



## Formulation and Evaluation of Herbal Antifungal Cream

Abhishek Bisai<sup>2</sup>, Vinita Singh<sup>1</sup>, Nitin Kumar<sup>2</sup>, Deborah Yukti Tandi<sup>1</sup>, Harish Sharma<sup>1</sup> and Gyanesh Kumar Sahu<sup>1\*</sup>

<sup>1</sup>Rungta Institute of Pharmaceutical Sciences and Research, Kohka, Kurud, Bhilai, India

<sup>2</sup>Rungta Institute of Pharmaceutical Sciences, Kohka, Kurud, Bhilai, India

\*Corresponding Author: Gyanesh Kumar Sahu, Dean and Professor, Rungta Institute of Pharmaceutical Sciences and Research, Kohka, Kurud, Bhilai, India.

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### Abstract

Fungal diseases become a major medical problem. Fungal disease is difficult to manage because they tend to be chronic, hard to diagnosis. The fungal infection is a common condition caused by fungi. The herbal antifungal cream was formulated by using various herbs such as neem and aloe vera. Herbal medicine is one of the oldest and most universal system of health care system. The herbal antifungal cream is very helpful and it is fewer side effects. All herbal ingredients are easily available in market. The herbal antifungal cream is used to treat fungal infection which most commonly affect our skin, hair and nails. Herbal antifungal cream are used to treat fungal skin infection such as athletes foot, ringworm and jock itch. This herbal antifungal cream represents a natural and safe to use, and this herbal antifungal cream is beneficial in reduction of fungal infection.

**Keywords:** Herbal Antifungal Cream; Fungal Disease; Herbs; Herbal Ingredient; Skin Infection

### Introduction

#### Cosmeceuticals

The word “cosmetics” is derived from Greek word “kosmtikos”, which means “power, arrangement and ability in beautifying”.

The word “Cosmeceuticals” made up of two word one is “cosmetic” and another is “pharmaceutical”.

Cosmeceuticals are cosmetic products with bioactive ingredients purported to have medical benefits [1].

#### Herbal cosmetics

Herbal cosmetics utilize natural ingredients derived from plants, herbs, and minerals to nourish and enhance the skin and hair. These products often exclude synthetic chemicals, making them popular for those seeking gentler alternatives. Ingredients like aloe vera, tea tree oil, lavender, and rosehip are common in herbal cosmetics for their soothing, moisturizing, and antioxidant

properties. Many herbal cosmetics also incorporate traditional remedies from various cultures, such as Ayurveda and traditional Chinese medicine.

These products are believed to be safer and less likely to cause adverse reactions or skin irritations compared to their synthetic counterparts. Additionally, they're often environmentally friendly, as they're derived from renewable resources and may be biodegradable. However, it's essential to note that while herbal cosmetics can offer benefits, individual reactions may vary, and it's crucial to choose products carefully and consult with a dermatologist if you have specific skin concerns [2].

#### Cream

Creams are semi-solid emulsions used to moisturize, protect, and nourish the skin. They consist of a combination of water, oil, and other ingredients like emulsifiers, thickeners, and preservatives. Creams are versatile and come in various formulations to suit

different skin types and needs, such as moisturizing creams, anti-aging creams, and medicated creams for specific skin conditions. They provide hydration by preventing water loss from the skin and can also deliver active ingredients deep into the skin layers for targeted benefits. Creams are a popular choice for daily skincare routines due to their ease of application and effectiveness in improving skin health [3].

### Antifungal Creams

Antifungal creams are topical medications used to treat fungal infections of the skin, such as athlete’s foot, ringworm, and jock itch. These creams typically contain active ingredients like clotrimazole, miconazole, terbinafine, or ketoconazole, which work by inhibiting the growth of fungi and eliminating the infection. Antifungal creams are applied directly to the affected area and are usually used for a specified duration as directed by a healthcare professional. They provide relief from symptoms such as itching, redness, and irritation, and can effectively clear up fungal infections when used consistently and as prescribed. It’s essential to follow the instructions on the packaging or provided by a healthcare provider for safe and effective use [1,3].

### Method and Methodology Ingredient

Table 1: Ingredient [1,4].

