

# A Review Article on Antifungal Cream

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**Abstract-** Antifungal creams are topical treatments designed to address fungal infections that affect the skin, nails, and adjacent areas. They function by either inhibiting the development of or eliminating fungal pathogens like species of *Candida*, *Trichophyton*, and *Aspergillus*.

These formulations may include synthetic compounds such as clotrimazole or terbinafine, as well as natural ingredients like neem and tea tree oil. The creams offer targeted effectiveness, rapid relief from itching and inflammation, and fewer systemic side effects when compared to oral antifungal medications.

Interest in herbal and polyherbal versions has grown due to their safety, compatibility with skin, and additional benefits for skin health. The article covers the processes involved in formulation, evaluation criteria, and the pros and cons associated with antifungal creams.

Despite minor issues such as the need for frequent application and potential irritation, antifungal creams continue to be a highly effective, convenient, and accessible treatment option for managing superficial fungal infections and enhancing skin health.

**Keywords:** Anti-fungal, Poly-herbal, evaluation criteria, fungal infection

## I. INTRODUCTION

Antifungal creams are topical medications formulated to treat fungal infections affecting the skin, nails, and other superficial areas of the body. These infections are frequently caused by dermatophytes, yeasts, and molds, such as species from *Candida*, *Aspergillus*, and *Trichophyton*. Fungal infections tend to flourish in warm, moist regions of the body, including the feet, groin, and underarms, resulting in conditions like athlete's foot, ringworm, and jock itch. The primary objective of antifungal creams is to eradicate or hinder the growth of harmful fungi while alleviating symptoms like redness, itching, and irritation.

Antifungal creams function through different mechanisms based on the active components used. Common synthetic antifungal agents include clotrimazole, miconazole, terbinafine, ketoconazole, and econazole. These substances interfere with the production of ergosterol, an essential element of fungal cell membranes, leading to membrane disruption and cell death. Many formulations also include soothing ingredients, such as aloe vera or zinc oxide, to aid in healing and comfort.

Topical antifungal creams present several benefits, including ease of use, targeted effectiveness, minimal absorption into the bloodstream, and fewer side effects compared to oral antifungal treatments.

They are commonly used for mild to moderate infections and can be applied directly to the affected region for quick relief. Nevertheless, maintaining proper hygiene, applying consistently, and completing the treatment regimen are crucial to preventing recurrence.

In recent years, there has also been an emphasis on creating herbal antifungal creams that utilize natural plant extracts with antifungal properties, offering safer and more environmentally-friendly alternatives to synthetic medications. Overall, antifungal creams are essential in dermatological treatment by providing effective, accessible, and convenient options for managing and preventing fungal infections.

## II. OBJECTIVE

1. To suppress fungal proliferation:  
The primary focus is to halt the growth and dissemination of fungal organisms such as *Candida*, *Trichophyton*, and *Epidermophyton* species.
2. To alleviate symptoms:  
Mitigate itching, redness, inflammation, scaling, and discomfort associated with fungal infections like ringworm, athlete's foot, or jock itch.

3. To offer localized treatment:

Administer antifungal agents directly to the affected area, ensuring a higher concentration of the medication at the site of infection while minimizing systemic exposure.

4. To facilitate the healing of infected skin:

Assist in restoring the skin's normal condition by diminishing infection and irritation.

5. To avert recurrence:

Help prevent the return or spread of infection when utilized regularly and as directed.

6. To preserve skin health:

Certain formulations may also incorporate soothing, moisturizing, or protective components to uphold the skin's natural barrier function.



Fig. Types of antifungal infection

### III. TYPES OF ANTI-FUNGAL CREAMS

#### 1. Medicated antifungal creams:

Medicated antifungal creams are a crucial tool in the dermatological treatment of fungal infections. These products, containing synthetic antifungal compounds like azoles, allylamines, or polyenes, are commonly used as primary therapies for various superficial fungal conditions, including athlete's foot and yeast infections.

