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Original Research Article

ASSOCIATION OF DOMESTIC AND ENVIRONMENTAL FACTORS WITH RECURRENT DERMATOPHYTOSIS: A CROSS-SECTIONAL OBSERVATIONAL STUDY

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ABSTRACT

Background: Recurrent dermatophytosis has emerged as a significant public health concern, particularly in tropical regions, with increasing chronicity and treatment failure. Beyond host and pharmacological factors, household overcrowding, shared personal items, humidity, and hygiene practices may contribute to reinfection and persistence. Understanding domestic and environmental determinants is essential for effective prevention strategies and long-term disease control in affected populations. **Aims:** To evaluate the association between household and environmental factors and recurrent dermatophytosis and to identify modifiable risk determinants contributing to recurrence.

Materials and Methods: This hospital-based observational study was conducted over a period of 10 months and included 58 patients diagnosed with recurrent dermatophytosis attending the dermatology outpatient department. Detailed history was obtained using a structured questionnaire. Clinical examination was performed to document morphology and sites of involvement. Statistical analysis was carried out to determine associations between environmental factors and recurrence, with $p < 0.05$ considered statistically significant.

Results: The majority of patients were aged 21–40 years (34; 58.6%), with a male predominance (36; 62.1%). Overcrowding was observed in 29 (50.0%) households, while 33 (56.9%) patients reported sharing towels or clothing with family members. A positive family history of dermatophytosis was present in 31 (53.4%) cases. Inadequate ventilation and high indoor humidity were noted in 27 (46.6%) households. Wearing tight synthetic clothing was reported by 35 (60.3%) patients, and irregular washing or sun-drying of clothes was observed in 24 (41.4%). Significant associations were found between recurrence and sharing of personal items ($p = 0.021$), positive family history ($p = 0.017$), and overcrowding ($p = 0.034$). Poor ventilation also demonstrated a statistically meaningful correlation ($p = 0.042$).

Conclusion: Recurrent dermatophytosis is strongly influenced by modifiable household and environmental factors. Overcrowding, shared fomites, positive family history, and inadequate ventilation significantly contribute to reinfection and persistence. Addressing domestic hygiene practices alongside appropriate antifungal therapy is essential for reducing recurrence rates.

Keywords: Environmental determinants, fomite transmission, fungal infections, household factors, overcrowding, Recurrent dermatophytosis.

INTRODUCTION

Dermatophytosis is a superficial fungal infection caused by keratinophilic fungi belonging to the genera Trichophyton, Microsporum, and Epidermophyton.[1] It commonly affects the skin, hair, and nails, presenting as annular, erythematous, scaly plaques associated with pruritus.[2] In tropical and subtropical countries, dermatophytosis constitutes one of the most frequent dermatological consultations due to favorable climatic conditions such as heat and humidity. Over the past decade, clinicians have observed a rising trend of chronic, recalcitrant, and recurrent infections, posing therapeutic challenges and increasing disease burden.[3]

Recurrent dermatophytosis, defined as reappearance of lesions after apparent clinical resolution following adequate therapy, has become increasingly common.[4] While antifungal resistance, irrational steroid–antifungal combinations, incomplete treatment courses, and host immune factors are well-recognized contributors, these factors alone do not fully explain the high recurrence rates seen in routine practice.5 Reinfection from untreated family members, contaminated fomites, and persistent environmental reservoirs may play a substantial but underappreciated role in perpetuating infection cycles.[6]

Household dynamics significantly influence the transmission of dermatophytes. Overcrowding facilitates close physical contact and sharing of personal items such as towels, clothing, and bedding, increasing the likelihood of cross-infection.[7] Poor ventilation and high indoor humidity create a microenvironment favorable for fungal survival and proliferation.[8] Inadequate sun exposure of clothing, infrequent laundering, and use of tight synthetic garments further contribute to moisture retention, promoting fungal persistence. These modifiable environmental determinants may act synergistically with host factors to sustain recurrent disease.[9,10]

Despite growing clinical concern, most available literature focuses predominantly on pharmacological resistance and host immunity, with comparatively limited emphasis on domestic and environmental risk factors. There remains a need to systematically evaluate the role of household practices, hygiene behaviors, and environmental conditions in recurrent dermatophytosis, particularly in regions where the disease is endemic. Understanding these associations is crucial for designing comprehensive management strategies that extend beyond antifungal therapy to include preventive and behavioral interventions.

