



Original Article

## Atypical Dermatophytosis in the Era of Steroid Misuse: A Clinico-Epidemiological and Mycological Study from Western Uttar Pradesh

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### ABSTRACT

**Background:** Dermatophytosis in India has increasingly manifested as chronic, recurrent, and atypical disease, largely attributed to the misuse of topical corticosteroid-containing preparations. This study evaluated the epidemiological, clinical, and mycological profile of atypical dermatophytosis.

**Materials and Methods:** A cross-sectional observational study was conducted among 77 patients with atypical dermatophytosis attending a tertiary care centre in Western Uttar Pradesh. Clinical and epidemiological data were recorded, and diagnosis was confirmed by KOH microscopy and fungal culture.

**Results:** The mean age was  $32.21 \pm 14.74$  years, with most patients belonging to the 20–30-year age group. Topical corticosteroid use was reported by 84.4% of patients, while recurrence and positive family history were observed in 72.7% and 61.0%, respectively. Tinea corporis was the most common presentation. Steroid-modified dermatophytosis was the predominant atypical variant. Culture positivity was observed in 84.4% of cases, with *Trichophyton rubrum* being the most common isolate. Corticosteroid use was significantly associated with recurrence and chronicity ( $p < 0.001$ ).

**Conclusion:** Corticosteroid misuse is strongly associated with atypical, chronic, and recurrent dermatophytosis, emphasizing the need for early diagnosis and rational treatment strategies.

**Keywords:** Atypical dermatophytosis; Epidemiology; Topical corticosteroids; Recurrence; *Trichophyton rubrum*; Fungal culture.

### INTRODUCTION

Dermatophytosis is one of the most common superficial fungal infections encountered in dermatological practice worldwide. It is caused by keratinophilic fungi belonging primarily to the genera *Trichophyton*, *Microsporum*, and *Epidermophyton*, which invade keratinized tissues such as the skin, hair, and nails (Martinez-Rossi et al., 2021). The prevalence of dermatophytosis has increased considerably in tropical and subtropical countries, particularly in India, where warm and humid climatic conditions favor fungal growth and transmission (Gnat et al., 2019).

Over the past decade, India has witnessed a remarkable shift in the epidemiology and clinical presentation of dermatophytosis. What was previously considered a relatively benign and easily treatable infection has evolved into a chronic, recurrent, and often treatment-resistant disease. Increasing numbers of patients are presenting with extensive lesions, multiple-site involvement, and atypical morphologies, posing significant diagnostic and therapeutic challenges (Dogra & Narang, 2017; Verma et al., 2021).

Atypical dermatophytosis refers to dermatophyte infections presenting with unusual or modified clinical appearances that may mimic other inflammatory dermatoses. Such altered presentations frequently result in delayed diagnosis, inappropriate treatment, disease chronicity, and increased transmission within the community. The changing clinical

spectrum has highlighted the need for a better understanding of the epidemiological and clinical determinants associated with these atypical manifestations (Dogra & Narang, 2017).

Although several studies have documented the changing pattern of dermatophytosis in different parts of India, data regarding atypical dermatophytosis from Western Uttar Pradesh remain limited. Therefore, the present study was undertaken to evaluate the epidemiological determinants, clinical characteristics, and mycological profile of patients presenting with atypical dermatophytosis at a tertiary care centre in Western Uttar Pradesh.

## LITERATURE REVIEW

Recent years have witnessed substantial changes in the clinical behavior of dermatophytosis in India. Several investigators have reported increasing rates of chronic, recurrent, extensive, and treatment-resistant infections. The widespread availability and irrational use of topical corticosteroid-containing fixed-dose combination preparations have been recognized as major contributors to this changing epidemiological scenario (Verma et al., 2021).

Atypical dermatophytosis has emerged as an important clinical challenge. Dermatophyte infections may present with unusual morphologies resembling eczema, psoriasis, seborrheic dermatitis, rosacea, lupus erythematosus, and other inflammatory dermatoses. Such modified presentations often lead to diagnostic confusion and delayed treatment. Steroid-modified tinea, tinea incognito, and pseudoimbricata have been increasingly reported from different regions of India (Dogra & Narang, 2017).

