

Formulation And Evaluation of Herbal Anti-Fungal Cream

C.SARANYA¹, M.JEEVANANTHAM², R.SHANMATHI²,
J.VASANTHAKUMAR², V.VENKATACHALAM², S.VIDHYASHREE²

¹ Assistant professor, Dept of Pharmaceutics, Pachamuthu College of Pharmacy, Dharmapuri

² Student, Pachamuthu College of Pharmacy, Dharmapuri

Corresponding Author: C.SARANYA

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ABSTRACT: Fungal skin infections are frequent dermatological issues, and extended use of synthetic antifungal medications can lead to side effects and resistance to drugs. Herbal remedies provide a more secure and efficient option because of their natural source and low risk of side effects. This study seeks to develop and assess a herbal antifungal cream incorporating Kuppaimeni (*Acalypha indica*), Aloe vera, and Turmeric (*Curcuma longa*). These therapeutic plants are recognized for their antibacterial, antifungal, anti-inflammatory, and wound-healing abilities. They are gathered from fully grown leaves, cleaned thoroughly, and blended to create a powder for inclusion in the formulation. Turmeric and Kuppaimeni extracts were made using appropriate solvents, whereas fresh Aloe vera gel was incorporated directly into the formulation. The cream base was created using the emulsification method, into which the herbal extracts were integrated. Antifungal effectiveness was evaluated against prevalent fungal pathogens. Were prepared utilizing appropriate solvents such as ethanol through maceration, then filtered and concentrated. The findings demonstrated that the formulated herbal cream exhibited favourable physicochemical characteristics, stability, and notable antifungal effects, without any indications of skin irritation. Thus, the developed herbal antifungal cream may be regarded as a safe, efficient, and cost-effective substitute for synthetic antifungal products in treating fungal skin infections. The prepared cream was assessed for visual characteristics, pH level, uniformity, ease of spreading, stability, and potential skin irritation.

Key Words: Skin Infection, *Acalypha Indica*, Anti-Fungal, Maceration

I. INTRODUCTION

Fungal infection is common in humans concern, affecting the skin, nails and mucous membranes. Conventional antifungal treatments

often come with side effects and risks of resistance, making herbal alternatives an attractive option. Fungi are the common cause of the fungal infection [1]. These studies explore the formulation and effectiveness of an antifungal herbal cream using plant-based ingredients with known antifungal properties, such as neem (*Azadirachtole indica*), turmeric (*Curcuma longa*), aloe vera (*Aloe barbadense*), have a medicinal property, including antifungal, antibacterial and antioxidant effects it utilized in a variety of traditional medicine. To develop a herbal cream which can give multipurpose effect, like moisturizer, reduce acne and skin irritation, reduce skin diseases like eczema, psoriasis, wrinkles, rashes etc. and adding glow to the face [2]

. Neem possesses antidiabetic, antiviral, anti-inflammatory properties. Various effects like antibacterial, antifungal, anthelmintic, antiparasitic, anticancer, anti-HIV, anti-bone resorption, antispasmodic, antipyretic, antidiarrheal, immunomodulation, hypolipidemic, antimicrobial, hepatoprotective, gastro protective have also been studied [3]. Fungal infection, also known as mycosis, is disease caused by fungi. Different types are traditionally divided according to the part of the body affected, superficial, subcutaneous, and systemic. Superficial fungal infections include common tinea of the skin, such as tinea of the body, groin, hands, feet and beard, and yeast infections such as pityriasis versicolor. Subcutaneous types include eumycetoma and chromoblastomycosis, which generally affect tissues in and beneath the skin. Systemic fungal infections are more serious and include cryptococcosis, histoplasmosis, pneumocystis, pneumonia, aspergillosis and mucormycosis [4]. Signs and symptoms range widely. There is usually a rash with superficial infection. Fungal infection within the skin or under the skin may present with a lump and skin changes. Pneumonia-like symptoms or meningitis may occur with a deeper or systemic infection [5]

CREAM



Fig no:1 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 moisture creams, antiaging creams, and medicated creams 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. O/W Creams are made up of tiny droplets of oil dispersed in a continuous water phase. O/W type is more comfortable and acceptable in terms of beauty with less oil, easily washed Off using water. W/O Creams are made up of tiny droplets of Water dispersed by a continuous Oil phase. W/O Types are more difficult to handle and move higher as they provide an oily barrier that reduces water loss in the stratum corneum. Emollient Non-Cosmetic Moisture Arrangements come in the form of Creams, Oils, Lotions, and Gels. Emollient helps the skin to feel relaxed [6].

