iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 13 **Issue:** V **Month of publication:** May 2025

DOI: https://doi.org/10.22214/ijraset.2025.71741

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 13 Issue V May 2025- Available at www.ijraset.com

A Review: A Polyherbal Ointment

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Abstract: ***The current work employs fruit peel extracts of Citrus sinensis (orange), Punica granatum (pomegranate), and Musa paradisiaca (banana) to formulate and evaluate Polyherbal ointment and hydrogel. Bioactive components with anti-inflammatory and wound-healing qualities, like as flavonoids, tannins, and polyphenols, are abundant in these peels. After being extracted using maceration, the extracts were added to topical preparations. Their stability, compatibility, and therapeutic potential were validated by a number of biological and physical analyses. Both the hydrogel and the ointment showed notable anti-inflammatory action, suggesting that they may be used as natural and affordable substitutes for topical medication delivery.***
Keywords: Polyherbal formulation, fruit peel extract, orange peel, pomegranate peel, banana peel, anti-inflammatory activity, herbal ointment, herbal hydrogel, wound healing, maceration, topical application.

I. INTRODUCTION

Interest in traditional herbal formulations, especially the creation of Polyherbal ointments, has been reignited in recent years due to the increased demand for plant-based medicinal solutions. A topical mixture of many herbal extracts that work together to provide the intended therapeutic effects—such as anti-inflammatory, antibacterial, wound-healing, antifungal, and antioxidant properties—is referred to as a Polyherbal ointment. Combining herbal substances improves overall effectiveness and lowers the likelihood of side effects or resistance that are frequently linked to synthetic or single-drug therapy[1-3].

The biggest organ in the human body, the skin is always vulnerable to wounds, infections, and inflammatory reactions. Ancient medicinal systems such as Ayurveda, Unani, and Traditional Chinese Medicine have long used topical formulations based on herbs in the form of ointments. Herbs have traditionally been applied externally in these ancient systems to treat skin conditions such ulcers, dermatitis, eczema, burns, infections, and wounds. The addition of Polyherbal extracts to semi-solid bases, such as ointments, presents a viable substitute for topical therapy that is patient-friendly, safe, and successful in contemporary pharmaceutics[4-5].

The utilisation of many plant parts, including roots, leaves, flowers, fruits, and barks, is made possible by a Polyherbal approach. Each of these parts contributes distinct phytochemicals, including terpenoids, flavonoids, alkaloids, tannins, saponins, and phenolic. It is well recognized that these bioactive substances are essential for reducing inflammation, promoting the production of collagen, scavenging free radicals, and offering antimicrobial defence. For example, because to their strong pharmacological properties, herbs such as *Musa paradisiaca* (banana peel), *Citrus sinensis* (orange peel), *Punica granatum* (pomegranate peel), Calendula officinalis, Aloe vera, *Azadirachta indica* (neem), and *Curcuma longa* (turmeric) are commonly utilised in Polyherbal ointments[5-6].

Additionally, choosing suitable herbal constituents, the kind of ointment base (oleaginous, water-soluble, or absorption bases), and the end product's physicochemical stability are all important factors to take into account when creating a topical Polyherbal ointment. Strong phytoconstituents are extracted from herbal source materials using methods including maceration, Soxhlet extraction, or cold percolation. To maintain the bioactivity and provide appropriate spreadability, homogeneity, and patient compliance, the extract must be thoroughly included into the ointment base[7-8].

Polyherbal ointments have been shown in several trials to be therapeutically effective in lowering inflammation, improving wound healing, and providing antibacterial defence.For example, because orange, banana, and pomegranate peels are high in vitamin C, flavonoids, and antioxidants, formulations that contain a combination of fruit peel extracts have shown a lot of promise. In addition to offering an affordable supply of raw materials, these underutilized agricultural wastes aid in the creation of environmentally friendly products and promote sustainability. Additionally, a number of pharmacognostical and pharmacological characteristics, such as pH, viscosity, spreadability, extrudability, microbial load tests, and in vivo models for anti-inflammatory and wound healing efficacy, are used to evaluate Polyherbal ointments. Herbal formulations frequently perform better than synthetic ones in terms of safety, tolerability, and long-lasting healing benefits, according to comparative studies comparing Polyherbal and conventional ointments[9-10].

To sum up, Polyherbal ointments represent a comprehensive, multi-pronged strategy for treating a range of skin conditions.

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The future of Polyherbal ointments seems bright due to growing consumer interest in natural remedies, growing knowledge of herbal medications, and regulatory support for the development of herbal products. Nonetheless, clinical research, standardisation, quality assurance, and scientific validation are still essential to guaranteeing the therapeutic efficacy and commercial viability of these conventional treatments[11-12].

II. LITERATURE SURVEY

1) Patil S., Deshmukh M., Kale R.[13]
Title: Phytochemical Analysis and Anti-inflammatory Evaluation of *Citrus sinensis* Peel Extract
Journal:*International Journal of Pharmaceutical Sciences Review and Research*, 2021
Summary: This study reported the presence of flavonoids such as hesperidin and naringenin in orange peel extract. The extract exhibited notable anti-inflammatory and antioxidant activity, proving beneficial for topical formulations like ointments and hydrogels.