S. No.	Ingredient	Quantity	Roles
01.	Neem	20 ml	Antifungal agent
02.	Turmaric	10 ml	Anti fungal agent
03.	Aloe vera gel	20 ml	Soothing agent, moisturizer
04.	Glycerine	10 ml	Lubricant
05.	Tween-20	10 ml	Emulsifier
06.	Beeswax	1.5 gm	Emollient
07.	Borax	0.2 gm	Buffer
08.	Silica gel	0.1 gm	Adsorbent
09.	Bentonite	4 gm	Thickening agent
10.	Methylparaben	0.2 gm	Preservative
11.	Rose oil	q.s.	Fragrance

### Material

#### Neem

Neem, scientifically known as *Azadirachta indica*, is a versatile tree native to the Indian subcontinent. It holds significant cultural, medicinal, and agricultural importance. Neem has been used in traditional medicine for centuries. Its extracts contain compounds with antibacterial, antifungal, antiviral, and anti-inflammatory properties. Neem oil, derived from its seeds, is used topically to treat skin conditions like acne, eczema, and psoriasis. It’s also used in oral care products for its ability to combat bacteria. Neem-based products are widely available in the market, including soaps, shampoos, lotions, toothpaste, and herbal supplements. These products capitalize on neem’s antimicrobial and skin-nourishing properties [4,5].

#### Turmeric:

Turmeric, scientifically known as *Curcuma longa*, is a flowering plant of the ginger family, native to the Indian subcontinent and Southeast Asia. It has been used for thousands of years in traditional medicine and cooking, particularly in India and other parts of Asia [5].

#### Aloe vera

The Aloe vera gel is made up of water, amino acids, vitamins, lipids, sterols, tannins, and enzymes and also contains phenol, saponin, anthraquinones components, which have antiviral, antibacterial, and antifungal properties. Aloe vera is a plant species that has been used for centuries for its medicinal and healing properties. Aloe vera, a succulent plant species native to North Africa, is renowned for its multifaceted uses in traditional medicine and various industries. The plant’s gel-like substance, found in its fleshy leaves, has been extensively studied for its potential health benefits and therapeutic properties [4,6].

### Other excipients

#### Glycerine

Glycerine, also known as glycerol, is a colorless, odorless, viscous liquid that is sweet-tasting. It’s commonly used in pharmaceuticals, cosmetics, food, and even explosives. Studies on glycerine

cover its various applications, including its use as a moisturizer, its role in pharmaceutical formulations, and its potential health effects when ingested or applied topically. It is a trihydroxy sugar alcohol, meaning it contains three hydroxyl groups, which contribute to its solubility in both water and alcohol [6,7].

#### **Tween-20**

The Tween-20 study investigates the properties and applications of a surfactant known as Tween-20, which is commonly used in various industries including pharmaceuticals, food, and cosmetics. Tween-20 is a nonionic surfactant belonging to the Tween series, produced by ethoxylation of sorbitan monolaurate. Tween-20 exhibits amphiphilic properties, meaning it has both hydrophilic and hydrophobic regions. This characteristic allows it to reduce surface tension and form stable emulsions by interacting with both water and oil molecules. As a result, Tween-20 is frequently employed as an emulsifier, stabilizer, and solubilizing agent in various formulations [6-8].

#### **Beeswax**

Beeswax, a natural substance secreted by honeybees, plays a vital role in the hive's construction and maintenance. It is composed primarily of esters, fatty acids, and hydrocarbons, making it a complex mixture with various applications. Beeswax has a unique combination of properties that make it valuable in numerous industries. Its main components include palmitic, oleic, and linoleic acids, along with various alcohols like triacontanol and melissyl alcohol. These compounds give beeswax its characteristic odor and consistency [9].

#### **Borax**

Borax, also known as sodium borate, is a versatile compound with various applications across industries and households. Its chemical formula is  $\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$ . Borax is primarily mined from natural deposits in countries like Turkey, the United States, and Chile.

In terms of its properties, borax is a white, odorless powder that dissolves easily in water. One of its most notable characteristics is its ability to act as a buffering agent, helping to stabilize pH levels in solutions. This property makes it valuable in cleaning products, cosmetics, and even as a food additive [8,9].