Various epidemiological factors have been implicated in the persistence and spread of dermatophytosis, including overcrowding, excessive sweating, occlusive clothing, sharing of personal belongings, positive family history, and poor treatment compliance. Family clustering has been identified as an important factor contributing to recurrence and reinfection among household contacts (Gnat et al., 2019; Verma et al., 2021).

Mycological studies conducted in different parts of India have consistently demonstrated *Trichophyton rubrum* as the predominant etiological agent. However, recent reports have documented increasing isolation of *Trichophyton mentagrophytes complex* and *Trichophyton indotineae*, suggesting an evolving mycological profile (Kalita et al., 2019; Reddy & Vani, 2018). These changes may partly explain the increasing frequency of chronic, recurrent, and atypical disease observed in clinical practice.

Despite the growing burden of atypical dermatophytosis, region-specific data regarding its epidemiological determinants and mycological profile remain limited. This highlights the need for further studies evaluating the changing clinical spectrum of dermatophytosis in different geographic regions.

## METHODOLOGY

The present cross-sectional observational study was conducted from November 2025 to May 2026 in the Department of Dermatology, Venereology and Leprology, Teerthankar Mahaveer Medical College & Research Centre, Western Uttar Pradesh, India. The study was approved by the Institutional Ethics Committee (IEC No. \_\_\_\_\_) and the College Research Committee. Written informed consent was obtained from all participants or their legal guardians before enrolment in the study. A total of 77 patients with atypical dermatophytosis attending the outpatient and inpatient services of the Department of Dermatology were included in the study. Patients were selected using purposive sampling, and all eligible patients presenting during the study period were recruited consecutively. Atypical dermatophytosis was defined as dermatophyte infection presenting with non-classical morphological patterns such as steroid-modified, eczematous, psoriasiform, pseudoimbricata, Majocchi granuloma, rosacea-like, seborrheic dermatitis-like, lupus erythematosus-like, or other unusual clinical presentations.

Patients of any age and gender presenting with clinically suspected atypical dermatophytosis and willing to provide written informed consent were included in the study. Patients presenting with classical dermatophytosis, tinea capitis, or tinea unguium, and those with negative findings on both potassium hydroxide (KOH) microscopy and fungal culture were excluded. Tinea capitis and tinea unguium were excluded because these entities differ in their epidemiology, clinical presentation, and diagnostic approach from glabrous skin dermatophytosis.

A detailed history regarding demographic characteristics, duration of disease, symptoms, recurrence, family history, history of contact, prior use of topical corticosteroids, fixed-dose combination creams, oral antifungal medications, associated comorbidities, overcrowding, excessive sweating, clothing habits, sharing of clothes or towels, and animal exposure was recorded. A thorough dermatological examination was performed, and clinical morphology, site of involvement, lesion distribution, chronicity, and extent of disease were documented. After cleansing the affected skin surface with 70% alcohol, skin scrapings were collected from the active advancing edge of the lesion using the blunt end of a sterile No. 15 surgical blade held at an angle of approximately 90 degrees. Each specimen was divided into two portions: one for direct microscopic examination and the other for fungal culture. For direct microscopy, skin scrapings

were treated with 10% potassium hydroxide (KOH) and examined under a light microscope using 10× and 40× objectives for the presence of fungal hyphae, spores, or yeast cells. For fungal culture, specimens were inoculated onto Sabouraud dextrose agar supplemented with chloramphenicol and cycloheximide and incubated at 25–28°C for up to four weeks. Identification of dermatophyte species was based on colony morphology and microscopic characteristics. Dermatophyte infection was confirmed by positivity on either KOH microscopy or fungal culture.

