therapy of chronic inflammatory diseases such as arthritis, dermal application of Tacrolimus (TL) in combination with colloidal approaches may leads to sustained and long term therapeutic effects.

Objective: Current work entails to development and assessment of well-tolerated colloidal carrier system containing immunosuppressant drug TL for transdermal delivery to study its efficacy against arthritis.

Methods: TL-NEs of different composition from phase diagram were prepared by high sheer homogenization and a comprehensive physico-chemical characterization of the novel systems was performed using different techniques in order to get most optimum NE. Optimized NE was incorporated in to carbopol-934 gel and subjected to ex vivo skin permeation studies, droplet size analysis, zeta potential measurement, TEM examination, Rheology and stability study. Moreover, we have evaluated the in vivo anti arthritic potential of same formulation and compared it with a marketed ointment (Protopic®, 0.03%) for the first time.

Results: Developed TL-NG formulation composed of Capryol 90 (5.0% w/w), tween-20 (15.0% w/w), Transcutol HP (7.5% w/w), water (72.5%) w/w, carbopol-934 (1.0%) and found to have permeation flux (68.88 µg/cm2/h), release (1621.46 µg/24 h), small droplet size (12.72 nm) and viscosity of 1.07 Pas. The results of ZP indicated that formulation was stable and shelf life at room temperature was calculated as 1.59 years. The in-vivo investigation demonstrated direct evidence on significant reduction (41.80%) in inflammation over a period of 24 h.

Conclusion: On the basis of these preliminary finding, we conclude that developed TL-NG has good anti-inflammatory action and may provide promising perspective for treatment of Arthritis.

Biography

Kashish is currently pursuing PhD in Pharmaceutics at Department of Pharmaceutics, Faculty of Pharmacy, Hamdard University (New Delhi, India). She received her master's degree in Quality Assurance from the Hamdard University and awarded with University Gold Medal for securing first rank. She is also awarded with INSPIRE FELLOWSHIP by Department of science and Technology (Government of India) for a period of five years. She is a registered manufacturing chemist in sections of tablet, capsule, liquid orals,external preparations, powders and repacking by the Drug office of the state of Uttar Pradesh and have previous working experience in USFDA plant in India. Her main research interests are Novel drug delivery system, health care quality improvement and quality assurance.

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