#### **Silica gel**

Silica gel is a porous form of silica dioxide, synthetically manufactured from sodium silicate. It appears as small, translucent beads or granules and is known for its high adsorption capacity. Silica gel has a wide range of applications due to its ability to absorb and hold moisture, odor, and other substances without reacting chemically with them [8-10].

#### **Bentonite**

Bentonite is a versatile clay mineral renowned for its unique properties and wide-ranging applications across various industries. It is primarily composed of montmorillonite, a swelling clay mineral, along with other minerals such as quartz, feldspar, and gypsum. This composition gives bentonite remarkable characteristics including high water absorption capacity, plasticity, swelling ability, and thixotropy [10].

#### **Methyl paraben**

Methyl paraben is a commonly used preservative in cosmetics, pharmaceuticals, and food products due to its ability to inhibit microbial growth and extend product shelf life. Chemically, it belongs to the paraben family, which are esters of para-hydroxybenzoic acid. Methyl paraben is typically synthesized from para-hydroxybenzoic acid and methanol.

Its antimicrobial properties make it effective against a wide range of bacteria and fungi, enhancing product stability and safety. However, there has been some controversy surrounding its safety, particularly its potential to disrupt endocrine function as it can mimic estrogen, though scientific consensus suggests that at typical exposure levels, it poses minimal risk to human health [4,9].

#### **Rose oil**

Rose oil, also known as rose otto or rose essential oil, is extracted from the petals of various types of roses, primarily *Rosa damascena* or *Rosa centifolia*. The extraction process typically involves steam distillation or solvent extraction, yielding a concentrated oil with a strong, floral scent. Rose oil is often used in aromatherapy for its calming and mood-enhancing effects. Some studies suggest that inhaling the scent of rose oil may reduce anxiety and promote relaxation.

### Methodology

#### Method of extraction (Neem extract)

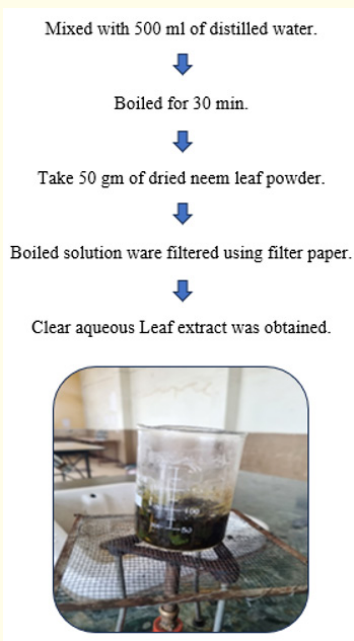


Figure 1: Neem Extract.

#### Turmeric extract

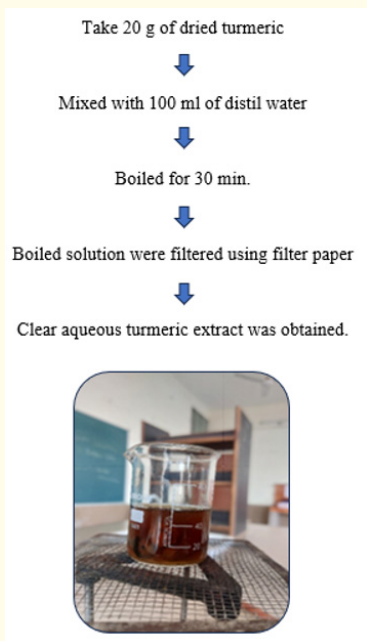


Figure 2: Turmeric extract.

#### Method of preparation

Take two beaker A & B, wash and clean properly.

#### In Beaker A

- Take aloe vera gel & boil on water bath.
- Add neem extract and turmeric extract with continuous stirring.

