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Formulation and Evaluation of Antifungal Herbal Cream

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ABSTRACT

The aim of the study was to formulate a cream containing herbal composition to treat fungal infections of the skin and improve skin properties. This preparation belongs to herbal medicinal creams containing antifungal agents. It reveals a formula for treating skin fungal infections. For skin infections, a topical approach is the best option. Developing a local drug delivery system with systemic action may be advantageous for a variety of drugs, as it offers many advantages over traditional drug administration routes. Herbal ingredients such as Aloe vera, Neem, Tulsi, Pot Marigold (calendula) oil used to treat fungal skin infections. The cream base also contains bees wax, liquid paraffin, borax and methyl paraben. Rose oil is used for better fragrance. When the extracted herbal ingredients combine, they exert a powerful antifungal effect. The herbal antifungal cream formulation prepared was checked for its efficacy and safety. The prepared antifungal cream was performed to evaluate the physico-chemical properties of formulated cream, including: Physical Appearance- Colour, Odour, Texture, State, pH, Spreadability, Homogeneity, Removal, After feel, Type of smear, Irritancy study and Antifungal activity. The medicated cream had good viscosity and color. However, the aroma of rose water was characteristic. Formulated herbal antifungal cream formulations were found to produce Antifungal effect with no irritation and rashes on skin.

KEYWORDS: *Herbal Antifungal cream, Topical drug delivery system, Aloe vera, Neem, Tulsi, Pot Marigold (calendula), Rose petals*

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INTRODUCTION

Fungal infections are one of the deadliest infections accountings in excess of 1.5 million deaths annually worldwide. The main reason for fungal infection is neglected by the society. Over the past two decades, fungal infections have increased significantly in frequency and as causes of morbidity and mortality. Fungal infections are also called mycosis, is a skin disease caused by a fungus and a type of microorganisms. There are millions of species of fungi, fungi can live in the air, soil, water, plants and also live-in human body. They can also lead to skin problems like rashes or bumps. Fungal infections come in different forms like ringworm, athletes' foot, yeast infections and jock itch. Some fungi like aspergillus can be dangerous and leads to life threatening disease. Fungal infections can be contagious and can be spread from one person to another person. [1,2]

Materials and Method: The Antifungal herbal cream was formulated using natural herbal ingredients, selected herbal ingredients collected from nearby region. Herbs along with their part used in formulation of Antifungal herbal cream are tabulated in table.

Sr. No.	Common name	Picture	Botanical name	Part used	Category / Use
1	Aloe Vera		*Aloe vera (L.) Burm*	Leaf	Anti-inflammatory and antifungal activity; stimulate cell proliferation
2	Tulsi		*Ocimum tenuiflorum*	Leaf	Antifungal
3	Neem		*Azadirachta indica*	Leaf	Relieves skin dryness, itching and redness
4	Pot marigold		*Calendula officinalis*	Flower	Anti-inflammatory and antifungal activities
5	Rose oil		*Rosa damascena*	Petals	Fragrance

Extraction Process:

1. **Aloe Vera:**[3,4,5]

- Mature, healthy and fresh aloe Vera leaves were collected and washed with distilled water.
- Then after proper drying of leaves in hot air oven, the outer part of the leaf was dissected longitudinally using a sterile knife.
- Then the aloe Vera gel that is the colorless parenchymatous tissue was removed using the sterile knife.
- Then it is filtered using muslin cloth to remove the fibers and impurities.

2. **Tulsi:**[6]

- Tulsi leaves were collected and washed with distilled water and dried in hot air oven.
- Then after proper drying, the leaves were powdered.
- Then 1g Tulsi leaf powder + 10 ml dimethyl sulfoxide was taken in a volumetric flask and then shake.
- Then the solution was heated on water bath at 80 to 100 °C for few minutes and then concentrated up to 5 ml and filtered using a muslin cloth to remove impurities.
- Then the filtrate or the filter product in which a clear solution or clear extract of Tulsi leaves was used in the preparation.

3. **Neem:**[7]

- Neem leaves were collected and washed with distilled water and dried in hot air oven.
- After proper drying, leaves were powdered.
- Then 5g Neem leaves powder + 50 ml dimethyl sulfoxide was taken in a volumetric flask and shake.
- Then the solution was heated on a water bath at 80-100 °C and concentrated up to 20 ml and then filtered using muslin cloth to remove impurities.
- Then the filtrate or filter product obtained, which is a clear solution or clear extract of Neem leaves, was used in the preparation.

Formulation Table:

Sr. No.	Ingredients	Batch 1	Batch 2	Batch 3
1	Aloe Vera	1.5 ml	1 ml	1 ml
2	Tulsi	0.5 ml	0.2 ml	0.4 ml
3	Neem	1.5 ml	1 ml	1 ml
4	Pot marigold oil	2 ml	1.5 ml	1 ml
5	Bees wax	3 gm	3 gm	3 gm
6	Liquid paraffin	10 ml	10 ml	10 ml
7	Borax	0.4 gm	0.4 gm	0.4 gm
8	Methylparaben	0.3 gm	0.3 gm	0.3 gm
9	Rose oil	Q.S.	Q.S.	Q.S.

