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Formulation and Evaluation of Herbal Anti-Fungal Cream

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ABSTRACT:-

The goal of using herbal medicine is to treat diseases effectively and safely. According to the World Health Organization (WHO), about 80% of the world's population relies on herbal medicine as their main form of healthcare.

This study focuses on developing an antifungal cream—a type of cream used to kill or stop the growth of fungi. The aim is to make a cream that is both effective and safe, without causing unwanted side effects.

For this research, a plant from the mint family called Ocimum Americanum L., also known as lantulas, was used to create the cream. This plant contains natural compounds like terpineol, methyl chavicol, eugenol, and linalool. These ingredients are found in the plant's essential oils and are known to have several medicinal properties, including antifungal, antibacterial, antioxidant, and anti-parasitic effects.

The plant material was first soaked in 80% methanol for a day. Then it was filtered, and the liquid was heated in a water bath until it became a thick, semi-solid extract. This extract was then used to make the antifungal cream.

The main focus of this study is to test how well Ocimum Americanum works against fungal infections and to ensure that the cream made from it is safe to use.

KEYWORDS:- Herbal Antifungal Cream, Fungal Disease, Herbs, Herbal Ingredient, Skin Infection.

NEED OF INVESTIGATION OF HERBAL ANTI-FUNGAL CREAM:

1. **Rising Antifungal Resistance**
   - **Problem**: Common synthetic antifungal drugs (like azoles or allylamines) are becoming less effective due to the development of resistant fungal strains.
   - **Need**: Investigating herbal alternatives could offer new mechanisms of action that circumvent resistance.
2. **Side Effects of Synthetic Drugs**
   - **Problem**: Many commercial antifungal creams can cause side effects such as irritation, burning, or allergic reactions.
   - **Need**: Herbal formulations, if proven safe and effective, could offer gentler options with fewer adverse effects.
3. **Rich Source of Bioactive Compounds**
   - **Observation**: Many herbs contain phytochemicals (e.g., terpenoids, flavonoids, alkaloids) with known antifungal activity.
   - **Need**: Scientific validation of these compounds can lead to the development of potent herbal antifungal formulations.
4. **Cost-Effectiveness and Accessibility**
   - **Problem**: Synthetic antifungal treatments may be expensive or unavailable in low- resource settings.
   - **Need**: Herbal creams can potentially be produced locally at lower cost, improving access to treatment in rural or underdeveloped areas.
5. **Demand for Natural Products**
   - **Trend**: There is a growing consumer preference for herbal and organic personal care products.

- **Need**: Investigation ensures that marketed herbal antifungal creams are not only natural but also scientifically proven to be effective and safe.

6. **Potential for Novel Drug Development**

- **Opportunity**: Screening herbal formulations can lead to the discovery of new antifungal agents or drug leads.

Need: Investigation supports drug development pipelines for both topical and systemic antifungal therapies.

OBJECTIVE:-

Antifungal creams *are used to treat fungal infections like athlete's foot, ringworm, and yeast infections. These creams work by targeting and killing the fungus causing the problem.*

Here are some common ingredients you'll find in antifungal creams:

- ***Clotrimazole*** *– Treats a variety of fungal skin infections.*
- ***Miconazole*** *– Often used for athlete's foot and other common fungal issues.*
- ***Terbinafine*** *– Works especially well on infections caused by dermatophytes (a type of fungus).*
- ***Ketoconazole*** *– Frequently used for skin and yeast infections.*

To get the best results, always follow the directions on the label. Apply the cream as instructed to the affected area. If your symptoms don't improve or get worse, it's a good idea to see a doctor.

INTRODUCTION:-

Herbal Cosmetics –

Herbal cosmetics are beauty products made from natural ingredients like plants, herbs, and minerals. People choose them because they often don't contain harsh chemicals, making them a gentler option for skin and hair care.

Common ingredients you'll find in these products include aloe vera, tea tree oil, lavender, and rosehip. These natural ingredients are known for their soothing, moisturizing, and healing properties. Many herbal cosmetics are also inspired by traditional healing practices, like Ayurveda from India or traditional Chinese medicine.

Because they're made from natural sources, herbal cosmetics are usually considered safer and less likely to cause skin problems. They're also better for the environment since they come from renewable resources and often break down naturally.

However, just because something is natural doesn't mean it works for everyone. It's still important to choose the right product for your skin and talk to a dermatologist if you have any specific concerns.