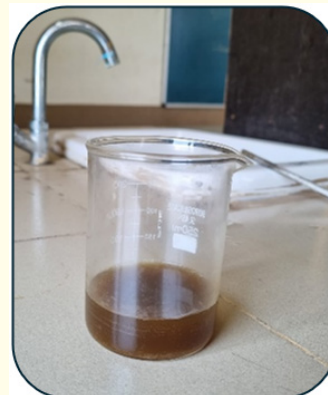
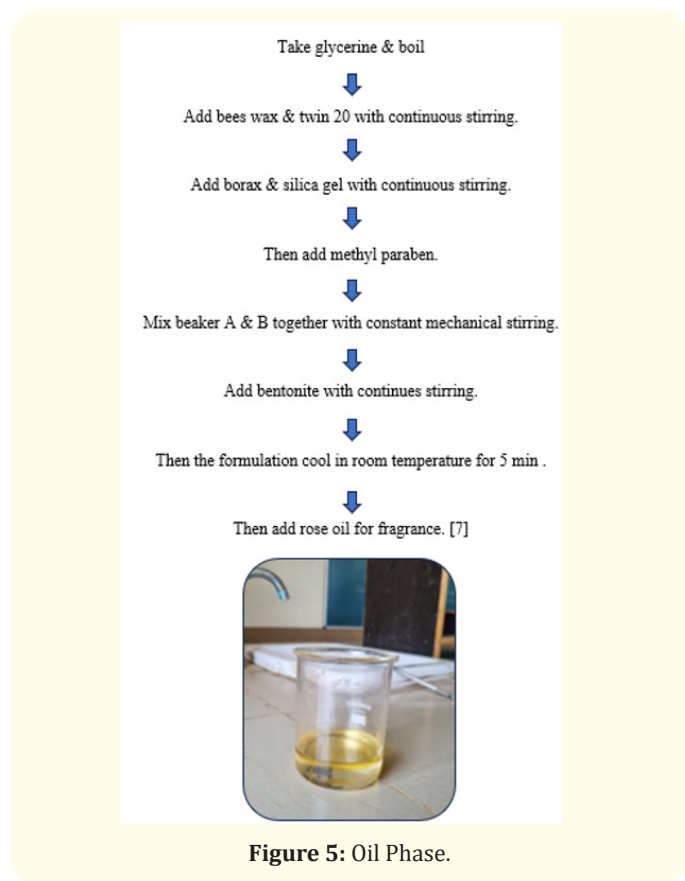


Figure 3: Water Phase.



Figure 4: Aloe vera.

**In Beaker B**



**Figure 5:** Oil Phase.

**Evaluation parameter**

**Physical properties**

The physical properties of antifungal cream play a significant role in its usability, efficacy, and overall user experience. The cream was observed for colour, odour, appearance and texture [11,12].

Sr. No.	Properties	Observation
1.	Colour	Pale yellow
2.	Odour	Characteristic
3.	Appearance	Semi- solid
4.	Texture	Smooth

**Table 2**

**pH determination**

The pH of various semi-solid (cream) formulation were determined by using digital pH meter. Weight 2.5g of cream and dispersed in 25ml of distilled water and stored for 2 hours. Then measurement of pH by using digital pH meter [12].

**Result**

The pH values are 5.87.

**Patch test**

A patch test for a herbal antifungal cream involves applying a small amount of the product onto a small area of the skin, typically on the forearm or behind the ear. The purpose of this test is to evaluate the cream’s potential for causing irritation or allergic reactions in sensitive individuals. After application, the area is observed for any signs of redness, swelling, itching, or other adverse reactions over a period of 24 to 48 hours. This test helps to assess the cream’s safety profile and determine if it is suitable for use on larger areas of the skin without causing harm or discomfort [13].

**Result**

No any inflammation or irritation to the skin.

**Spreadability test**

The spreadability test for a herbal antifungal cream assesses its ability to evenly distribute and cover a given surface area upon application. This test typically involves placing a fixed quantity of the cream onto a standardized surface, such as glass or a skin mimic substrate, and measuring the diameter of the spread after a specified time period. Factors like viscosity, texture, and formulation components influence the cream’s spreadability. A cream with good spreadability ensures uniform coverage, easy application, and enhanced efficacy. This test helps in optimizing formulation parameters to achieve desired spreading characteristics for better consumer experience and therapeutic outcomes [14].

**Result**

Good spreadability ensures uniform coverage, easy application, and enhanced efficacy.