Advantages of Cream: -

1. Rehydrate dried skin.
2. Replenish extra dry or rough spots on the skin.
3. Feel and smell good.
4. Help yourself relax.
5. Soften the roughest parts of your body.
6. Make your skin glow.

Herbal creams:

Herbal creams are emulsion which includes both oil and water. They may contain things like neem aloe vera, Tulsi, turmeric, different tinctures, extracts, and essential oils can be found in herbal creams. Vitamins and minerals are natural nutrients found in herbal creams, which are free of synthetic additives that might be toxic. Skin helps to feel sensation like hot

and cold and regulated the temperature of the body [7].

Ideal characteristics of Herbal Cream: -

- It should have Good Appearance.
- It should spread easily on the skin.
- Non-irritant to the skin.
- They should remove oil, sebum, dirt, dead cells from skin.
- They should form emollient film which should remain on skin after application
- They should also provide softening, lubricating and protecting the skin apart from cleaning.
- They should non-greasy and non-staining.
- They should not change membrane and skin functions.

TYPES OF HERBAL CREAMS



They fall into two categories:

Fig no:2: Herbal Cream

Oil-in-water(O/W) Creams:

Cream that consists of small oil droplets distributed in a continuous phase are referred to as oil-in-water (O/W) creams. Whereas an emulsion phase containing oil Droplets dispersed across the aqueous phase is referred to as an oil- in-water (O/W) emulsion [8].

Example: Milk, Ice creams, lotions.

Water-in-Oil(W/O) Creams:

Creams consisting of water combined with oil in a continuous phase, are referred to as water-in-oil (W/O) creams. The emulsion is considered as water-in-oil (W/O) type when the dispersed phase is water, and the Dispersion medium is oil. Feels greasy and oily on the skin and forms a protective occlusive layer

(prevents water loss from skin). More suitable for dry or rough skin conditions. Commonly used in cold creams, barrier creams, and ointments.

Example: Cold cream is a typical water-in-oil cream.

SKIN

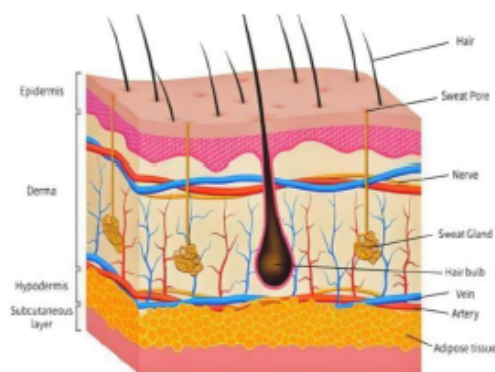
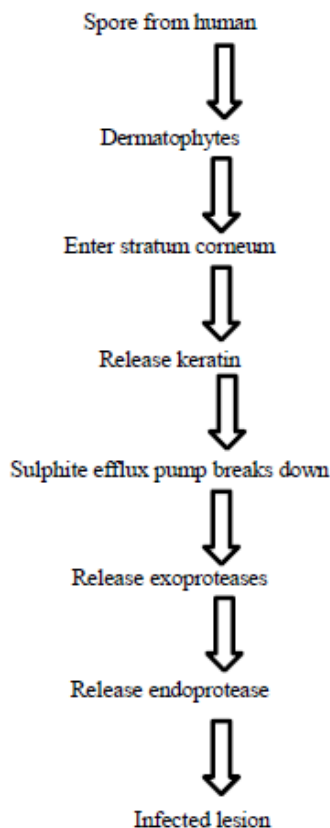


Fig no :3: Skin

When dermatophyte skin infection occurs, fungal spores from the environment that are normally harmlessly attached to the top layers of the skin germinate into tubes called mycelia. In some cases, dermatophytes can grow into deeper layers of the skin, and cause more serious infections. However, usually the fungi stay in the upper layers of the skin, growing outwards into a ring-shaped rash. As a result, some of these infections have the common name of "ringworm" (tinea corporis). Whilst not usually serious, this is usually irritating and itchy, highly embarrassing and something we want to get rid of as quickly as possible [9].