Antifungal Creams –

Antifungal creams are medicines you put on your skin to treat fungal infections like athlete's foot, ringworm, or jock itch. These infections can make your skin itchy, red, and irritated.

The creams have ingredients like clotrimazole, miconazole, terbinafine, or ketoconazole. These fight off the fungus and help clear up the infection. You apply the cream directly to the infected area and use it for a certain number of days, as directed by a doctor or written on the package.

To get the best results, it's important to use the cream regularly and follow the instructions carefully. When used the right way, antifungal creams can stop the fungus from growing and help your skin heal.

DRUG PROFILE OF HERBAL ANTI-FUNGAL CREAM:

1. **Name of the Product:**

Herbal Antifungal Cream *(Example: "FungoHerb Cream")*

2. **Dosage Form:**

Topical cream

3. **Category:**

Herbal antifungal agent

4. **Composition:**

Herbal Ingredient	Quantity	Role
Neem	20 ml	Antifungal, antibacterial
Turmeric	10 ml	Anti-inflammatory, antifungal
Beeswax	1.5 g	Emollient
Aloe Vera	20 ml	Soothing, wound healing
Borax	0.2 g	Buffer
Rose oil	q.s.	Fragrance

5. **Mechanism of Action:**

- **Azadirachtin** (from neem) – disrupts fungal cell membranes.
- **Curcumin** (from turmeric) – inhibits fungal growth by affecting cell division.
- Inhibit fungal growth
- Destroy fungal cell walls
- Reduce inflammation and itching
- Promote skin healing

6. **Dosage and Administration:**

- Apply topically to the affected area 2–3 times daily
- Continue for at least 1 week after symptoms subside to prevent recurrence

7. **Contraindications:**

- Hypersensitivity to any of the herbal components
- Open wounds or mucosal surfaces (unless specifically tested and approved)

8. **Side Effects:**

- Mild irritation or redness (rare)
- Allergic reaction in sensitive individuals (patch test recommended)

9. **Storage Conditions:**

- Store in a cool, dry place away from direct sunlight
- Keep container tightly closed when not in use

9. **Shelf Life:**

- 24 months from the date of manufacture (may vary with preservatives used)

10. **Regulatory Status:**

- Classified under Herbal product category
- Subject to quality and safety testing under herbal medicine regulations

EXCIPIENTS PROFILEOF HERBAL ANTI-FUNGAL CREAM:

1. **Cream Base (Emulsion System)**

- Purpose: Acts as the vehicle for delivering the herbal actives.
- Types: Oil-in-water (O/W) or water-in-oil (W/O) emulsions depending on skin type and therapeutic goal.

Common Ingredients:

- Emulsifying Agents:

- Glyceryl monostearate: Emulsifier and stabilizer.

2. Humectants

- Purpose: Attract and retain moisture in the skin.
- Examples:

- Glycerin: Natural humectant, improves skin hydration.
- Propylene glycol: Also enhances penetration of actives.

3. Emollients

- Purpose: Soften and smooth the skin; enhance skin feel.
- Examples:
  - Mineral oil or light liquid paraffin: Occlusive agent.
  - Shea butter or cocoa butter: Natural plant-based emollients.

4. Thickeners/Gelling Agents

- Purpose: Control viscosity and improve application.
- Examples:
  - Carbopol (Carbomer): Synthetic polymer for gel consistency.
  - Xanthan gum or guar gum: Natural alternatives.

5. Preservatives

- Purpose: Prevent microbial contamination during storage and use.
- Examples:
  - Essential oils (e.g., tea tree oil, clove oil): Some have preservative effects and may synergize with the antifungal action.

6. pH Adjusters

- Purpose: Maintain skin-friendly pH (usually ~5.5).
- Examples:
  - Citric acid or lactic acid: Adjusts acidity.
  - Sodium hydroxide: Raises pH if needed.

7. Antioxidants

- Purpose: Prevent oxidation of herbal components and oils.
- Examples:
  - Tocopherol (Vitamin E): Natural antioxidant.
  - Ascorbic acid (Vitamin C): Supports antioxidant stability.

PLAIN OF WORK OF HERBAL ANTI-FUNGAL CREAM:

1. Product Concept and Objective

- **Objective**: To develop a natural, effective, and safe herbal anti-fungal cream for topical use to treat fungal skin infections (e.g. athlete's foot, ringworm, jock itch).
- **Target Audience**: Individuals suffering from mild to moderate fungal infections, especially those preferring herbal or natural remedies.

