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Management of Extensive Recalcitrant Dermatophytosis Using a Topical Propylene Glycol–Salicylic Acid Formulation: A Case Study

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Abstract

Although dermatophytosis is a frequent superficial fungal infection, its severe, long-lasting, and resistant variants provide serious therapeutic hurdles. Poor drug penetration, topical agent abuse, and impaired skin barrier function have all been connected to an increase in reports of resistant dermatophytosis. In this case study, a 30-year-old male patient with widespread resistant dermatophytosis was successfully treated with a topical formulation that included high-concentration salicylic acid and propylene glycol. After traditional topical and systemic antifungal treatments failed, the patient saw quick symptom improvement within a week and full clinical remission within two months. The significance of keratolytic and penetration-enhancing techniques in the treatment of refractory dermatophytosis is demonstrated by this example.

Keywords: Dermatophytosis, Recalcitrant fungal infection, Salicylic acid, Propylene glycol, Keratolytic therapy, Case study

Introduction

Dermatophytes cause dermatophytosis, a superficial fungal infection that affects keratinised tissues like skin, hair, and nails. Tinea corporis, tinea cruris, tinea faciei, and tinea auricularis are common clinical manifestations. Topical and systemic antifungal medications including azoles and allylamines are part of standard treatment.

Particularly in tropical nations, dermatologists and general practitioners have seen a concerning increase in widespread, chronic, and treatment-resistant dermatophytosis in recent years. Antifungal resistance, steroid-modified tinea, unfinished treatment regimens, and insufficient antifungal drug penetration via hyperkeratotic skin are some of the factors causing this trend.

Salicylic acid is a well-known keratolytic agent that increases medication penetration and encourages stratum corneum desquamation. Propylene glycol has inherent antifungal qualities and serves as a humectant, solvent, and penetration enhancer. In cases that are resistant, their combined topical use can provide a useful substitute.

Case Presentation

A 30-year-old male patient, complained of a persistent fungal infection affecting several body locations. The external ear, face, groin area, and inner thighs were all affected.

Clinical Features

- Persistent itching and burning sensation
- Erythema with well-defined margins
- Scaling and hyperkeratosis
- Gradual spread despite treatment

The patient had previously used oral antifungal drugs for sufficient periods of time in addition to topical ketoconazole and other antifungal creams. But there was little reaction, and the illness kept getting worse. Immunosuppression, diabetes mellitus, or systemic disease were not present.

Table 1: Baseline Patient Profile

Parameter	Details
Age	30 years
Gender	Male
Date of Presentation	16 March 2025
Affected Areas	Thighs, groin, face, external ear
Previous Treatment	Topical ketoconazole, oral antifungals
Response to Prior Therapy	Poor
Comorbidities	None

Intervention

A customized topical ointment was prepared containing:

- **Propylene glycol**
- **Salicylic acid (50% concentration)**

Treatment Protocol

- Application: **Twice daily (BD)**
- Timing: Daytime and nighttime
- Duration: 2 months
- Instructions: Apply thin layer to affected areas; avoid mucosal surfaces

Results

Clinical improvement was assessed based on symptom relief, lesion size, erythema, and scaling.

Table 2: Treatment Outcome Timeline

Time Period	Clinical Response
1 week	Significant reduction in itching and scaling
1 month	~70% improvement in lesions
2 months	Complete clinical resolution

The response was **superior to previous antifungal therapies**, with no reported adverse effects during treatment.

Fig. 1: Representative progression of dermatophytosis healing (illustrative)

Discussion

A rising clinical concern is recalcitrant dermatophytosis. Fungal persistence in deeper layers, a changed stratum corneum barrier, or inadequate penetration through hyperkeratotic skin can all be reasons why conventional antifungal medications don't work.

By dissolving keratin, salicylic acid eliminates the diseased stratum corneum and lowers the fungus load. Propylene glycol is a useful carrier in topical preparations because it increases skin permeability and has hygroscopic and antifungal qualities.

The quick reaction shown in this patient implies that in resistant instances, barrier disruption and improved penetration might be more important than antifungal efficacy alone. Despite using a larger dose of salicylic acid than conventional formulations, safety and effectiveness were guaranteed by careful application and monitoring.