2) Alkofahi A., Alzoubi K., Bustanji Y.[14]
Title: Anti-inflammatory and Wound Healing Potential of Pomegranate Peel Extract in Rats
Journal:*Journal of Ethnopharmacology*, 2020
Summary: The research explored pomegranate peel extract's anti-inflammatory potential and its positive effect on wound healing in rats. The extract decreased pro-inflammatory cytokines and encouraged collagen formation, supporting its use in polyherbal hydrogels.

3) Ahmed R., Singh A., Sultana S.[15]
Title: Pharmacological Investigation of Banana Peel Extract in Wound Healing and Anti-inflammatory Activity
Journal:*Pharmacognosy Research*, 2019
Summary: Banana peel extract was analyzed for phytochemicals and showed promising wound healing and anti-inflammatory activity. The study highlighted the peel's antioxidant-rich nature and potential in herbal ointment formulations.

4) Deshmukh M., Gaikwad R., Bhalerao A.[16]
Title: Formulation and Evaluation of Herbal Hydrogel Containing Orange Peel Extract
Journal:*Journal of Pharmaceutical Innovation*, 2022
Summary: A hydrogel was formulated using Carbopol 940 and orange peel extract. The final product was evaluated for spreadability, pH, drug content, and anti-inflammatory activity, confirming its suitability as a topical treatment.

5) Khan M., Rahman A., Javed S.[17]
Title: Hydrogel Formulation of Pomegranate Peel Extract for Wound Healing Application
Journal:*Asian Journal of Pharmaceutics*, 2020
Summary: The study developed a pomegranate peel-based hydrogel and evaluated its physical properties and bioactivity. It demonstrated enhanced wound closure and antimicrobial efficacy, positioning it as a viable herbal hydrogel base.

6) Singh P., Sharma N.[18]
Title: Development of Polyherbal Ointment Using Fruit Peel Extracts and Its Evaluation
Journal:*International Journal of Green Pharmacy*, 2018
Summary: A polyherbal ointment containing orange, banana, and lemon peel extracts was developed. It showed good anti-inflammatory and antimicrobial activity, emphasizing the value of fruit peels in herbal therapeutics.

7) Ravikumar K., Patel R., Kumari D.[19]
Title: Comparative Study of Anti-inflammatory Potential of Herbal Ointments Prepared from Banana and Orange Peel Extracts
Journal:*Research Journal of Pharmacy and Technology*, 2021
Summary: The study compared ointments formulated with orange and banana peel extracts. Orange peel showed higher anti-inflammatory activity, suggesting its dominant role in Polyherbal combinations.

8) Bhatt V., Jain A.[20]
Title: A Review on Therapeutic Potential of Fruit Peels in Herbal Medicine
Journal:*Journal of Applied Pharmaceutical Science*, 2017
Summary: This review covered the therapeutic value of fruit peels including banana, orange, and pomegranate, highlighting their bioactive contents such as flavonoids, polyphenols, and essential oils suitable for topical applications.

9) Mitra D., Roy S., Chatterjee B.[21]
Title: Evaluation of Herbal Ointments Containing Fruit Peel Extracts for Wound Healing in Rats
Journal:*International Journal of Current Pharmaceutical Research*, 2020
Summary: Herbal ointments formulated with orange and banana peel extracts were tested for wound contraction. The formulations demonstrated significant wound healing and anti-inflammatory effects in rat models.

10) Kumar A., Joshi R., Mishra S.[22]
Title: Development and Evaluation of Polyherbal Hydrogel Using Mixed Fruit Peel Extracts
Journal:*World Journal of Pharmaceutical Research*, 2023
Summary: A Polyherbal hydrogel combining banana, pomegranate, and orange peels was developed. The gel showed excellent anti-inflammatory activity, acceptable physical parameters, and potential as a wound care product.

III. FORMULATION

The orange, pomegranate, and banana peel extracts have been shown to have anti-inflammatory and wound-healing qualities, they were used in the formulation of the Polyherbal ointment and hydrogel. After extraction using the maceration process, the material was incorporated into appropriate bases. Glycerin and Carbopol 940 were utilised as gelling agents for the hydrogel, while petroleum jelly and beeswax were combined to make the ointment. To guarantee the best possible medication content, spreadability, and therapeutic impact, the formulations were created in a range of concentrations. The goal of the fruit peel extract combination was to provide topical application with synergistic advantages against inflammation and mild skin conditions[24-25].