The novelty of the present study lies in its focused evaluation of modifiable household and environmental determinants contributing to recurrence in a defined patient population. By identifying significant domestic risk factors, the study aims to provide practical, evidence-based recommendations for reducing reinfection and improving long-term outcomes. The rationale is that effective control of recurrent dermatophytosis requires not only appropriate pharmacotherapy but also targeted environmental modifications and patient education. Addressing these overlooked factors may significantly reduce recurrence rates, minimize disease chronicity, and alleviate the socioeconomic burden associated with persistent fungal infections.

Aims and Objectives

- To evaluate the association between household and environmental factors and recurrent dermatophytosis and to identify modifiable risk determinants contributing to recurrence.

MATERIALS AND METHODS

This hospital-based observational study was conducted in the Department of Dermatology at Sree Mookambika Institute of Medical Sciences over a period of 10 months from March 2025 to December 2025. A total of 58 patients clinically diagnosed with recurrent dermatophytosis and attending the dermatology outpatient department were enrolled after obtaining informed consent. Recurrent dermatophytosis was defined as the reappearance of clinical lesions within six weeks of apparent complete resolution following adequate antifungal therapy.

Inclusion criteria comprised patients aged above 18 years of either gender who had clinically diagnosed dermatophytosis with documented recurrence within six weeks after completion of adequate antifungal treatment. Patients willing to provide informed consent and reliable history regarding household practices were included in the study.

Exclusion criteria included patients with primary (first episode) dermatophytosis, immunocompromised individuals such as those with uncontrolled diabetes mellitus, HIV infection, malignancy, or those on long-term systemic corticosteroids or immunosuppressive therapy. Pregnant and lactating women were excluded. Patients who were unwilling to participate or unable to provide complete household or environmental details were also excluded from the study.

Detailed demographic data including age, gender, occupation, and socioeconomic status were recorded. A structured questionnaire was administered to collect information regarding household and environmental factors such as number of family members, overcrowding (more than two persons per room), ventilation status, indoor humidity, sharing of personal items (towels, clothing, bedding), frequency of washing and sun-drying clothes, bathing habits, use of occlusive or synthetic garments, presence of domestic animals,

and history of similar infection among family members.

Clinical examination was performed to document morphology, site of involvement, duration, and number of recurrences. Wherever required, potassium hydroxide (KOH) mount was performed to support the diagnosis. All findings were systematically recorded in a predesigned proforma.

Data collected were entered into a Microsoft Excel spreadsheet and analyzed using appropriate statistical software. Categorical variables were expressed as frequencies and percentages. Associations between household/environmental factors and recurrence were assessed using Chi-square test, and a p-value of less than 0.05 was considered statistically significant.

RESULTS

The majority of patients belonged to 21–40 years (34; 58.6%), indicating higher exposure among the active working-age group, possibly due to increased sweating, occupational exposure, and close interpersonal contact. [Table 1]

Table 1: Age Distribution (n = 58)

Age Group (years)	Number (n)	Percentage (%)
18–20	6	10.3
21–30	18	31.0
31–40	16	27.6
41–50	11	19.0
>50	7	12.1

Males constituted 62.1% of cases, suggesting increased risk related to outdoor activity, perspiration, and occlusive clothing habits. [Table 2]

Table 2: Gender Distribution

Gender	Number (n)	Percentage (%)
Male	36	62.1
Female	22	37.9

Sharing of personal items (56.9%) and use of tight synthetic clothing (60.3%) were the most prevalent modifiable risk factors. Half of the households experienced overcrowding, indicating favorable conditions for cross-transmission. [Table 3]

Table 3: Baseline metabolic parameters according to dietary pattern

Factor Identified	Number (n)	Percentage (%)
Overcrowding (>2 persons/room)	29	50.0
Sharing towels/clothes	33	56.9
Positive family history	31	53.4
Poor ventilation	27	46.6
High indoor humidity	25	43.1
Tight synthetic clothing	35	60.3
Inadequate sun-drying of clothes	24	41.4

A statistically significant association (p=0.028) was observed between overcrowding and positive family history, suggesting clustering of infection within households due to close contact. [Table 4]

Table 4: Association Between Overcrowding and Positive Family History

Overcrowding	Family History Present n (%)	Family History Absent n (%)	p-value
Present (n=29)	20 (69.0%)	9 (31.0%)	0.028*
Absent (n=29)	11 (37.9%)	18 (62.1%)	

Patients sharing towels or clothing showed significantly higher multiple recurrences (p=0.021), highlighting fomites as an important reservoir for reinfection. [Table 5]

Table 5: Association Between Sharing Personal Items and Multiple Recurrences

Sharing Personal Items	>2 Recurrences n (%)	≤2 Recurrences n (%)	p-value
Yes (n=33)	21 (63.6%)	12 (36.4%)	0.021*
No (n=25)	9 (36.0%)	16 (64.0%)	

A significant correlation (p=0.034) was observed between poor ventilation and high humidity, indicating that inadequate airflow contributes to moisture retention, promoting fungal persistence. [Table 6]

Table 6: Association Between Poor Ventilation and High Indoor Humidity

Poor Ventilation	High Humidity Present n (%)	High Humidity Absent n (%)	p-value
Present (n=27)	19 (70.4%)	8 (29.6%)	0.034*
Absent (n=31)	6 (19.4%)	25 (80.6%)	

Use of tight synthetic garments was significantly associated with truncal dermatophytosis (p=0.039), likely due to occlusion and sweat retention.