### Homogeneity

The homogeneity of herbal antifungal cream is crucial for consistent effectiveness and application. Ensuring uniform distribution of active ingredients throughout the product is essential to guarantee each application delivers the intended benefits. Achieving homogeneity involves meticulous formulation and manufacturing processes, including thorough mixing of ingredients and quality control measures. Manufacturers utilize techniques like blending, emulsification, and particle size reduction to achieve desired consistency. Additionally, analytical methods such as visual inspection, microscopy, and spectroscopy are employed to assess homogeneity. By maintaining homogeneity [14,15].

### Result

Cream are uniform distribute on skin.

### Viscosity

The viscosity of formulated antifungal creams was measured by Brook field Viscometer using 4 spindle at varying speed and shear rates. This viscosity ensures uniform coverage, facilitating the absorption of active ingredients into the skin for maximum efficacy against fungal infections. Additionally, the cream’s viscosity contributes to its stability, preventing separation of ingredients and ensuring a consistent texture throughout its shelf life.

### Result

21801 mPa.

### Microbial test

For this test, prepare culture media by using nutrient agar. Nutrient agar media was used for study of microbial growth. In this take nutrient agar and placed for 24 hrs, then the microbial growth was observed. Then apply the cream on the surface area of the petriplate, then observed.

### Result

When apply the cream, it inhibit the growth of fungi and kill them [4,6,7,16].

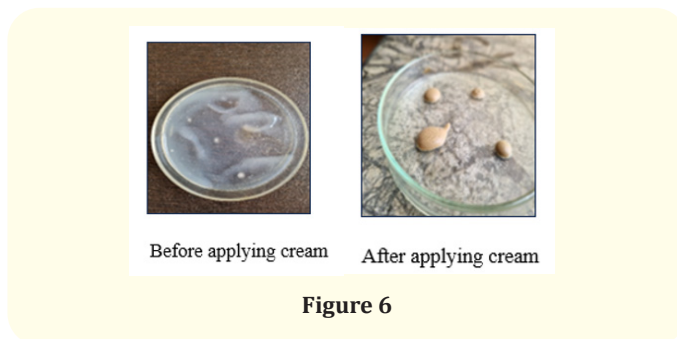


Figure 6

### Result

Sr. No.	Test	Result
1	Physical Evaluation	
a.	Colour	Pale Yellow
b.	Odour	Characteristic
c.	Appearance	Semi- solid
d.	Texture	Smooth
2	pH	5.87
3	Patch Test	No irritation on the skin.
4	Spreadability Test	Good spreadability ensures uniform coverage, easy application, and enhanced efficacy
5	Homogeneity	Cream are uniform distribute on skin.
6	Viscosity	21801 mPa
7	Microbial Test	It inhibit the growth of fungi and kill them.

Table 3

### Future Prospective

The future prospective for herbal antifungal creams are promising as there is a growing demand for natural and sustainable alternatives in health care. Herbal antifungal creams, derived from plant extracts with inherent antifungal properties, offer a holistic approach to managing fungal infections. The increasing awareness of the side effects associated with synthetic antifungal medications has led to a surge in interest in herbal remedies. Herbal antifungal creams have the advantage of being generally well-tolerated, reducing the risk of adverse reactions. The diverse range of bioactive compounds present in herbs can target various fungal strains effectively. Collaborations between traditional herbal knowledge and modern pharmaceutical research can lead to the development of innovative formulations



## Conclusion

The increasing global awareness of the environmental impact of pharmaceuticals and a growing desire for sustainable, natural solutions have propelled herbal remedies into the spotlight. Herbal antifungal creams, harnessing the power of plant extract, represent a compelling alternative to synthetic medications, offering a balance between efficacy and safety. One of the key strengths lies in the generally well-tolerated nature of herbal formulation, often associated with synthetic counterparts. Scientific advancements in herbal medicine research further substantiate the efficacy of specific plant compounds against fungal pathogens. This intersection of traditional herbal knowledge and modern scientific validation enhances the credibility of herbal antifungal remedies, paving the way for great integration into mainstream health care practices. The future trajectory of herbal antifungal creams is marked by sustainability, safety and efficacy making them a compelling choice in the evolving landscape of antifungal treatments.

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