IV. EVALUATION PARAMETERS

Important characteristics including physical appearance, pH, viscosity, spreadability, and homogeneity were assessed for the prepared Polyherbal ointment and hydrogel. Spectrophotometric analysis was used to determine the drug's content, and stability tests were carried out in various settings. Carrageenan-induced paw oedema was used to evaluate anti-inflammatory efficacy in animal models. To guarantee safety and effectiveness, further tests were conducted, such as those for microbiological load and skin irritation. The findings demonstrated the feasibility of both formulations for topical medicinal application by confirming their strong anti-inflammatory activity and outstanding physicochemical characteristics. In order to maximize formulation stability and improve patient compliance, several assessment criteria are essential[26-27]

V. FUTURE SCOPE AND CHALLENGES

In cosmetics and wound treatment, the use of Polyherbal formulations made from leftover fruit peels provides economical and environmentally friendly substitutes. Future research can use these extracts to investigate cutting-edge medication delivery methods like transdermal patches or Nano-formulations. In order to confirm safety and effectiveness in human populations, clinical studies are necessary. Standardisation of herbal extracts, regulatory clearance, extraction process scalability, and batch-to-batch consistency are still significant obstacles, nevertheless. By addressing these issues through pharmacovigilance and quality control, fruit peel extract-based herbal topical treatments that are both eco-friendly and efficacious can be commercialized[28].

VI. CONCLUSION

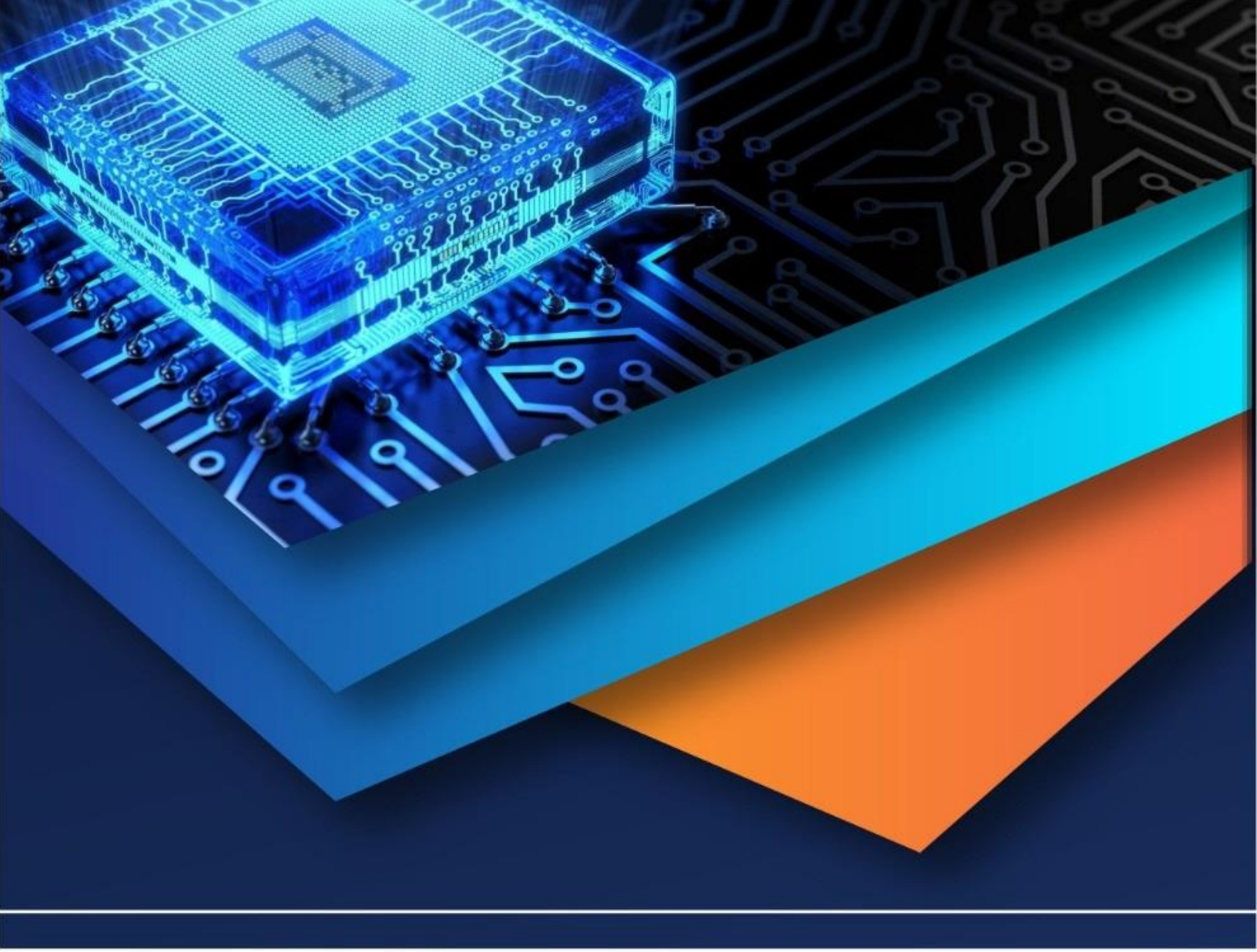
The study effectively illustrated how to formulate and assess a Polyherbal ointment and hydrogel utilising extracts from banana, pomegranate, and orange peels. Both formulations demonstrated strong anti-inflammatory action and favorable physicochemical characteristics, making them viable options for topical natural treatment. In addition to encouraging sustainable pharmaceutical practices, the use of fruit peel waste in medicinal goods gives value to underutilized resources. This Polyherbal method offers a more secure and efficient substitute for manufactured medications. Such compositions have the potential to transform herbal skincare and inflammation management treatments with more study and standardisation.

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