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"Formulation And Evaluation Of Herbal Antifungal Cream From Tea Tree Oil"

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ABSTRACT :

Fungal infections, such as dermatophytosis and candidiasis, are becoming increasingly common due to environmental shifts and weakened immune systems. This study developed an herbal antifungal cream using tea tree oil, known for its antifungal and anti-inflammatory effects. The formulation also included glycerin and vitamin E oil to improve moisture, stability, and application. Tests on pH, spread ability, viscosity, and stability showed that the cream had effective antifungal activity, good skin compatibility, and favorable physical properties, suggesting it as a promising natural option for treating fungal skin infections.

Key Word: Antifungal, Tea tree oil.

1. INTRODUCTION

Fungal skin infections, commonly caused by dermatophytes, yeasts, and molds, are prevalent in warm, moist conditions. While conventional treatments are effective, natural remedies like tea tree oil are gaining popularity due to fewer side effects. Rich in compounds like terpinen-4-ol, tea tree oil disrupts fungal membranes, helping treat infections such as athlete's foot, ringworm, and jock itch. Combined with ingredients like lavender oil, aloe vera, and natural emollients, this herbal cream promotes healing and skin comfort, offering a gentle, effective alternative for fungal skin care.

MECHANISM OF ACTION OF ANTIFUNGAL CREAM

Antifungal creams are applied to the skin to treat surface-level fungal infections like ringworm, athlete's foot, and jock itch.
Herbal antifungal creams use natural ingredients from plants that help fight fungal infections. Let me know if you had like this expanded into a paragraph or tailored for a specific audience. Unlike synthetic antifungals, herbal formulations often target multiple pathways in fungi and are less likely to cause resistance or side effects.

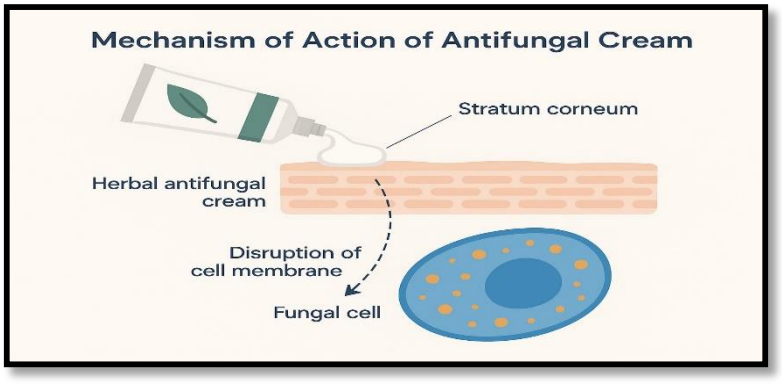

Fig.1. Mechanism of action of antifungal cream

General Mechanism of Herbal Antifungal Cream:

1. **Application to Affected Skin**
   The cream is applied directly to the area with a fungal infection.
2. **Penetration into Infected Skin Layers**
   Active herbal ingredients absorb into the skin, reaching the site of infection.
3. **Disruption of Fungal Cell Membrane or Cell Wall**

Compounds such as terpinen-4-ol (from tea tree oil) interfere with fungal cell membranes by breaking down ergosterol and other essential lipids.

4. **Inhibition of Fungal Growth and Activity**
   The formulation halts spore germination, enzyme function, and fungal proliferation.
5. **Fungal Cell Death and Symptom Relief**
   The fungi are destroyed, alleviating symptoms like itching, redness, and irritation.
6. **Healing and Skin Recovery**
   Natural emollients and healing agents support skin repair and restore barrier function.

3. Material and Method

3.1. Ingredient

1. Tea tree oil
2. Coconut oil
3. Beeswax
4. Vitamin E oil
5. Lavender oil
6. Borax
7. Glycerine
8. Distilled water
9. Emulsifying wax

1) Tea Tree Oil:
Tea tree oil is a natural essential oil derived from the leaves of the *Melaleuca alternifolia* plant, which grows in Australia. It has strong antifungal, antibacterial, and anti-inflammatory properties.