Formulation of cream:[8,9]

- Heat liquid paraffin and beeswax in a borosilicate glass beaker at 75 ℃ and maintain that heating temperature. (Oil phase). In another beaker, dissolve borax, methylparaben in distilled water and heat this beaker to 75 ℃ to dissolve borax and methylparaben and to get a clear solution. (Aqueous phase).
- Then slowly add this aqueous phase to heated oily phase.
- Then add a measured amount of aloe Vera gel, Neem extract, Tulsi extract and Pot marigold oil (calendula oil) and stir vigorously until it forms a smooth cream.
- Then add few drops of rose oil as a fragrance.
- Put this cream on the slab and add few drops of distilled water if necessary and mix the cream in a geometric manner on the slab to give a smooth texture to the cream and to mix all the ingredients properly.
- This method is called as slab technique or extemporaneous method of preparation of cream.

Evaluation test for prepared antifungal herbal cream:[10,11]

1. **Physical appearance:** The physical appearance of the cream can be observed by its colour, odour, texture & state.
2. **Determination of pH:** The pH of the cream can be measured on a standard digital pH meter at room temperature by taking adequate amount of the formulation diluted with a suitable solvent in a suitable beaker.
3. **Spreadability:** Adequate amount of sample is taken between two glass slides and a weight of 100gm is applied on the slides for 5 minutes. Spreadability can be expressed as,

$$S = \frac{m \times l}{t}$$

Where,
m = weight applied to upper slide.
l = length moved on the glass slide.
t = time taken.

4. **Homogeneity:** The formulation was tested for the homogeneity by visual appearance and by touch.
5. **Removal:** The ease of removal of the creams applied was examined by washing the applied part with tap water.
6. **After feel:** Emolliency, slipperiness and amount of residue left after the application of fixed amour cream was checked.
7. **Type of smear:** After application of cream, the type of film or smear formed on the skin were checked.
8. **Irritancy study:** Mark an area of 1sq.cm on the left-hand dorsal surface. The cream was applied to the specified area and time was noted. Irritancy, erythema, edema was checked, if any, for regular intervals upto 24hrs and reported.
9. **Antifungal Activity:**

Prepare Samples: Cut each bread slice into quarters or use whole slices if small. Lightly moisten the bread with a sterile water mist to promote mold growth.

Control: No cream, just moist bread.

Positive control: Prepared antifungal herbal cream.

Test area: Apply a thin layer of prepared antifungal herbal cream to a section of the bread surface using a sterile swab.

Incubation:
Place each piece in a separate sealed ziplock bag or container. Store at room temperature (20–25°C) in the dark.

Observation:
Check daily observation for up to 3–5 days. Watch for mold growth patterns—usually black, green, or white fuzzy patches. Compare how much mold grows on the cream-treated bread (Positive control) vs. the control.

Observation Table:

Sr. No.	Evaluation Test	Observation / Result		
		Batch 1	Batch 2	Batch 3
1	Physical Appearance			
a	Colour	Buff yellow to cream	Buff yellow to cream	Buff yellow to cream
b	Odour	Pleasant	Pleasant	Pleasant
c	Texture	Smooth	Smooth	Smooth
d	State	Semisolid	Semisolid	Semisolid
2	pH	6.9	6.7	6.3
3	Spreadability (gm.cm/sec)	18.09	19.10	22.05
4	Homogeneity	Homogenous	Homogenous	Homogenous
5	Removal	Easily Removable	Easily Removable	Easily Removable
6	After feel	No residue, very soft	No residue, soft	No residue, soft
7	Type of smear	Very moist	Mild moist	Less moist
8	Irritancy study	Non irritant	Non irritant	Non irritant
9	Antifungal Activity	No mold on cream	Less mold on cream	Less mold on cream

Results and discussion:

1. **Physical appearance:**
The colour of prepared antifungal herbal cream was found to be Buff yellow to cream, pleasant odour, Smooth texture & Semisolid state.

2. **Determination of pH:** The pH of prepared antifungal herbal cream was found to be in the range of 6.3 – 6.9.

   According to the results, the PH of all the three formulations (Batch 1, Batch 2 & Batch 3) were found to be nearer to skin pH so it can be safely used on the skin.

3. **Spreadability:**
   The spreadability of the three formulations that is Batch 1, Batch 2 & Batch 3 was carried out and out of that for Batch 1 the time taken by the 2 slides to separate is less, lesser the time taken for separation of the two slides better the spreadability so according to this statement Batch 1 showed better spreadability.

4. **Homogeneity:** All prepared batches were found to be Homogenous.

5. **Removal:** All prepared batches were removed easily and found satisfactory results.

6. **After feel:** No residue found on the skin surface after application and feels very soft.

7. **Type of smear:** Amongst all 3 batches, smear of Batch 1 found to be very moist.

8. **Irritancy study:** According to the results of all the 3 batches that is (Batch 1, Batch 2 & Batch 3) showed no sign of irritancy, erythema and edema found satisfactory.

9. **Antifungal Activity:** Amongst all 3 batches, Batch 1 shows no mold on cream and Batch 2 & Batch 3 shows less mold on cream. Batc shows satisfactory & better result.

Conclusion:
The use of herbal/bioactive ingredients in antifungal herbal creams influences the biological functions of the skin and provides necessary benefits for healthy skin against antifungal infections. The prepared formulations exhibited good spreadability and better feel without any irritancy throughout the study period. The main ideology behind combining the plant materials is to observe the effect of different plants in the development of skin care formulation. The combination proves to be beneficial in preparation of antifungal herbal cream formulations. The herbal antifungal cream formulation prepared was checked

for its efficacy and safety. The antifungal activity of prepared antifungal herbal cream was found satisfactory results shows less or no mold and gives potential antifungal effect**.** Hence, a new way can be found to combat antibiotic resistance of pathogenic organism and provide safe and healthy living through germ free skin. From this study, it can be concluded that the formulated herbal antifungal cream formulations were found to produce moisturizing effect with no irritation and rashes on skin.

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