## RESULTS AND FINDINGS

### Demographic Characteristics

A total of 77 patients with atypical dermatophytosis were included in the study. The mean age of the study population was  $32.21 \pm 14.74$  years. The majority of patients belonged to the 20–30 years age group (36.4%), followed by patients aged 31–40 years and 41–50 years (15.6% each). Males constituted 53.2% of the study population, while females accounted for 46.8%.

Most patients belonged to the upper-middle socioeconomic class (35.1%), followed by the upper-lower class (24.7%). Students (27.3%) and housewives (26.0%) represented the most common occupational groups. A substantial proportion of patients had no formal education (31.2%), while 28.6% had completed secondary education.

The mean duration of disease was  $1.25 \pm 1.62$  years. Groin involvement was the most common site of initial lesion (32.5%), followed by the face (20.8%) and abdomen (18.2%). Itching was the predominant presenting symptom and was reported by 63.6% of patients.

**Table 1. Demographic and baseline characteristics of study participants**

Parameters		Frequency (n)	Percentage (%)
Age groups (yrs)	<20	15	19.481
	20-30	28	36.364
	31-40	12	15.584
	41-50	12	15.584
	51-60	7	9.091
	>60	3	3.896
Mean age±SD (yrs)		32.208±14.743	
Gender	Male	41	53.2
	Female	36	46.8
Socioeconomic Status	Lower class	15	19.5
	Lower middle	16	20.8
	Upper lower	19	24.7
	Upper middle	27	35.1
Occupation	Carpenter	3	3.9
	Driver	2	2.6
	Electrician	1	1.3
	Farmer	15	19.5
	Housewife	20	26.0
	Plumber	1	1.3
	Shopkeeper	10	13.0
	Student	21	27.3
Education Level	Teacher	4	5.2
	<10 th pass	10	13.0
	10th pass	22	28.6
	12th pass	12	15.6
	Graduate	10	13.0
Religion	No formal education	24	31.2
	Hindu	31	40.3
Mean Duration of Disease	Muslim	46	59.7
		1.247±1.619	
Site of Initial Lesion	Abdomen	14	18.2
	Arm	1	1.3
	Buttock	8	10.4
	Chest	13	16.9
	Face	16	20.8
	Groin	25	32.5

<b>Symptoms</b>	<b>Itching</b>	49	63.6
	<b>Burning</b>	28	36.4
	<b>Both</b>	0	0
	<b>None</b>	0	0
<b>Total</b>		<b>77</b>	<b>100</b>

### Epidemiological Determinants and Risk Factors

Among the study population, recurrence was observed in 72.7% of cases, while a positive family history was present in 61.0% of patients. History of contact with affected individuals was reported by 45.5% of participants.

Topical corticosteroid use was documented in 84.4% of patients, and an identical proportion reported the use of fixed-dose combination (FDC) creams. Previous oral antifungal therapy had been received by 59.7% of patients.

Among associated comorbidities, diabetes mellitus was the most common (16.9%), followed by hypertension (6.5%) and hypothyroidism (3.9%). Occlusive clothing (63.6%), sharing of clothes or towels (54.5%), excessive sweating (40.3%), overcrowding (39.0%), and animal exposure (23.4%) were identified as important epidemiological determinants.

**Table 2. Distribution of epidemiological determinants and risk factors**

		<b>Frequency (n)</b>	<b>Percentage (%)</b>
<b>Recurrence</b>	<b>No</b>	21	27.3
	<b>Yes</b>	56	72.7
<b>Family History</b>	<b>No</b>	30	39.0
	<b>Yes</b>	47	61.0
<b>History of Contact</b>	<b>No</b>	42	54.5
	<b>Yes</b>	35	45.5
<b>Topical Steroid Use</b>	<b>No</b>	12	15.6
	<b>Yes</b>	65	84.4
<b>FDC Use</b>	<b>No</b>	12	15.6
	<b>Yes</b>	65	84.4
<b>Oral Antifungal History</b>	<b>No</b>	31	40.3
	<b>Yes</b>	46	59.7
<b>Comorbidities (Specify)</b>	<b>Diabetes</b>	13	16.9
	<b>Hypertension</b>	5	6.5
	<b>Hypothyroidism</b>	3	3.9
	<b>CAD</b>	1	1.3
	<b>TB</b>	2	2.6
	<b>NA</b>	57	74.0
<b>Overcrowding</b>	<b>No</b>	47	61.0
	<b>Yes</b>	30	39.0
<b>Excessive Sweating</b>	<b>No</b>	46	59.7
	<b>Yes</b>	31	40.3
<b>Occlusive Clothing</b>	<b>No</b>	28	36.4
	<b>Yes</b>	49	63.6
<b>Sharing Clothes/Towels</b>	<b>No</b>	35	45.5
	<b>Yes</b>	42	54.5
<b>Animal Exposure</b>	<b>No</b>	59	76.6
	<b>Yes</b>	18	23.4