Pathophysiology



Causes of fungal infection:

Fungal infection commonly based on:

Dermatophytes:

Dermatophytes are a group of fungal that live off Keratin, a substance in your hair, your nails and the outer layer of your skin. They don't infect living tissue.

Candida:

Candida albicans is a yeast that naturally lives on your body. Under certain condition, it can grow too much and cause itching and redness.

Environmental fungi:

That live in soil or water. Examples including Histoplasma, Coccidioides, Blastomyces and Aspergillus [11].

Symptoms:



Fig no :4: Fungal infection

Fungal infections can manifest in different ways depending on the type of fungus and the area of the body affected. Common symptoms include:

Skin Infections:

Itching, redness, and rash in the affected area. Common types include athlete's foot, jock itch, and ringworm.

Nail Infections:

Discoloured, thickened, or brittle nails, often seen in onychomycosis (nail fungus).

Oral Infections: White patches in the mouth or throat, pain while eating, and loss of taste, often associated with oral thrush.

Vaginal Infections:

Itching, burning, and unusual discharge, commonly caused by Candida species.

Respiratory Infections:

Symptoms like cough, fever, and difficulty breathing can occur if the infection affects the lungs [12].

ANTIFUNGAL CREAM

Antifungal creams are topical medication used to treat fungal infections of the skin, such as athlete's foot, ringworm, and jock itch. These creams typically contain active ingredient 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 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 [13].



Fig no :5: Antifungal cream

TREATMENT OF FUNGAL SKIN INFECTION:

The treatment of fungal infections usually comprises topical or oral preparations. Localized fungal infections are usually treated with topical treatment that needs to be typically applied once or twice a day for usually for two to three weeks.

Symptom resolution is the end goal of antifungal therapy.

Following are the topical treatments for fungal skin infections:

- ✓ Clotrimazole
- ✓ Ketoconazole
- ✓ Miconazole
- ✓ Terbinafine
- ✓ Oxiconazole
- ✓ Econazole

Treatment with oral therapy is important for more widespread infections or cases that show no improvement with topical treatment. Oral antifungals are expected to clear the condition in about 2 to 3 weeks [14].

Following are the suggested oral medications (one or more) to be used in the treatment of fungal skin infections:

- ✓ Terbinafine
- ✓ Fluconazole
- ✓ Itraconazole
- ✓ Griseofulvin

AIM AND OBJECTIVE

Aim

Formulation and Evaluation of herbal Antifungal Cream.

Objective

1. To prepare cream having antifungal properties.
2. Antifungal cream having herbal active pharmaceutical ingredient.
3. Selecting herbs having antifungal properties.
4. To improve the efficacy of Antifungal cream on fungal infection.
5. To reduce the side effect.

PLANT PROFILE

ACALYPHA INDICA

Acalypha indica is an herbal plant that grows mostly in wild and needs wet, temperate and tropical region. It is popular by names I.e. Indian Nettle, Copper leaves, Kuppaimeni(in Kerala). Local people acknowledge it for its medicinal uses and consume parts of it for therapeutic purposes.

MAIN HERBAL CONSTITUENTS:



Fig no:6: Acalypha indica

Plant taxonomy:

Kingdom:	Plantae
Order:	Malpighiales
Family:	Euphorbiaceae
Subtribe:	Acalyphinae
Genus:	Acalypha
Species:	A.indica

Common name: Indian copper leaf

Chemical constituents:

Acalypha indica, also known as Kuppaimeni, contains a variety of chemical compounds including tannins, flavonoids, acalypsin and the pyranoquinolinone alkaloid flindersin. Additionally, it contains phenolic compounds, saponins, steroids.

Aloe Vera:



Fig no:7: Aloe Vera

Synonyms	: Musabar, Ghrit-Kumari
Family	: liliaceae
Parts used	: Leaf gel
Chemical constituents	: Aloin, barbaloin, Isobarbaloin&Resine.

