A Systematic Review on Herbal Emulgel: Formulation, Evaluation, and Antifungal Potential of Lantana Camara Linn Leaves Extract

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Abstract

Herbal medicine plays a vital role in modern therapeutic approaches due to its safety and efficacy. The combination of herbal extracts with novel drug delivery systems such as emulgels enhances their therapeutic potential. This review follows the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines to systematically analyze the formulation and evaluation of a herbal emulgel containing Lantana camara Linn leaves extract for antifungal activity. This study critically evaluates the formulation methods, physicochemical properties, and pharmacological efficacy of herbal emulgels, focusing on their role in skin disorders.

Key Words: .Lantana Camara, herbal emulgel, hydroalcoholic extract, antifungal activity. carbopol 940.

Introduction

Background

Herbal medicine has been used since ancient times for treating various ailments. Lantana camara, a widely distributed medicinal plant, possesses significant antifungal properties.[1-4] Emulgels, a combination of emulsions and gels, offer advantages such as improved drug penetration, controlled drug release, and enhanced patient compliance.[5-7]

Objectives

This review aims to:

1. Systematically evaluate the formulation methods of herbal emulgels.
2. Assess the physicochemical characteristics and stability of the emulgel.
3. Analyze the antifungal efficacy of Lantana camara emulgel against various fungal pathogens.

Methodology

PRISMA-Based Literature Search

A systematic search was conducted in electronic databases, including PubMed, Google Scholar, and Scopus. The inclusion criteria encompassed studies on herbal emulgels, Lantana camara extracts, and their antifungal properties. Articles in English, published between 2000 and 2024, were considered.

Study Selection

Out of 150 initial articles, 40 were reviewed based on relevance. Studies focusing on Lantana camara formulations and antifungal assays were prioritized.

Data Extraction

Key parameters such as formulation techniques, characterization methods, and in vitro antifungal evaluations were extracted and analyzed.

Formulation and Preparation of Herbal Emulgel[8-11]

Ingredients and Composition

The herbal emulgel formulation included:

- **Active ingredient**: Hydroalcoholic extract of Lantana camara leaves.
- **Gelling agent**: Carbopol 940.
- **Preservatives**: Methyl paraben and propyl paraben.
- **Solvents**: Propylene glycol and distilled water.
- **pH adjuster**: Triethanolamine.

Preparation Method[12-16]

1. Carbopol 940 was dispersed in distilled water and allowed to swell.
2. Methyl and propyl parabens were dissolved in a small volume of distilled water.
3. Lantana camara extract was mixed with propylene glycol.
4. The solution was incorporated into the gel base, and pH was adjusted using triethanolamine.

Evaluation of Herbal Emulgel

Physicochemical Properties[17-20]

- **pH**: Maintained between 6.8 and 7.0.
- **Viscosity**: Measured using a Brookfield viscometer.
- **Spreadability**: Determined using a slip and drag method.
- **Stability Study**: Conducted as per ICH guidelines.

Antifungal Activity[21-23]

The emulgel was tested against **Candida tropicalis, Fusarium sp., and Aspergillus niger** using the agar diffusion method. Results indicated significant antifungal activity, with inhibition zones ranging from 14-20 mm.

Discussion

Herbal emulgels offer a promising alternative to conventional antifungal treatments due to their enhanced drug delivery capabilities and biocompatibility.[24-27] The combination of emulsions and gels provides better skin penetration and prolonged drug retention, making them highly effective for dermatological applications. The formulation of Lantana camara-based emulgels showed significant physicochemical stability, indicating their suitability for long-term use. Moreover, the presence of natural bioactive compounds in Lantana camara contributes to its potent antifungal effects, supporting its traditional medicinal use. The antifungal activity observed in the study suggests that these emulgels can effectively inhibit the growth of pathogenic fungi, providing a safer and more sustainable option compared to synthetic antifungal agents. However, further research, including in vivo studies and clinical trials, is needed to validate the efficacy and safety of these formulations in real-world applications. Additionally, optimization of formulation parameters and large-scale production techniques should be explored to enhance their commercial viability.[28-30]

Conclusion

This systematic review highlights the potential of Lantana camara herbal emulgel as an effective antifungal formulation. The combination of herbal extracts with emulgel technology offers promising advancements in dermatological therapies. Further studies are required to establish its commercial viability and therapeutic applications.