2. Research & Development

- **A. Literature Review**
  - Identify effective antifungal herbs (e.g., neem, tea tree oil, turmeric, basil, aloe vera, calendula).

- Study traditional uses and modern research on each.

- **B. Ingredient Selection**
  - Base cream formulation (e.g., shea butter, coconut oil, beeswax).
  - Active herbal ingredients with antifungal properties.
  - Pre
  - servatives and stabilizers (natural options preferred).
- **C. Formulation Testing**
  - Prototype multiple formulations.
  - Test for stability, pH, texture, and shelf life.
- **D. Efficacy Testing**
  - In-vitro and possibly in-vivo antifungal activity tests.
  - Dermatological testing for skin irritation and safety.

3. **Regulatory Compliance**
   - **A. Product Classification**
     - Determine if it's a cosmetic or over-the-counter (OTC) medicine.
   - **B. Documentation**
     - Compile ingredient safety data.
   - Prepare product information file (PIF).**C. Licensing and Approvals**
     - Seek approvals from health authorities (e.g., FDA, AYUSH in India).
     - Ensure GMP compliance.
4. **Manufacturing**
   - **A. Sourcing Raw Materials**
     - Select certified suppliers of herbs and base ingredients.
   - **B. Production Process**
     - Batch manufacturing under hygienic conditions.
     - Quality control at every stage (raw material, in-process, finished product).
   - **C. Packaging**
     - Choose suitable containers (tubes, jars).
     - Labeling in accordance with legal and marketing requirements.
5. **Marketing and Distribution**
   - **A. Branding**
     - Choose product name and brand identity.
     - Design logo and packaging visuals.
   - **B. Marketing Strategy**
     - Educate customers on herbal benefits.
     - Online and offline promotional campaigns.
   - **C. Distribution Channels**
     - Online marketplaces (Amazon, own website).
     - Pharmacies, health stores, and wellness centers.

6. **Monitoring and Feedback**
    - Collect customer feedback post-launch.
    - Address complaints or adverse effects.

LITERATURE SURVEY:

1. **Venugopalan Santhosh Kumar et al. (2013)**

Neem (Azadirachta indica) is mostly grown in the Indian subcontinent and has been used in traditional medicine for thousands of years. According to the World Health Organization

(WHO), many people in developing countries rely heavily on traditional remedies. In India, neem has been used for over 4,500 years to treat a wide range of health issues. Different

parts of the neem tree—including the fruit, seeds, oil, leaves, roots, and bark—have all been found to have healing properties.

For example, people have long used neem twigs to clean their teeth, neem leaf paste or juice to treat skin problems and infections, and neem tea as a general health tonic. Neem leaves have also been used to keep insects away from beds, food storage bins, and closets. Because of its many uses, neem is often called "the village pharmacy"—a natural remedy for everything from fevers and infections to everyday aches and pains.

2. **Rakesh Kumar Singh (2019)**

Neem (Azadirachta indica) has been a key part of traditional Indian medicine systems like Ayurveda and homeopathy for centuries. It's not only widely grown in India but is also found in countries like Australia, Africa, Asia, and the Americas—even in parts of Europe and the United States, where some small farms are reported to be successful.

Neem is one of the most well-known medicinal plants in India, and Ayurveda describes many of its health benefits. Every part of the neem tree is used for healing:

- Flowers: Neem flowers can be used fresh, dried, or as a powder. In South India, they're even used in cooking. They help treat issues like nausea, intestinal worms, and skin discoloration (bleaching).
- Fruit pulp: This can be used both as a natural medicine and for making methane gas as an energy source.
- Wood: Neem wood is strong and durable, making it a good choice for making furniture.
- Bark: The bark is believed to help purify the blood, support healthy hair, and control blood sugar levels.
- Seeds: Neem seeds are used to treat intestinal worms and leprosy.

3. Seed oil: Neem oil from the seeds is used to treat skin conditions like eczema, leprosy, and other irritations**Balraj Singh Gill et.al. (2018):**

Vitex negundo, also known as Nirgundi, is a medicinal plant with many healing uses. It has been used in traditional medicine across several countries, including India, China, Nepal, Pakistan, Sri Lanka, Indonesia, the Philippines, and Indochina.

Historically, Nirgundi leaves have been used to treat arthritis, inflammation, skin infections, and even eye problems. People also use dried Nirgundi leaves when storing woolen clothes because the leaves help repel worms and insects that can damage the fabric.