They work by disrupting the integrity of fungal cell membranes or blocking essential enzymes required for fungal growth and reproduction. For example, azole compounds such as clotrimazole or miconazole inhibit the synthesis of ergosterol, an essential component of fungal cell membranes, leading to cell death. Allylamines like terbinafine affect ergosterol production through a different mechanism, while polyenes such as nystatin attach to ergosterol, causing membrane disruption and resulting in the death of the fungal cells.

These creams present numerous benefits, including ease of use, targeted treatment, and minimal

systemic adverse effects. They provide swift relief from symptoms such as itching, redness, and flaking, thus enhancing patient comfort and adherence to treatment. Additionally, their broad-spectrum capabilities render them effective against a wide range of fungal pathogens.

Furthermore, extended use may lead to the emergence of antifungal resistance, making it necessary to periodically reevaluate treatment approaches.

#### 2. Herbal Antifungal Cream

Herbal antifungal ointments utilize the healing capabilities of natural plant ingredients known for their antimicrobial attributes. In contrast to medicated ointments that rely on synthetic antifungal compounds, herbal formulations derive their effectiveness from botanical extracts and essential oils.

These ointments frequently contain a variety of plant extracts, such as tea tree oil, neem, garlic, lavender, and calendula, with each possessing unique antifungal characteristics. For instance, tea

tree oil has broad-spectrum antimicrobial effects, making it effective against numerous fungal species, including *Candida albicans* and dermatophytes. Likewise, neem extract is rich in substances like azadirachtin and nimbin, which have strong antifungal and anti-inflammatory properties.

A key benefit of herbal antifungal ointments is their perceived safety and natural composition, which attracts those looking for alternative treatments. Additionally, many herbal components offer extra advantages for the skin, such as reducing inflammation, aiding in wound healing, or hydrating dry, irritated skin.

Despite their growing popularity, herbal antifungal ointments have certain drawbacks. Their effectiveness and safety can greatly differ based on factors like the species of the plant, the method of extraction, and the concentration of the active ingredients. Moreover, the scientific research backing their use is still limited, with most studies being small-scale trials or based on anecdotal evidence.

### 3. Polyherbal Anti-fungal Creams

Polyherbal antifungal creams merge traditional herbal treatments with contemporary pharmaceutical practices, creating a synergistic mix of various plant extracts to fight fungal infections. In contrast to single-ingredient herbal creams, which depend on the healing properties of individual plants, polyherbal formulations combine a range of botanicals to boost effectiveness and expand coverage.

These creams often include a thoughtfully selected array of plant extracts, with each chosen for its specific antimicrobial properties and its compatibility with other components. By utilizing the complementary effects of several herbs, polyherbal creams strive to tackle multiple facets of fungal infections, from hindering fungal proliferation to alleviating inflammation and aiding skin recovery.

For example, a polyherbal cream may incorporate tea tree oil for its extensive antimicrobial capabilities, aloe vera for its soothing and hydrating qualities, and calendula for its inflammation-reducing properties. Together, these ingredients

collaboratively provide thorough symptom relief while also addressing the root fungal infection.

A significant benefit of polyherbal antifungal creams is their potential to achieve greater efficacy compared to single-ingredient herbal creams. By harnessing the varied bioactive elements found in different plants, polyherbal formulations may demonstrate a wider spectrum of activity and increased potency against fungal pathogens. Furthermore, the combination of various herbs with complementary effects can minimize the likelihood of developing treatment resistance.

Nonetheless, similar to herbal creams in general, polyherbal formulations encounter challenges linked to standardization, quality assurance, and scientific substantiation.

## IV. ADVANTAGES OF ANTIFUNGAL CREAM

### 1. Targeted Action:

Antifungal creams are applied directly onto the infected area, allowing the active components to effectively address the infection on-site. This targeted action leads to quicker alleviation of symptoms such as itching, redness, and irritation.