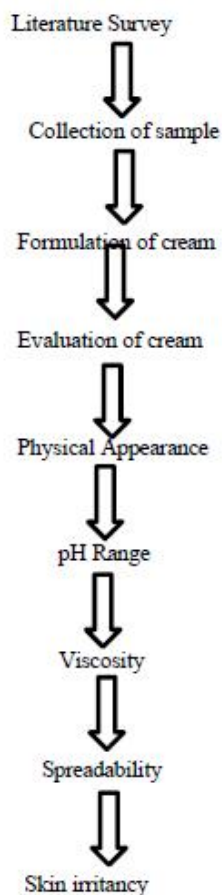
Turmeric:



Fig no:8: Turmeric

Synonyms:	Turmeric, Kurkum, haldi.
Family	: Zingiberaceae
Chemical constituents:	Curcumin
Parts used	: Rhizome paste, powder

5. PLAN OF WORK



6. METHODOLOGY:

Collection:

1. Fresh and healthy *Acalypha indica* leaves were collected from a clean area.
2. The plant was identified correctly before collection.
3. Mature and undamaged leaves were selected.
4. Leaves were carefully plucked from the plant.
5. The collected leaves were kept in a clean container for further processing.



Fig no:9: Collection

Drying:

1. The collected *Acalypha indica* leaves were washed with clean water.
2. The leaves were spread evenly on a clean tray or paper.
3. They were kept in a shaded place away from direct sunlight.
4. The leaves were dried at room temperature for several days.
5. After complete drying, the leaves were stored for further use.



Fig no:10: Drying

Powdering:

1. Completely dried *Acalypha indica* leaves were taken.
2. The dried leaves were crushed using a grinder or mortar and pestle.
3. The leaves were ground into a fine powder.
4. The powder was sieved to obtain a uniform particle size.
5. The obtained powder was stored in an airtight container for further use.



Fig no:11: Powdering

Collection of Turmeric:

1. Fresh turmeric rhizomes were collected from a clean place or market.
2. Healthy and good-quality turmeric rhizomes were selected.
3. Damaged or spoiled rhizomes were removed.
4. The collected turmeric was kept in a clean container.
5. It was then taken for further processing such as washing and drying.



Fig no:12: Collection of Turmeric

Drying of Turmeric:

1. Fresh turmeric rhizomes were washed with clean water.
2. The turmeric was cut into small pieces.
3. The pieces were spread on a clean tray.
4. They were dried in shade or sunlight for several days.
5. After complete drying, the turmeric was stored for further use.



Fig no:13: Drying of Turmeric

Powdering of turmeric:

1. Completely dried turmeric pieces were taken.
2. The dried turmeric was crushed using a grinder or mortar and pestle.
3. It was ground into a fine powder.
4. The powder was sieved to obtain uniform particle size.
5. The turmeric powder was stored in an airtight container for further use.



Fig no:14: Powdering of turmeric

Collection of Aloe vera gel:

1. Select fresh and healthy Aloe vera leaves from the plant.
2. Cut the thick outer leaves carefully using a clean knife.
3. Wash the leaves with clean water to remove dirt.
4. Keep the leaves upright for a few minutes to drain the yellow latex.
5. Cut the leaf from the sides and peel the outer green skin.
6. Collect the transparent Aloe vera gel from inside the leaf.
7. Store the gel in a clean container for further use.



Fig no:15: Collection of Aloe vera gel

Extraction of sample



Fig no:16: Extraction of Acalypha indica

The extract of Acalypha indica is prepared by first collecting and drying the leaves, which are then ground into a fine powder. The powdered material is soaked in ethanol and subjected to the maceration process, where it is kept in a closed container for a specific period with occasional stirring. During maceration, the ethanol penetrates the plant cells and dissolves the active phytochemical constituents such as flavonoids, tannins, and alkaloids. After sufficient soaking, the mixture is filtered to separate the liquid extract from the plant residue. The filtrate obtained is the ethanolic extract of Acalypha indica, which can be further concentrated and used for medicinal or

formulation purposes [15].



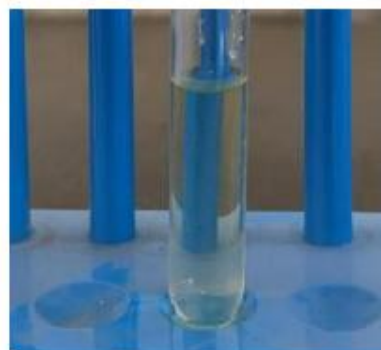
Fig no:17: Extraction of Turmeric

Turmeric extract can be prepared by the maceration process using ethanol as a solvent. First, dried turmeric rhizomes are collected, cleaned, and ground into a fine powder. The powdered turmeric is then soaked in ethanol in a closed container and allowed to stand for several days with occasional stirring to ensure proper mixing. During this process, the ethanol penetrates the plant material and dissolves the active constituents such as curcuminoids, essential oils, and other phytochemicals. After sufficient maceration, the mixture is filtered to remove solid residues, and the filtrate obtained is the ethanolic extract of turmeric, which can be further concentrated and used for pharmaceutical or herbal formulations [16].