Fig.2. Tea tree oil

2) Coconut oil:
Coconut oil is a natural oil obtained from the white flesh of ripe coconuts. It's recognized for its ability to fight fungi and bacteria while also keeping the skin hydrated, making it a mild yet effective option for treating skin infections.

Fig.3. Coconut oil

3) Beeswax:
Beeswax is a natural wax made by honeybees and is commonly used in antifungal creams as a base ingredient.

4) Vitamin E Oil:
Vitamin E oil is a fat-soluble antioxidant that is often added to antifungal creams and skin treatments for its skin-healing and nourishing properties, however, it does not have strong direct antifungal effects.

5) Lavender Oil:
Lavender essential oil is widely used as a natural remedy because it helps fight fungi and bacteria, while also calming and soothing the skin.. It's extracted from the flowers of the Lavandula angustifolia plant.

3.2. Formulation Table

Ingredient	F1	F2	F3
Tea Tree Oil	0.30g	0.60g	0.80g
Aloe Vera Gel	1.50g	3.00g	4.00g
Lavender Oil	0.15g	0.30g	0.40g
Beeswax	0.75g	1.50g	2.00g
Borax	0.075g	0.15g	0.20g
Emulsifying Wax	0.90g	1.80g	2.40g
Glycerin	0.45g	0.90g	1.20g
Coconut Oil	1.50g	3.00g	4.00g
Vitamin E	0.075g	0.15g	0.20g
Distilled Water	8.30g	16.65g	24.80g
Total	15g	30g	40g

Table No.1

3.3. Procedure

3.2.1. Prepare Oil Phase

1. In a clean beaker, add:
    1. Coconut oil
    2. Beeswax
    3. Emulsifying wax
    4. Tea tree oil
    5. Lavender oil
    6. Vitamin E
2. Gently heat in a water bath (~70–75℃) until fully melted and uniform.

3.2.2. Prepare Water Phase

3. In a separate beaker:
    - Mix distilled water with glycerin and borax.
    - Heat to the same temperature (~70–75℃).

3.2.3. Emulsification

4. Slowly add the water phase into the oil phase while stirring continuously using a homogenizer or hand blender.
5. Continue mixing until the emulsion is stable and creamy.

3.2.4. Cooling and Aloe Addition

6. As the mixture cools to ~40°C, add aloe vera gel.
7. Stir well to fully integrate.

3.2.4. Packaging

8. Pour lotion into sterilized containers while still fluid.
9. Let it cool completely, then cap and label.

Fig.2. Antifungal Cream

4. Evaluation Test

1. Physical Evaluation
   - Appearance: White color, smooth in texture,
   - Odor: Pleasant
   - Consistency: Smooth, uniform spread ability.
2. pH Determination
   - pH maintained between 6.0 to 7.0.
3. Skin Irritation Test
   - Performed on human volunteers.
4. Stability Studies
   - No change in colour.
   - No pH change.

5. Result

The formulated herbal antifungal cream with tea tree oil was white to off-white, smooth in texture, and easy to apply. It produced a mild cooling effect and had a pleasant, non-greasy feel. The cream showed consistent uniformity and was visually suitable for topical use. Its pH ranged from 6.0 to 6.8, indicating skin compatibility and formulation stability. It was non-sticky, non-irritating, and easily washable with water or mild cleansers. Spreadability tests confirmed smooth, even application with minimal changes during stability assessment.

6. Conclusion

The tea tree oil-based herbal antifungal cream demonstrates strong potential as a natural treatment for fungal skin infections. With its antifungal, antibacterial, and anti-inflammatory properties, tea tree oil helps alleviate symptoms like itching and irritation. The cream is skin-friendly, easy to use, and poses fewer risks of side effects compared to conventional chemical treatments. It effectively targets common fungal infections such as athlete's foot and ringworm, making it a suitable option for those seeking herbal or organic skincare solutions. Overall, this formulation offers a safe and effective natural alternative for managing fungal skin conditions.

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