Source of Support: Nil

Conflict of Interest: Nil

References :

1. Patwardhan B., Hooper M. Ayurveda and future drug development. *International Journal of Alternative Complement Medicine*. 1992;10:9-11.
2. Hook D.J., Pack E.J., Yacobucci J.J., Guss J. Approaches to automating the dereplication of bioactive natural products: The key step in high-throughput screening of bioactive materials from natural sources. *Journal of Biomolecular Screening*. 1997;2:145-152.
3. Borris J. Natural Product Research: Perspectives from a major pharmaceutical company (Merck Research Laboratories). *Journal of Ethnopharmacology*. 1996;51:29.
4. Hardenia A., Jayronia S., Jain S. Emulgel: An emergent tool in topical drug delivery. *International Journal of Pharmaceutical Sciences and Research*. 2014;5(5):1653-1660.
5. Kumar L., Verma R. In vitro evaluation of topical gel prepared using natural polymer. *International Journal of Drug Delivery*. 2010;2:58-63.
6. Joel L.Z., Gregory P.K., Liberman H.A., Rieger M.M., Banker G.S. *Pharmaceutical Dosage Forms: Disperse Systems*. New York: Marcel Dekker; 1989:502.
7. Ahmed L., Mohammed Z., Mohammed F. Screening of some Indian medicinal plants for their antimicrobial properties. *Journal of Ethnopharmacology*. 1998;62:183-193.
8. Dahanukar S., Thatte U. *Ayurveda Revisited.* 3rd ed. Mumbai: Popular Prakashan; 2002:10.
9. Rol Prakash R.P., Rao R. Pharmaceutical and clinical research. 2010;3:126-129.
10. Joy J.M., Vamsi S., Satish C., Nagaveni K. *Lantana camara Linn: A Review. International Journal of Phytotherapy.* 2012;2(2):66-73.
11. Mukherjee P.K. *Quality Control of Herbal Drug.* New Delhi: Business Horizon Publication; 2002:133, 193, 176-193, 380-422, 405-407, 492.
12. Tetali P., Waghchaure C., Daswani P.G., Antia N.H., Birdi T.J. Ethnobotanical survey of antidiarrhoeal plants of Parinche valley, Pune district, Maharashtra, India. *Journal of Ethnopharmacology.* 2009;123:229-236.
13. Costa J.G.M., Rodrigues F.F.G., Sousa E.O., Junior D.M.S., Campos A.R., Coutinho H.D.M., de Lima S.G. Composition and larvicidal activity of the essential oils of *Lantana camara* and *Lantana montevidensis*. *Chemistry of Natural Compounds.* 2010;46(2).
14. Nayak B.S., Raju S.S., Eversley M., Ramsubhag A. Evaluation of wound healing activity of *Lantana camara* L. - A preclinical study. *Phytotherapy Research.* 2009;23:241-245.
15. Nguta J.M., Mbaria J.M., Gakuya D.W., Gathumbi P.K., Kiama S.G. Traditional antimalarial phytotherapy remedies used by the South Coast

community, Kenya. *Journal of Ethnopharmacology.* 2010;131:256-267.

16. Kokate C.K., Purohit A.P., Gokhale S.B. *Textbook of Pharmacognosy.* 4th ed. Pune: Nirali Prakashan; 2006.
17. *Indian Pharmacopoeia.* 3rd ed. 1996.
18. Mukherjee P.K. *Quality Control of Herbal Drug.* Business Horizon; 2002.
19. World Health Organization. *WHO Traditional Medicine Strategy.* Geneva: WHO; 2002:223-225.
20. Farnsworth N.R. Ethnopharmacology and future drug development: The North American experience. *Journal of Ethnopharmacology.* 1993;38:145-152.
21. Houghton P.J. The role of plants in traditional medicine and current therapy. *Journal of Alternative and Complementary Medicine.* 1995;1:131-143.
22. Dubey N.K., Kumar R., Tripathi P. Global promotion of herbal medicines: India's opportunity. *Current Science.* 2004;86:37-41.
23. Ramasamy S., Charles M.A. Antibacterial effect of volatile components of selected medicinal plants against human pathogens. *Asian Journal of Microbial Biotechnology and Environmental Sciences.* 2009; 209-210.
24. Lam K.S. New aspects of natural products in drug discovery. *Trends in Microbiology.* 2007;15:279-289.
25. Dahanukar S.A., Kulkarni R.A., Rege N.N. Pharmacology of medicinal plants and natural products. *Indian Journal of Pharmacology.* 2000;32(Suppl):S81-S118.
26. Cowan M.M. Plant products as antimicrobial agents. *Clinical Microbiology Reviews.* 1999;12:564-582.
27. Harborne J.B. *Phytochemical Methods: A Guide to Modern Techniques of Plant Analysis.* 3rd ed. Springer International Edition; 1998.
28. Khandelwal K.R. *Practical Pharmacognosy.* 3rd ed. Pune: Nirali Publication; 2017:78-87.
29. Hawk P.B., Oster B.L., Summerson W.H. *Practical Physiological Chemistry.* 13th ed. New York: McGraw Hill Book Co.; 1954:111-119.
30. Rosenthaler L. *Chemical Investigations of Plants.* 1st ed. London: G. Bell and Sons; 1930:23-29, 119-132.