Preliminary Test for *Acalypha Indica*

1. Alkaline Reagent Test

Procedure: Add a few drops of sodium hydroxide (NaOH) solution to the extract.



Observation: An intense yellow colour appears, which becomes colourless after adding dilute acid, confirming flavonoids.

Fig no:18: Alkaline Reagent Test

2. Lead Acetate Test

Procedure: Add a few drops of lead acetate solution to the plant extract.

Observation: Formation of a yellow precipitate indicates the presence of flavonoids.



Fig no:19: Lead Acetate Test

3. Ferric Chloride Test

Procedure: Add a few drops of ferric chloride (FeCl_3) solution to the extract.

Observation: Formation of a greenish or blackish colour indicates flavonoids.



Fig no:20: Ferric Chloride Test

Preliminary test for turmeric

1. Alkaline Reagent Test

Procedure: Add a few drops of sodium hydroxide (NaOH) solution to the extract.

Observation: A yellow colour appears, which becomes colourless after adding dilute acid, confirming flavonoids ^[17].

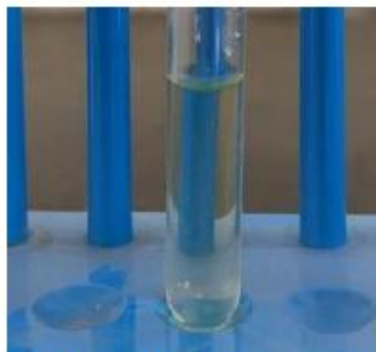


Fig no:21: Alkaline Reagent Test

2. Lead Acetate Test

Procedure: Add a few drops of lead acetate solution to the turmeric extract.

Observation: Formation of a yellow precipitate indicates the presence of flavonoids ^[18].

Fig no:22: Lead Acetate Test



3. Ferric Chloride Test

Procedure: Add a few drops of ferric chloride (FeCl_3) solution to the extract.

Observation: Appearance of a greenish or dark coloration shows the presence of flavonoids ^[19].



Fig no:23: Ferric Chloride Test

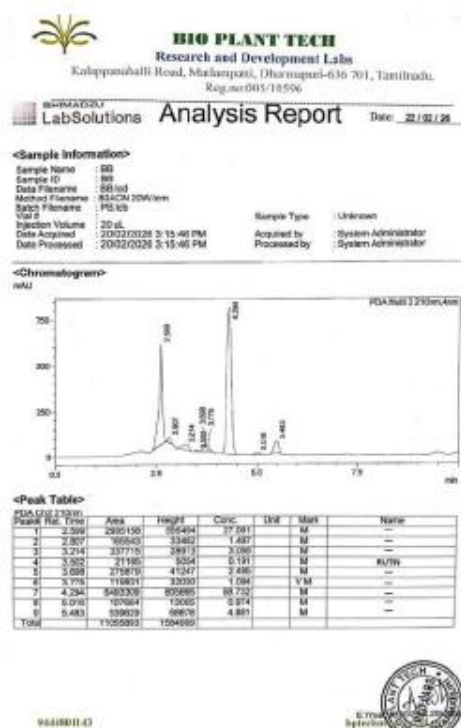


Fig no:24: Analysis of flavonoids in acalypha indica

Ingredient:

s.no:	Ingredient	Quantity	Roles
1	Acalypha indica	20 ml	Antifungal agent
2	Turmeric	10ml	Antifungal agent
3	Aloe vera gel	20 ml	Moisturizer
4	Glycerine	10 ml	Lubricant
5	Tween- 20	10 ml	Emulsifier
6	Bees Wax	1.5 gm	Emollient
7	Borax	0.2 gm	Buffer
8	Silica gel	0.1 gm	Obsorbent
9	Bentonite	4 gm	Thickening agent
10	Methyl Paraben	0.2gm	Preservative
11	Rose oil	Q. S	Fragrance

