



PREVALENCE OF ALLERGIC CONTACT DERMATITIS INDUCED BY TOPICAL ANTIFUNGALS IN PATIENTS WITH DERMATOPHYTOSIS: A CROSS-SECTIONAL STUDY

Dermatology

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ABSTRACT

Background: Allergic contact dermatitis (ACD) to topical antifungals is an emerging concern in recurrent dermatophytosis. **Objective:** To assess the prevalence and common sensitizers causing ACD in patients with recurrent dermatophytosis. **Methods:** A cross-sectional study involving 70 patients patch-tested with Indian Standard Series antigens and commercial antifungal preparations. **Results:** ACD was detected in 20% of patients. Common sensitizers included benzyl alcohol and amorolfine. No systemic reactions or cross-sensitivities were observed. **Conclusion:** ACD to topical antifungals is not uncommon. Patch testing is recommended in non-responders.

KEYWORDS

Allergic Contact Dermatitis, Antifungals, Dermatophytosis, Patch Test, Sensitization

INTRODUCTION

Dermatophytosis is the most common superficial fungal infection worldwide^{1,2}, with a high burden in tropical regions like India. The warm, humid climate promotes persistence and transmission.³ Recently, *Trichophyton mentagrophytes* has emerged as the dominant species in India, replacing *T. Rubrum*.^{4,5}

Multiple factors influence the chronicity and spread of dermatophytosis, including urbanization, overcrowding, poor hygiene, limited healthcare access, and the circulation of virulent strains.^{3,6}

Topical antifungals are widely used for dermatophytosis, candidiasis, and pityriasis versicolor. Luliconazole, approved in India in 2009, is now among the most commonly prescribed agents, comprising nearly one-third of the topical antifungal market.⁷ These treatments are available in various formulations—creams, gels, lotions, and shampoos—but may contain excipients that act as sensitizers.

Misuse of fixed-dose combination (FDC) creams containing antifungals, corticosteroids, and antibiotics is common due to easy over-the-counter access. Such irrational use contributes to resistance, treatment failure, and allergic contact dermatitis (ACD)—a Type IV hypersensitivity reaction. Risk factors for ACD include age, site of application, comorbidities, and self-medication.

MATERIALS AND METHODS

This cross-sectional, observational study was conducted following approval from the Institutional Ethics Committee (IEC), and informed consent was obtained from all participants. A total of 70 patients with clinically diagnosed recurrent dermatophytosis were included. Common preservatives and vehicles from the Indian Standard Series (ISS) and commercially available products were patch tested “as is” and applied to the upper back using Finn chambers secured with micropore adhesive [Figure 1].



Figure 1. Application of Finn Chambers on the Upper Back

the use of systemic or topical antifungals and antihistamines was discontinued. Initial readings were taken at 48 hours, with follow-up readings at 72 or 96 hours, in accordance with the International Contact Dermatitis Research Group (ICDRG) guidelines. The test was not performed on individuals below 18 years of age, pregnant and lactating women, patients with immunocompromising conditions such as HIV, lupus erythematosus, or those on systemic corticosteroids, individuals with a history of severe hypersensitivity reactions or those with non-fungal dermatoses at the test site.

Reactions were graded using the ICDRG scale as −, +, ++, or +++, with only those graded + or higher considered true positives. Statistical analysis was performed using SPSS software. The chi-square test was applied to assess differences in patch test outcomes, and a p-value ≤ 0.05 was considered statistically significant.

Table 1. List of Antigens Used for Patch Test

1. Vaseline	14. Kathon Cg
2. Wool Alcohol	15. Sorbic Acid
3. Formaldehyde	16. Triclosan
4. Parabens Mix	17. Thiomersal
5. Neomycin Sulphate	18. Eberconazole
6. Chlorocresol	19. Ciclopirox Olamine
7. Fragrance Mix	20. Sertaconazole
8. Benzyl Alcohol	21. Luliconazole
9. Benzyl Salicylate	22. Terbinafine
10. Isopropyl Myristate	23. Ketoconazole
11. Sorbitan Sesquio	24. Amorolfine
12. Rose Oil	25. Pramoxine Hcl
13. Polyethylene Glycol	26. Control

RESULTS

The study included 70 patients, with a male-to-female ratio of 3:4. The median age of participants was 35 years, with an interquartile range (IQR) of 23.75 to 45.25 years. Among the total participants, 14 patients (20%) tested positive, while 56 patients (80%) showed no evidence of ACD.



