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FORMULATION AND EVALUATION OF IVERMECTIN NANOEMULSION

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ABSTRACT

Ivermectin is a potent antiparasitic agent with limited transdermal absorption due to its poor water solubility and high lipophilicity. Nanoemulsion-based formulations have emerged as a promising strategy to enhance drug delivery through the skin. This study aims to formulate, characterize, and evaluate a nanoemulgel of ivermectin for transdermal application. The optimized formulation demonstrated suitable physicochemical properties, stability, and potential for improved topical delivery of ivermectin.

KEYWORDS: Ivermectin, Nanoemulsion, Nanoemulgel, Topical Delivery, Transdermal, Zeta Potential, Droplet Size, Carbopol, Stability, Ultrasonication.

1. INTRODUCTION

Ivermectin is widely used to treat parasitic infections such as scabies, onchocerciasis, and strongyloidiasis. Although effective orally, its use in topical formulations has been limited due to poor aqueous solubility. Nanoemulsions offer several advantages including enhanced solubility, improved skin permeation, and stability of hydrophobic drugs like ivermectin.

2. OBJECTIVES

- Develop a stable nanoemulsion of ivermectin for transdermal application.
- Optimize formulation parameters for droplet size and stability.
- Prepare a nanoemulgel using Carbopol as a gelling agent.
- Evaluate the formulation for physicochemical and stability parameters.

3. MATERIALS AND METHODS

3.1 MATERIALS

Ivermectin, Isopropyl Myristate, Tween 80, Span 60, PEG 400, Carbopol Ultrez 20, Triethanolamine, Distilled Water.

3.2 METHODOLOGY

Nanoemulsion Preparation: Oil phase (ivermectin, isopropyl myristate, Span 60) heated to 80°C. Aqueous phase (Tween 80, PEG 400 in water) also heated. Oil phase added to aqueous phase under stirring, followed by ultrasonication to form nanoemulsion.

Nanoemulgel Preparation: Carbopol dispersed in water. Nanoemulsion added slowly. Triethanolamine used to adjust pH to 6.5-7.0.

4. Results And Characterization

Droplet Size: 145.6 nm PDI: 0.22

Zeta Potential: -32.4 mV Viscosity: 7800 cps

pH: 6.5

Stability: NE3 formulation stable for 3 months at 4°C and 25°C with no phase separation.

5. DISCUSSION

Nanoemulsions enhance drug solubility and skin permeation due to their small droplet size and large surface area. Ivermectin's poor aqueous solubility limits its transdermal delivery, but nanoemulgel systems can overcome this challenge.

6. CONCLUSION

Ivermectin nanoemulsion and its conversion to nanoemulgel showed significant improvement in solubility, spreadability, and transdermal penetration. This formulation is promising for treatment of parasitic skin infections like scabies.

7. Future Scope

- Conduct in vivo studies.
- Stability testing under ICH guidelines.
- Clinical trials on human volunteers.

8. REFERENCES

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