### 2. Reduced Side Effects:

Because antifungal creams are intended for topical use, only a small amount of the medication enters the bloodstream. This lowers the likelihood of systemic side effects that may occur with oral antifungal medications.

### 3. Simple to Apply:

Cream formulations are user-friendly, can be easily spread, and are appropriate for various skin types and areas of the body, making them convenient for everyday use.

### 4. Quick Symptom Relief:

Topical antifungal creams frequently deliver rapid relief from discomfort, including itching and burning sensations, after just a few applications, enhancing patient comfort and adherence to treatment.

### 5. Easily Accessible:

Numerous antifungal creams can be purchased without a prescription, making them readily available for addressing mild to moderate fungal infections.

6. Diverse Formulations:

Antifungal creams are offered in multiple strengths and blends, sometimes including additional ingredients such as anti-inflammatory or antibacterial agents to promote better healing and prevent secondary infections.

7. Suitable for All Ages:

Topical antifungal products can be used safely across different age groups, including children, adults, and seniors, depending on the specific formulation and medical guidance.

8. Natural Options:

Herbal antifungal creams that feature plant extracts like neem, aloe vera, or Cassia alata provide a natural and safer alternative, decreasing chemical exposure and the risk of allergic reactions.

## V. DISADVANTAGES OF ANTIFUNGAL CREAM

1. Shallow Penetration:

Antifungal creams primarily interact with the upper layers of the skin and may lack the depth necessary to address severe or internal fungal infections. This diminishes their efficacy in more severe or long-standing cases.

2. Necessity for Frequent Application:

To obtain the intended results, antifungal creams generally need to be applied once or twice a day over several weeks. Irregular application or not completing the full course can result in treatment failure or the return of the infection.

3. Skin Irritation and Allergic Reactions:

Some individuals may encounter local side effects, such as redness, burning, itching, or dryness at the application site. These reactions are frequently due to sensitivity to specific components or preservatives.

4. Narrow Scope of Effectiveness:

Not every antifungal cream works against all types of fungi. Using an inappropriate formulation might slow recovery or exacerbate the infection.

## VI. APPLICATION OF ANTIFUNGAL INFECTION

Antifungal creams are topical products utilized to

treat various fungal infections affecting the skin, nails, and adjacent tissues.

These formulations are designed to deliver the antifungal ingredient directly to the infection site, providing quick and effective results while minimizing absorption into the bloodstream.

These creams are mainly employed to address common fungal ailments such as ringworm (*Tinea corporis*), athlete's foot (*Tinea pedis*), jock itch (*Tinea cruris*), and yeast infections (*Candidiasis*). They work by hindering the growth of harmful fungi through the disruption of the fungal cell membrane or by interfering with critical cellular processes. Some antifungal creams can also treat *Tinea versicolor*, a condition characterized by discolored skin patches.

Beyond their therapeutic function, antifungal creams are used to alleviate symptoms linked to fungal infections like itching, redness, burning, and irritation. They also offer preventive advantages for individuals susceptible to recurring infections, such as athletes or those with diabetes, where high moisture levels can encourage fungal development.

Specific antifungal formulations are also applied for seborrheic dermatitis and mild fungal nail infections (*onychomycosis*), although these conditions might need extended or systemic treatment for full recovery. Even after visible symptoms have resolved, antifungal creams are frequently recommended for several additional days to ensure the total elimination of fungal spores and prevent future occurrences.

## VII. GENERAL PROCEDURE FOR MAKING ANTI-FUNGAL CREAM

1. Formulation Development:

- Identify the purpose and specific fungal infections to target (e.g., athlete's foot, ringworm).
- Select the active antifungal compounds based on their effectiveness and safety profile (e.g., azoles, allylamines, polyenes).
- Choose appropriate excipients and additives to enhance the cream's texture, stability, and effectiveness (e.g., emollient).
- Consider adding other components that might offer additional antimicrobial effects or soothing benefits, such as herbal extracts or essential oils.