Table 7: Association Between Synthetic Clothing and Site of Infection

Synthetic Clothing	Truncal Involvement n (%)	Other Sites n (%)	p-value
Yes (n=35)	23 (65.7%)	12 (34.3%)	0.039*
No (n=23)	8 (34.8%)	15 (65.2%)	

DISCUSSION

Recurrent dermatophytosis continues to be a significant clinical concern, particularly in tropical regions where environmental conditions favor fungal persistence. In the present study, the majority of patients belonged to the 21–40 years age group, with a clear male predominance. This pattern suggests increased exposure among the active working population, likely due to occupational factors, excessive sweating, and use of occlusive clothing.

These findings were consistent with Kumar U et al,[11] and Singh BS et al,[12] who also reported higher prevalence in the third and fourth decades with male predominance, reinforcing the role of lifestyle and occupational exposure in disease recurrence. However, Kurukkanari R et al,[13] observed a younger age distribution with slight female predominance, indicating demographic variability across regions.

Household transmission emerged as a key contributing factor in the present study, with a high proportion of patients reporting overcrowding, positive family history, and sharing of personal items. These findings are in agreement with Tuknayat A et al,[14] who highlighted familial clustering due to shared hygiene practices, common use of towels, soaps, and living spaces. Similarly, Shenoy MM et al,[15] reported significant associations between chronic and recurrent dermatophytosis with family history and sharing of fomites, supporting the role of intra-familial transmission in sustaining infection cycles.

Environmental conditions such as poor ventilation, high indoor humidity, and inadequate sun-drying of clothes were identified as important risk factors in the present study. These factors contribute to prolonged fungal survival on clothing and household surfaces, facilitating reinfection. Although not directly emphasized in all studies, these findings align with the broader understanding of dermatophytosis epidemiology, where warm and moist environments act as reservoirs for infection persistence.

Clothing habits, particularly the use of tight synthetic garments, were significantly associated with recurrent infection in the present study. Occlusive clothing promotes sweating and creates a favorable microenvironment for fungal growth. This observation is supported by Shenoy MM et al,[15] who reported a high prevalence of synthetic clothing use among patients with chronic dermatophytosis, indicating its role as an important modifiable risk factor.

Lifestyle-related risk factors have also been highlighted in the literature. Son JH et al.16 demonstrated that obesity, increased waist circumference, and lifestyle habits such as alcohol consumption are associated with a higher risk of dermatophytosis. These findings suggest that metabolic and behavioral factors may further predispose individuals to infection and recurrence, complementing the environmental and household determinants observed in the present study.

In contrast, Paudel S et al,[17] reported no significant association between recurrence and factors such as sharing of towels or steroid use, although males were more likely to relapse. This partially contrasts with the present findings, where sharing of fomites and household exposure were strongly implicated, indicating variability across populations and study settings.

Furthermore, the chronic and recurrent nature of dermatophytosis has a significant impact on quality of life. Das A et al,[18] reported a substantial psychological burden, including anxiety, depression, and stress, particularly in patients with prolonged disease and extensive involvement. This underscores the broader implications of recurrent dermatophytosis beyond physical symptoms.

The study observed that household transmission, environmental conditions, clothing habits, and lifestyle factors collectively contribute to persistence and reinfection. Addressing these modifiable risk factors, along with appropriate antifungal therapy and patient education, is essential to break the cycle of recurrence and reduce disease burden.

CONCLUSION

Recurrent dermatophytosis is strongly influenced by modifiable domestic and environmental determinants. Overcrowding, sharing of personal items, positive family history, poor ventilation, high indoor humidity, and use of tight synthetic clothing

significantly contribute to reinfection and persistence. Effective management requires a comprehensive approach that combines appropriate antifungal therapy with environmental control measures and patient education. Emphasis on household hygiene, avoidance of fomite sharing, adequate ventilation, and proper clothing practices is crucial to reduce recurrence rates and prevent ongoing transmission within families.

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