4. **Nurkhalida Kamal et.al (2022):**

Since ancient times, the Vitex negundo plant—especially its leaves and fruits—has been used in many herbal remedies. People have prepared it in different forms like powders, pastes,

decoctions (herbal teas), and dried fruits to treat various health issues.

Traditional healing systems such as Ayurveda, Unani, Chinese medicine, Malay medicine, European herbal practices, and ancient Greek medicine have all recognized the healing power of Nirgundi (Vitex negundo).

These systems used it to treat many conditions, including:

- Rheumatism (joint pain and inflammation)
- Skin diseases
- Digestive problems
- Sexual health issues, such as low libido or hormonal imbalances

Overall, Vitex negundo has been valued for its wide range of healing properties across cultures and medical traditions.

5. Vandana Jain et.al (2012):

Murraya koenigii, also known as curry leaves, is an important herb in Indian traditional medicine systems like Ayurveda, Unani, and Siddha. It's been used for centuries in both cooking and healing. Different parts of the plant—like the leaves, stems, bark, and oil—are known for their medicinal benefits.

The plant helps with digestion and boosts general health. Its leaves, bark, and roots are often applied to the skin to treat poisonous bites from animals, skin outbreaks, and to stimulate the body. Eating the raw green leaves can help with digestive issues like diarrhea and dysentery, and they are sometimes used to induce vomiting if needed.

MATERIAL AND METHOD:

1. Neem

Neem, also called *Azadirachta indica*, is a tree that originally comes from the Indian subcontinent. It's well-known for its many uses in health, agriculture, and traditional practices. People have used neem in natural medicine for hundreds of years because it has powerful healing properties.

Neem contains natural compounds that can fight bacteria, fungi, and viruses, and it also helps reduce inflammation. Neem oil,

which is made from its seeds, is often used on the skin to help with conditions like acne, eczema, and psoriasis. You'll also find neem in products like toothpaste and mouthwash because it helps fight germs in the mouth.

Today, many neem-based products are sold, including soaps, shampoos, lotions, and supplements. These products are popular because neem helps keep the skin healthy and protects against infections.

2. Turmeric

Turmeric is a bright yellow spice that comes from the root of a plant called *Curcuma longa*, which is related to ginger. It originally comes from India and Southeast Asia. People have been using it for thousands of years, especially in cooking and traditional medicine across Asia—most famously in Indian cuisine and Ayurvedic practices.

3. Aloe vera

Aloe vera is a well-known plant that has been used for centuries for its healing and medicinal qualities. It's a type of succulent, originally from North Africa, and it's famous for the thick, gel-like substance found inside its leaves.

This gel is mostly made up of water but also contains amino acids, vitamins, fats, plant steroids, tannins, enzymes, and other natural compounds like phenols, saponins, and anthraquinones. These ingredients give Aloe vera powerful antiviral, antibacterial, and antifungal properties.

Because of these qualities, Aloe vera is widely used in traditional medicine as well as in modern products for skin care, health, and wellness.

4. Glycerine

Glycerine (also called glycerol) is a thick, clear liquid that has no smell and tastes sweet. You'll find it in many products like medicines, skincare items, food, and even some types of explosives. Scientists have studied it a lot because it's useful in many ways—like keeping skin moist, helping make pills and creams, and understanding what happens when people eat it or put it on their skin. Chemically, it's a type of sugar alcohol with three parts called "hydroxyl groups," which help it mix easily with water and alcohol.

5. Beeswax

Beeswax is a natural substance made by honeybees. It's essential for building and maintaining their hives.

Chemically, beeswax is a mix of different ingredients like fats, oils, and waxy substances. This mix gives it special qualities that make it useful in many industries, from cosmetics to candle-making.

The key ingredients in beeswax include fatty acids like palmitic, oleic, and linoleic acids, as well as alcohols such as triacontanol and melissyl alcohol. These compounds are what give beeswax its unique smell and texture.

6. Borax

Borax (also called sodium borate) is a natural compound that's used in lots of different ways, both at home and in various industries. Its chemical formula is **$Na_2B_4O_7 \cdot 10H_2O$**, but you don't need to worry about that unless you're doing chemistry.

Borax is mostly found in nature and is mined in places like **Turkey, the United States, and Chile**.

It looks like a **white, powdery substance** with no smell, and it **dissolves easily in water**. One of its key features is that it helps

keep the **pH level (acidity) of liquids balanced**, which is why it's used in things like **cleaning products, makeup, and even some foods**.