### Clinical Characteristics

Tinea corporis was the most common clinical presentation, accounting for 46.8% of cases, followed by tinea cruris (32.5%) and tinea faciei (20.8%).

Among atypical morphological variants, steroid-modified dermatophytosis was the most frequently observed pattern (28.6%), followed by eczematous dermatophytosis (23.4%) and psoriasiform dermatophytosis (15.6%). Majocchi granuloma and tinea pseudoimbricata each accounted for 7.8% of cases. Rosacea-like, seborrheic dermatitis-like, and lupus erythematosus-like variants were observed less frequently. Other uncommon atypical presentations accounted for 6.5% of cases.

Single lesions were observed in 50.6% of patients, while multiple lesions were present in 49.4%.

**Table 3. Clinical profile and atypical morphological variants**

		Frequency (n)	Percentage (%)
Clinical Type	Tinea corporis	36	46.8
	Tinea cruris	25	32.5
	Tinea faciei	16	20.8
Morphological Variant	Eczematous	18	23.4
	LE like	1	1.3
	Majocchi granuloma	4	5.2
	Pseudoimbricata	6	7.8
	Psoriasisiform	12	15.6
	Rosacea like	5	6.5
	Seborrheic dermatitis like	4	5.2
	Steroid modified	22	28.6
	Others	5	6.5
Number of Lesions	Single	39	50.6
	Multiple	38	49.4

Representative atypical morphologies are illustrated in Fig. 1–4.



**Fig.1: Steroid modified tinea faciei**



**Fig.2: Lupus erythematosus like tinea faciei**



**Fig.3: Tinea Pseudoimbricata**



**Fig.4: Hansen's disease like dermatophytosis**

**Mycological Profile**

Potassium hydroxide (KOH) microscopy was positive in 67.5% of patients, whereas fungal culture yielded growth in 84.4% of cases.

Among culture-positive isolates (n = 65), *Trichophyton rubrum* was the predominant species (50.8%), followed by *Trichophyton mentagrophytes* (27.7%), *Trichophyton indotineae* (15.4%), and *Trichophyton concentricum* (6.2%).

Chronic dermatophytosis (disease duration >6 months) was present in 51.9% of patients, while extensive disease was observed in 50.6%.

Correlation between KOH microscopy and fungal culture demonstrated that 51.9% of patients were positive on both investigations, whereas 32.5% were culture positive despite negative KOH examination.

**Table 4. Mycological profile of atypical dermatophytosis**

	Frequency (n)	Percentage (%)
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<b>KOH Result</b>	<b>Negative</b>	25	32.5
	<b>Positive</b>	52	67.5
<b>Culture Result</b>	<b>Negative</b>	12	15.6
	<b>Positive</b>	65	84.4
<b>Dermatophyte Species Identified (n=65)</b>	<i>T. Indotineae</i>	10	15.38
	<i>T. Rubrum</i>	33	50.77
	<i>T. Concentricum</i>	4	6.15
	<i>T. Mentagrophytes</i>	18	27.69
<b>Chronic (&gt;6 months)</b>	<b>No</b>	37	48.1
	<b>Yes</b>	40	51.9
<b>Extensive</b>	<b>No</b>	38	49.4
	<b>Yes</b>	39	50.6
<b>KOH-Culture Relation</b>	<b>KOH positive / Culture positive</b>	40	51.9
	<b>KOH positive / Culture negative</b>	12	15.6
	<b>KOH negative / Culture positive</b>	25	32.5

### Association Between Topical Corticosteroid Use and Disease Characteristics

A significant proportion of patients reported prior use of topical corticosteroids and fixed-dose combination creams. Statistical analysis demonstrated a significant association between corticosteroid use and recurrence as well as chronicity of dermatophytosis ( $p < 0.001$ ).