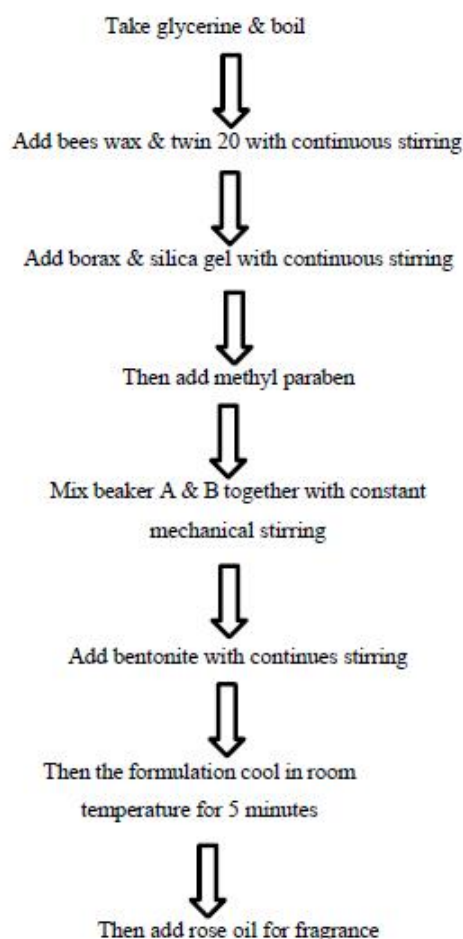
Table no: 1: Ingredients

Formulation Of Cream:

Beaker A

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

Beaker B



Physical Appearance

S.NO	Parameters	Observation
1.	Colour	Yellow
2.	Odour	Aromatic
3.	State	Semi solid
4.	Texture	Smooth

Table no: 2: Physical Appearance

Evaluation of Formulated Herbal cream:

(a) Physical examination:

Formulated cream was evaluated for its colour, odour, taste, smoothness, relative density. Results showed that the cream and both gels had a cosmetically appealing appearance and smooth texture, and they were all homogenous with no signs of phase separation.



Fig no:25: Physical appearance

(b) pH determination:

pH of formulated herbal cream was determined by using pH meter. 0.5 g cream was taken and dispersed in 50 ml distilled water and then PH was measured by using digital PH meter

(c) Spreadability:

The spread ability was expressed in terms of time in seconds taken by two slides to slip off from the cream, placed in between the slides, under certain load. Lesser the time taken for separation of the two slides better the spread ability. Then a weight or certain load was placed on the upper slide so that the cream between the two slides was pressed uniformly to form a thin layer.

$$\text{Spread ability} = m \times 1/t$$

Were,

m= Standard weight which is tied to or placed over the upper slide (10g)

I= length of a glass slide (7.5cm),

t= time taken in seconds(7sec)



Fig no:26: Spreadability test

d) Phase separation:

Prepared cream was kept in a closed container at a temperature of 25-100 °C. Then phase separation was checked for 24 h for 30 d. Any change in the phase separation was observed/checked. According to the results no phase separation was observed in formulations [20].

e) Wash ability:

Wash ability test was carried out by applying a small amount of cream on the hand and then washing it with help of tap water. formulation was easily washable.

IV.CONCLUSION

In summary, the study found that *Acalypha indica* leaves contain a variety of phytochemicals including tannins, saponins, flavonoids, terpenoids, anthraquinone, steroids, polyphenols, glycosides, and coumarins. The leaves also showed significant anti-inflammatory and antimicrobial activity, specifically against microbes causing skin disease. This study is the first to provide scientific evidence for the medicinal properties of *Acalypha indica* leaves, supporting their traditional use in India.

V. RESULT AND DISCUSSION

RESULT: The herbal antifungal cream was successfully formulated using extracts of *Acalypha indica*, (turmeric), and aloe vera. The prepared cream was evaluated for various physicochemical parameters, and the results showed that the formulation was suitable for topical use.

DISCUSSION: The results confirm that the formulated herbal cream possesses good physical properties, acceptable pH, good spreadability, and stability. The selected plant extracts contribute to the antifungal activity and skin-friendly nature of the formulation. Compared to synthetic antifungal creams, herbal formulations may offer fewer side effects and better patient acceptability. Thus, the formulated herbal antifungal cream can be considered a promising natural alternative for the treatment of fungal skin infections.

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