6. Methyl paraben

Methyl paraben is a chemical that's often added to products like makeup, medicine, and food to help keep them fresh and free from germs. It works by stopping bacteria and mold from growing, which helps the product last longer.

It's part of a group of chemicals called **parabens**, which are made from a substance called para-hydroxybenzoic acid.

Methyl paraben, in particular, is made by combining that acid with methanol.

While it's good at keeping products safe to use, there's been some concern that methyl paraben might affect hormones in the body because it can act a bit like estrogen. However, most scientists agree that the small amounts people are usually exposed to are not likely to be harmful.

7. Rose oil

Rose oil, also called *rose otto* or *rose essential oil*, is made from the petals of rose flowers— most commonly the **Rosa damascena** or **Rosa centifolia** types. It's usually extracted through a

process like steam distillation or using a solvent, which creates a powerful, sweet-smelling oil.

People often use rose oil in **aromatherapy** because it's believed to help **calm the mind** and **improve mood**. Some research even shows that just **smelling rose oil** can help lower **anxiety** and make you feel more **relaxed**.

Method of extraction (Neem extract)

1. Mixed with 500 ml of distilled water.
2. Boiled for 30 min.
3. Take 50 gm of dried neem leaf powder.

4. Boiled solution ware filtered using filter paper.
5. Clear aqueous leaf extract was obtain.

Fig. Neem Leaf

Fig. Neem Extract

Turmeric extract

1. Take 20 g of dried turmeric.
2. Mixed with 100 ml of distilled water.
3. Boiled solution were filtered using filter paper.
4. Clear aqueous turmeric extract was obtained.

Fig. Turmeric

Fig. 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 stir ring

Fig. Water Phase

Fig. Aloe Vera

In Beaker B

1. Take glycerine and boil.
2. Add bees wax and twin 20 with continuous stirring.
3. Add borax and silica gel with continuous stirring.
4. Then add methyl paraben.
5. Mix beaker A and B together with constant mechanical stirring.
6. Add bentonite with continuous stirring.
7. Then formulation cool in room temperature for 5 min.
8. Then add rise oil for fragrance.

Fig. Oil Phase

EVALUATION OF FORMULATION

Organoleptic Properties:

This means how the cream looks, feels, smells, and what color it is. These sensory qualities help tell us how good the cream is and what the user experience will be like. When testing the cream, we check it carefully to make sure it looks clean, has the right texture, and doesn't have any unwanted particles in it.

Determination of pH:

"To measure the pH, we first calibrated the pH meter using a standard buffer solution. Then, we took about 0.50 grams of the cream, dissolved it in 50 milliliters of purified water, and used a digital pH meter to check the pH of the mixture."

Safety:

The cream should be safe to use and shouldn't cause any irritation or harmful side effects.

Homogenicity:

"We checked the formulations for uniformity by touching them, visually inspecting them, and performing specific homogeneity tests."

Phase Separation:

"We poured the prepared cream into a wide-mouth container. After letting it sit for a day, we'll be able to see the oil and water parts of the cream separating."

RESULT AND DISCUSSION:

When apply the cream, it inhibit the growth of fungi and kill them.

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

In this study, we aim to create a polyherbal formulation and test how well it works against fungal infections. Fungal and bacterial infections can cause various skin problems, such as damage to skin cells, changes in skin texture, and discoloration. Fungal infections are especially common in sweaty or damp areas like skin folds, feet, and the groin.

To start, we conducted a market and literature survey, which showed that the specific combination of herbs we're using hasn't been tried before. We chose the plants based on earlier research and the information available about their medicinal properties.

After selecting the herbs, we developed a polyherbal antifungal formulation and tested it in the lab to see how effective it is at fighting fungal infections.

CONCLUSION:

As people become more aware of the environmental impact of pharmaceuticals and seek more natural, sustainable options, herbal remedies are gaining popularity. Herbal antifungal creams, which use plant-based ingredients, offer a promising alternative to synthetic medications by combining effectiveness with a lower risk of side effects.

One major advantage of herbal formulations is that they are often gentler on the body compared to chemical treatments. Recent scientific research is also backing up the traditional use of certain plant compounds, showing that they can effectively fight fungal infections.

This blend of ancient herbal wisdom and modern science is building trust in herbal antifungal creams and encouraging their use in mainstream healthcare. Looking ahead, these creams are likely to play a bigger role thanks to their focus on sustainability, safety, and effectiveness— making them a strong option in the future of antifungal treatments.

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