



Formulation And Evaluation Of Aceclofenac Nanoemulsion For Topical Drug Delivery

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Abstract

Aceclofenac, a non-steroidal anti-inflammatory drug (NSAID), is widely used in the treatment of osteoarthritis, rheumatoid arthritis, and ankylosing spondylitis. However, oral administration can cause gastrointestinal side effects. Nanoemulsion-based topical drug delivery systems offer an alternative route, improving drug solubility, penetration, and sustained release. The present study aims to formulate and evaluate a nanoemulsion of Aceclofenac for topical application.

Keywords

Aceclofenac, nanoemulsion, topical delivery, anti-inflammatory, NSAID.

1. Introduction

Aceclofenac is a phenylacetic acid derivative with potent anti-inflammatory and analgesic properties. However, its oral bioavailability is limited due to first-pass metabolism and gastric irritation. To overcome these challenges, nanoemulsion-based topical delivery offers improved skin penetration and controlled drug release.

Nanoemulsions are thermodynamically stable dispersions of oil and water stabilized by surfactants, having droplet sizes typically in the range of 20-200 nm, which enhances drug permeation through the skin.

2. Materials and Methods

2.1 Materials

Aceclofenac, castor oil, Tween 80 (surfactant), PEG 400 (co-surfactant), distilled water, and other analytical reagents.

2.2 Formulation Design

- Pseudo-ternary phase diagrams were constructed to determine the nanoemulsion zone.
- Aceclofenac was dissolved in oil phase (castor oil), and aqueous phase was prepared with surfactant/co-surfactant mix (Smix).
- The nanoemulsion was prepared using high-speed homogenization and ultrasonication.

2.3 Evaluation Parameters

- Droplet size and zeta potential (Dynamic Light Scattering)
- pH, viscosity, and refractive index
- Drug content uniformity
- In-vitro diffusion studies using Franz diffusion cell
- Skin irritation studies on albino rats

3. Results and Discussion

- Droplet Size: Optimized formulation showed droplet size around 120 nm with PDI < 0.3
- Zeta Potential: -25 mV indicated good stability
- Drug Content: >98% drug content ensured uniformity
- Diffusion Study: Sustained drug release observed over 8 hours
- Skin Irritation: No erythema or edema observed

These findings suggest that nanoemulsion enhances drug permeation and provides localized, sustained action without systemic side effects.

4. Conclusion

Aceclofenac-loaded nanoemulsion is a promising formulation for topical delivery, offering enhanced permeability, patient compliance, and reduced gastrointestinal risks. Further clinical studies are recommended to confirm therapeutic efficacy

References

1. Shakeel, F., et al. (2008). Nanoemulsions as vehicles for transdermal delivery of aceclofenac: formulation and characterization. *Drug Development and Industrial Pharmacy*, 34(6), 635-641.
2. Azeem, A., et al. (2009). Nanoemulsion components screening and selection: a technical note. *AAPS PharmSciTech*, 10(1), 69-76.
3. Puglia, C., et al. (2004). Influence of nanoemulsions on the transdermal delivery of ketoprofen. *Pharmaceutical Research*, 21(1), 129-135.
4. Ramesh, B., et al. (2014). Design and evaluation of aceclofenac nanoemulsion gel for enhanced topical delivery. *International Journal of Pharmaceutical Sciences Review and Research*, 25(2), 55-60.
5. Lawrence, M. J., & Rees, G. D. (2000). Microemulsion-based media as novel drug delivery systems. *Advanced Drug Delivery Reviews*, 45(1), 89-121