2. **Ingredient Selection:**
  - Obtain high-quality raw materials, including active pharmaceutical ingredients (APIs), excipients, and additives, from trusted suppliers.
  - Ensure all components comply with pharmacopeial standards and regulatory guidelines for pharmaceutical preparation.
3. **Compounding:**
  - Accurately weigh and measure the necessary amounts of each ingredient according to the formulation recipe.
  - Mix the active antifungal agents with the selected excipients and additives in the correct ratios.
  - Heat and stir the ingredients using appropriate equipment (e.g., mortar and pestle, homogenizer) to guarantee even distribution and dissolution.
  - Modify the formulation as required to achieve the target consistency, viscosity, and pH level.
4. **Quality Control:**
  - Conduct quality control assessments to evaluate the physical, chemical, and microbiological characteristics of the final cream.
5. **Packaging and Labeling:**
  - Transfer the prepared antifungal cream into suitable containers (e.g., jars, tubes) using sanitary methods to avoid contamination.
  - Affix labels on each container with necessary information, including the product name, strength, dosage instructions, storage requirements, and expiration date.
  - Ensure adherence to regulatory labeling standards and guidelines for pharmaceutical products.
6. **Storage:**
  - Store the packaged antifungal cream under appropriate conditions to preserve its stability and integrity (e.g., in a cool, dry location; shielded from light).

#### VIII. EVALUATION PARAMETERS OF ANTIFUNGAL CREAM

| Sr. No | Parameter                | Purpose/Significance                                     | Method/Observation  | Expected Result/Range                           |
|--------|--------------------------|--|---|---|
| 1.     | Physical Appearance      | To check color, texture and uniformity of the cream.     | Visual inspection.  | Smooth, uniform, no lumps or phase separation.  |
| 2.     | pH Measurement           | Ensures compatibility with skin and prevents irritation. | Measure using pH meter after dilution with distilled water.     | 5.0-7.0   |
| 3.     | Spreadability            | Determines ease of application on skin.                  | Two glass slides method; time taken for spreading measured.     | Should spread easily with minimal force.        |
| 4.     | Viscosity                | Indicates consistency and stability of the formulation.  | Measured using Brookfield viscometer.                           | Moderate viscosity.                             |
| 5.     | Homogeneity              | Ensures uniform distribution of ingredients.             | Visual and microscopic examination.                             | Uniform without grittiness or phase separation. |
| 6.     | Drug Content Uniformity  | Confirms even dispersion of active drug.                 | Dissolve sample, filter and analyze spectrophotometrically.     | Uniform and within specified limits.            |
| 7.     | In-vitro Diffusion Study | Evaluates rate and extent of drug release.               | Franz diffusion cell using dialysis membrane and buffer medium. | Controlled and sustained drug release.          |

|     |                 |  |   |                                       |
|-----|-----------------|--|---|---------------------------------------|
| 8.  | Extrudability   | Checks ease of cream extrusion from container. | Measure amount extruded under specific pressure.            | Should extrude easily and non-sticky. |
| 9.  | Washability     | Determines ease of removal from skin.          | Washed with water and observed.                             | Easily washable and non-sticky.       |
| 10. | Irritation test | Assesses potential for skin irritation.        | Applied to animal or human skin under controlled condition. | No redness, itching, or irritation.   |
| 11. | Stability       | Evaluates                                      | Stored at different.  | No Significant.                       |

### IX. CONCLUSION

Antifungal creams are essential topical treatments designed to address skin and nail infections caused by fungi. They deliver targeted action, prompt relief, and fewer side effects when compared to oral medications.

Synthetic formulations such as clotrimazole and terbinafine work by disrupting the membranes of fungal cells, whereas herbal and polyherbal options provide safer, natural alternatives with calming properties.

Although they offer several benefits, these creams may necessitate frequent applications and can lead to mild irritation. In summary, antifungal creams continue to be an effective, accessible, and convenient option for treating fungal infections and maintaining healthy, infection-free skin.

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