International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Preparation and Evaluation of Herbal Antifungal Patch of Extract of Psidium Guajava Leaves

Nadaf Arshad Yunus[1], Patil Omkar A[2], Patil Shivraj R[3], Pawar Abhishek M[4], Pore Shardul P[5], Yadav Aniket Avinash[6]

[1,2,3,4,5,6]Student, Adarsh College of Pharmacy, Vita

Abstract

Skin infections caused by fungi are a common problem worldwide, and the search for effective and safe antifungal treatments is ongoing. This research paper aims to prepare and evaluate an antifungal patch using Psidium guajava leaves. The study includes an introduction to the problem, the methodology employed, observations of the antifungal activity against various fungi related to skin infections, the results obtained, and a conclusion. The use of Psidium guajava leaves as a potential natural antifungal agent may provide a promising alternative for the treatment of skin infections. The cheapest polymer suitable for making an antifungal patch would be polyvinyl alcohol (PVA). PVA is a water-soluble polymer that can be easily processed into films or patches. It is biocompatible, non-toxic, and has good adhesive properties. PVA can also be used as a carrier for antifungal drugs, allowing for controlled release of the medication. Additionally, PVA is relatively inexpensive compared to other polymers, making it a cost- effective choice for manufacturing antifungal patches.

Keyword: Herbal Drug, Herbal antifungal patch, antifungal activity of Psidium guajava

Introduction

Skin infections caused by fungi, such as dermatophytes and Candida species, are prevalent and can cause significant discomfort and morbidity. Conventional antifungal treatments often have limitations, including side effects and the emergence of drug-resistant strains. Therefore, there is a need to explore alternative treatments, particularly those derived from natural sources. Psidium guajava, commonly known as guava, exhibits various medicinal properties, including antimicrobial activity. This research aims to prepare an antifungal patch using Psidium guajava leaves and evaluate its efficacy against different fungi related to skin infections.

There are various types of skin fungal infections, including:

1. Ringworm (Tinea corporis): A circular rash with a clear center, giving it a ring-like appearance.
2. Athlete's foot (Tinea pedis): Fungal infection affecting the feet, causing itching, redness, and peeling.
3. Jock itch (Tinea cruris): Fungal infection in the groin area, leading to itching, redness, and a rash.
4. Candidiasis: Caused by the Candida fungus, it can affect various body parts, such as the mouth (oral thrush), genitals (yeast infection), and skin folds.
5. Tinea versicolor: Characterized by discolored patches on the skin, often lighter or darker than the surrounding skin.

6. Nail fungus (Onychomycosis): Fungal infection of the nails, causing discoloration, thickening, and crumbling.

It's essential to consult with a healthcare professional for an accurate diagnosis and appropriatetreatment.

Polyvinyl alcohol (PVA) as adhesive polymers –

PVA is a water-soluble polymer that is commonly used as a carrier material for drug patches due to its low cost and good film-forming properties. Commonly used cheap adhesive polymers in patch preparation include acrylic-based adhesives, polyvinyl acetate, and polyvinyl alcohol. However, it's crucial to consider the specific requirements of your herbal patch and consult with a formulation expertto ensure safety and effectiveness.

Backing layer -

Commonly used and cost-effective backing layers for patches often include materials like polyethylene or polypropylene films. These materials are flexible, provide a barrier to external elements, and are relatively Inexpensive. However, the choice of the backing layer should also consider factors like breathability, comfort, and compatibility with the adhesive and herbal components. Consulting with a formulation expert can help determine the most suitable and cost-effective option for your specific patch preparation.

Evaluation test –

Several evaluation tests are commonly conducted for patches to ensure their quality, efficacy, and safety. Some key tests include:

1. **Adhesion Test:**
Assess the patch's ability to adhere to the skin without causing irritation.
2. **In Vitro Release Test:**
Determine the release profile of active ingredients from the patch.
3. **Content Uniformity:**
Ensure uniform distribution of herbal extract or active ingredients across the patch.
4. **Physical Appearance:**
Examine the patch for color, texture, and any signs of defects.
5. **Thickness and Weight Uniformity:**
Measure the thickness and weight of patches to ensure consistency.
6. **Drug Content:**
Quantify the amount of active ingredient in the patch to verify it meets the intended dosage.
7. **Skin Irritation Test:**
Evaluate the potential for skin irritation or sensitization caused by the patch.
8. **Microbial Limits Test:**
Check for the presence of microorganisms to ensure the patch's sterility.
9. **Peel Adhesion Test:**
Measure the force required to peel the patch from the skin.
10. **Water Vapor Transmission Rate (WVTR):**
Assess the patch's permeability to water vapor, affecting its breathability.
11. **Stability Testing:**

Subject the patches to various storage conditions to evaluate their stability over time.

These tests help ensure the patch's quality, safety, and performance. It's crucial to follow relevant guidelines and standards, and consulting with regulatory experts can be beneficial, especially if the patch will be used for medicinal purposes.

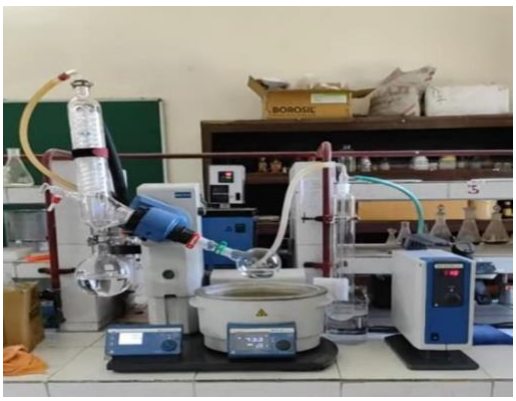
A transdermal delivery system is a method of administering drugs or other substances through the skin for systemic distribution. It involves the use of a patch or other device that contains the drug or substance, which is then applied to the skin. The drug or substance is absorbed through the skin and enters the bloodstream, allowing for targeted and controlled delivery. Transdermal delivery systems are commonly used for medications such as nicotine patches for smoking cessation, hormone replacement therapy, and pain relief. They offer several advantages over other methods of drug delivery, including convenience, steady and continuous release of the drug, avoidance of first-pass metabolism, and reduced side effects.