Figure 2. Negative Allergic Reaction at Patch Test Site

It was preceded by a minimum three-day washout period during which



Figure 3. Positive Allergic Reaction at Patch Test Site

Table 2. Sensitization Rates of Allergens in ACD-Positive Patients

Antigens	No. of patients showing positivity	Percentage
Benzyl Alcohol	8	11%
Amorolfine	6	8%
Ciclopirox Olamine	4	5%
Eberconazole	4	5%
Benzyl Salicylate	4	5%
Sorbic Acid	4	5%
Isopropyl Myristate	4	5%
Luliconazole, Thiomersal, Pramoxine, Fragrance Mix, Paraben Mix, Triclosan, Kathon CG, Formaldehyde, Chlorocresol, Wool Alcohol	2	2%

Table 3. Distribution of Allergens in ACD-Positive Patients

Patient No.	Topical Antifungals Used	Antigen Tested Positive (Grade)
1	Clotrimazole, Mixed Combination Cream	Ciclopirox (1+), Chlorocresol (1+), Formaldehyde (1+), Benzyl Alcohol (1+)
2	Luliconazole, Ketoconazole Powder, Mixed Combination Cream	Benzyl Alcohol (1+), Benzyl Salicylate (1+), Isopropyl Myristate (1+), Ketoconazole (1+), Ciclopirox (1+), Eberconazole (1+), Amorolfine (1+)
3	Terbinafine, Luliconazole	Wool Alcohol (1+), Triclosan (1+), Eberconazole (1+), Luliconazole (1+), Amorolfine (1+)
4	Mixed Combination Cream	Paraben Mix (1+)
5	Terbinafine Lotion	Benzyl Alcohol (1+), Benzyl Salicylate (1+), Sorbic Acid (1+)
6	Luliconazole, Amorolfine	Benzyl Alcohol (1+), Isopropyl Myristate (1+), Kathon (1+), Sorbic Acid (1+), Thiomersal (1+), Amorolfine (1+), Pramoxine (1+)
7	Luliconazole	Fragrance Mix

DISCUSSION

This study identified a 20% prevalence of ACD in patients using topical antifungals for recurrent dermatophytosis. Amorolfine and benzyl alcohol were the most frequent sensitizers, consistent with prior reports, including by Saha et al.⁸ Although itraconazole—used systemically—did not trigger systemic contact dermatitis, it remains a theoretical concern. No evidence of polysensitization or cross-reactivity among antifungals was observed. A pilot study by Nithya S et al., using nine commercial antifungal and antibiotic preparations, reported positive patch tests to multiple imidazoles (clotrimazole, oxiconazole, eberconazole, miconazole, sertaconazole), terbinafine, and pramoxine hydrochloride.⁹ These findings underscore the urgent need for standardized patch testing protocols in India. Larger studies are warranted to better characterize sensitization trends.

Limitations

This single-center study was limited by financial and infrastructural constraints, resulting in a relatively small sample size. The Indian Standard Series (ISS) lacked several relevant preservatives and vehicles, restricting the comprehensiveness of the testing panel. Commercial formulations were used in place of standardized allergen preparations, which may have introduced variability. Additionally, potential allergens from herbal or traditional medicines could not be evaluated.

CONCLUSION

Allergic contact dermatitis to topical antifungals is not uncommon and may be underrecognized, particularly in patients with persistent or worsening symptoms. Patch testing is a valuable tool for early identification of sensitizers and can guide more effective treatment. We recommend considering patch testing in patients unresponsive to standard therapy or those experiencing symptom exacerbation during treatment.

Conflicts of Interest

There are no conflicts of interest.

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