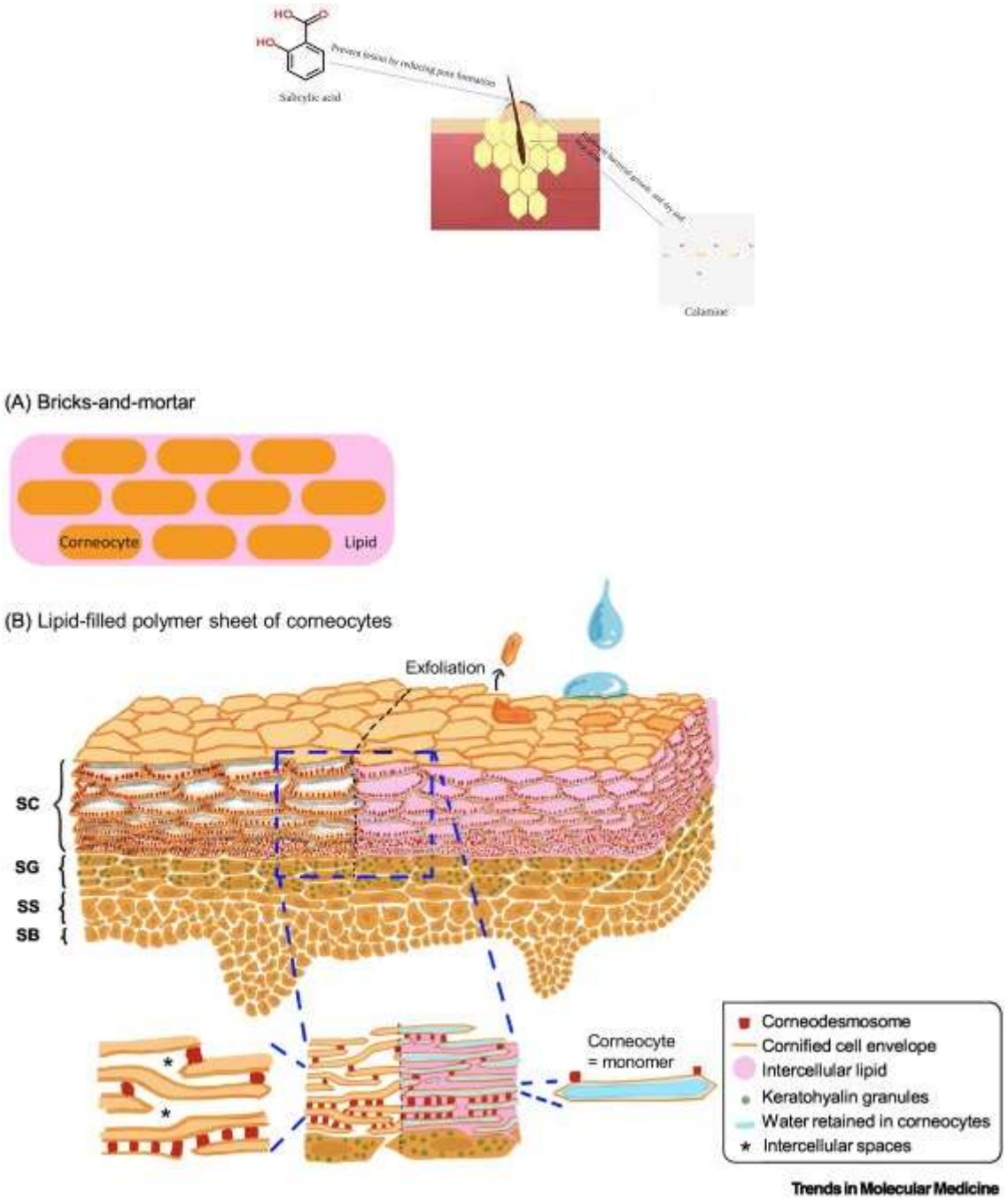

Fig. 2: Mechanism of action of salicylic acid and propylene glycol in dermatophytosis (schematic)

Conclusion

This case study shows that a topical formulation that combines salicylic acid and propylene glycol can be very successful in treating widespread dermatophytosis that is resistant to traditional antifungal treatment. The method improves topical medication action by focusing on the compromised skin barrier. To confirm safety, ideal concentration, and long-term results, more clinical research is advised.

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