The effectiveness of a transdermal delivery system depends on factors such as the permeability of the skin, the properties of the drug or substance being delivered, and the design of the patch or device. Various technologies and techniques are used to enhance the absorption of the drug, such as the use of chemical enhancers, microneedles, and iontophoresis. Overall, transdermal delivery systems provide a non-invasive and patient-friendly method of drug administration, offering improved convenience and compliance for patients.

Methodology -

1. Collection and preparation of Psidium guajava leaves extract:

- Fresh leaves of Psidium guajava were collected and thoroughly washed.
- The leaves were air-dried and ground into a fine powder.
- The powder was extracted using a suitable solvent, such as ethanol or water.
- The extract was filtered and concentrated by evaporation in rotary evaporator to obtain a concentrated solution.



2. Preparation of antifungal patches:

- Take 2.5 gm of Polyvinyl alcohol polymer.
- The 25 gm Psidium guajava leaf extract was incorporated into the polymer matrix.
- The mixture was casted onto a Polyethylene and allowed to dry. Polyethylene act as backing layer.

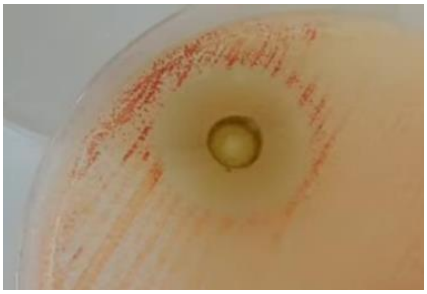
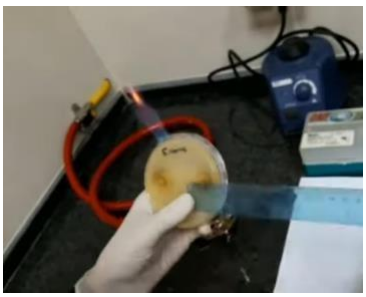
3. Evaluation of antifungal activity:

- Various fungi related to skin infections, including dermatophytes and Candida species, were selected

such as

1) Aspergillus niger 2) Escherichia coli 3) Bacillus subtilis

- The antifungal patch was placed on agar plates inoculated with the respective fungi.
- The plates were incubated at an appropriate temperature for fungal growth.
- The zones of inhibition were measured and recorded.

Observations Table –

Table no.1 – Antifungal action of sample of herbal patch on fungi.

Sr. No.	Fungi	Zone of inhibition (mm)
1	Bacillus subtilis	14±2
2	Aspergillus niger	15±2
3	Escherichia coli	08±2

Table no.2- Irritation test when patch applied on skin.

Sr. No.	Sample of patch	Irritation cause to skin
1	**A**	**No irritation**
2	**B**	**No irritation**
3	**C**	**No irritation**

Table no.3 – evaluation test for formulated patch

Sr. No.	Parameters	Observation
1	**Adhesion**	**Good**
2	**Flexibility**	**Flexible**
3	**Microbial Contamination**	**Absent**
4	**Remove**	**Easily removable**

Result

The herbal antifungal patch of extract of Psidium guajava was prepared successfully and evaluation was carried out by using B. subtilis, A. niger, E. coli. And various parameters.

Conclusion

Based on the observations, it can be concluded that guava leaves contain potent antifungal compounds that exhibit a dose-dependent inhibitory effect on various fungal strains. The effectiveness of guava as an antifungal drug opens opportunities for further research in drug development and potential use in clinical settings.

Overall, this research provides a comprehensive understanding of the health benefits of guava as an antifungal agent. The study examines the chemical constituents of guava, its cultural significance, and its various uses. The extraction procedure and observation results further validate the antifungal properties of guava. The findings contribute to the growing body of knowledge surrounding natural antifungal remedies and highlight the potential of guava as an alternative treatment option. Further research is warranted to explore the full therapeutic potential of guava in combating fungal infections.

References –

1. https://pubmed.ncbi.nlm.nih.gov/29751075/
2. Meckes M, Calzada F, Tortoriello bn J, Gonzalez J L and Martinez M.Terpenoids isolated from Psidium guajava Hexane extract with depressant activity on central nervous system. Phytother, 10: 600.
3. Begum S,Hassan S I,Ali N S and Siddiqui B S,Chemical constituents for the leaves of guajava. Natural Product DOI: 2004; 18:135.
4. Gutiérrez RMP, Mitchell S, Solis RV. Psidium guajava: A review of its traditional uses, phytochemistry and pharmacology. Ethnopharmacol. 2008, 117: 1-27.
5. Kumar Sumit, Swarankar Vivek, Sharma Sujata, Baldi Ashish Herbal Cosmetics: Used for Skin and Hair2012Lakshmana PS, Shirwaikar A, “Evaluation of rosin as a cream base for topical ketoconazole preparation”. Journal of Pharmaceutical Research, 2009; 8:80-85.
6. https://www.researchgate.net/publication/259334847_Antifungal_activity_of_Psidium_guajava_organic_extracts_against_dermatophytic_fungi
7. https://www.herdin.ph/index.php?view=research&cid=67842