**Table 5. Association between topical corticosteroid use and recurrence**

<b>Topical Steroid Use</b>	<b>Recurrence: No</b>	<b>Recurrence: Yes</b>	<b>Total</b>
<b>No</b>	11	1	12
<b>Yes</b>	10	55	65
<b>Total</b>	21	56	77

**Table 6. Association between topical corticosteroid use and chronicity**

<b>Topical Steroid Use</b>	<b>Chronicity: No</b>	<b>Chronicity: Yes</b>	<b>Total</b>
<b>No</b>	12	0	12
<b>Yes</b>	25	40	65
<b>Total</b>	37	40	77

## DISCUSSION

The present study evaluated the epidemiological determinants, clinical characteristics, and mycological profile of atypical dermatophytosis in patients attending a tertiary care center in Western Uttar Pradesh.

The majority of patients belonged to the 20–30-year age group, with a mean age of  $32.21 \pm 14.74$  years. Similar observations have been reported by Reddy and Vani (2018) and Kalita et al. (2019), who identified young adults as the most commonly affected population. Increased outdoor activity, excessive sweating, and prolonged exposure to humid environments may contribute to the higher prevalence observed in this age group.

A slight male predominance was observed in the present study. Similar findings have been reported by Bhatia and Sharma (2014), Mahajan et al. (2017), and Reddy and Vani (2018). The higher prevalence among males may be attributed to greater occupational exposure, increased perspiration, and frequent outdoor activities. However, the near-equal gender distribution suggests that dermatophytosis has become increasingly common among females as well.

Students constituted the most commonly affected occupational group, followed by housewives. Similar observations have been reported by Poluri et al. (2015) and Agarwal et al. (2014). Increased physical activity, use of occlusive clothing, and close interpersonal contact may contribute to increased susceptibility among students. A considerable proportion of patients also had limited educational attainment, which may influence awareness regarding hygiene practices, treatment adherence, and healthcare-seeking behavior (Patro et al., 2019).

The mean duration of disease was 1.25 years, and a large proportion of patients reported recurrence. These findings reflect the growing burden of chronic and recurrent dermatophytosis in India (Verma et al., 2021). Factors such as inadequate treatment, poor compliance, reinfection from untreated contacts, and inappropriate use of topical corticosteroids may contribute to disease persistence.

One of the most important findings of the present study was the high prevalence of topical corticosteroid and fixed-dose combination cream use. Furthermore, topical corticosteroid use showed a significant association with both recurrence and

chronicity of disease ( $p < 0.001$ ). Similar observations have been reported by Pravakar et al. (2025), who identified steroid misuse as an important determinant of chronic and recurrent dermatophytosis. Corticosteroids suppress local immune responses and alter lesion morphology, resulting in persistent infection and treatment failure (Dogra & Narang, 2017; Verma et al., 2021).

Positive family history was observed in more than half of the patients and showed a significant association with recurrence. Familial clustering likely results from close physical contact, sharing of clothing and towels, and untreated household reservoirs (Verma et al., 2021). These findings emphasize the importance of evaluating and treating family members to prevent reinfection.

Clinically, tinea corporis was the most common presentation, followed by tinea cruris and tinea faciei. Similar findings have been reported by Kalita et al. (2019) and Kumar et al. (2019). Among atypical morphologies, steroid-modified dermatophytosis was the predominant variant, followed by eczematous and psoriasiform lesions. The predominance of steroid-modified lesions further highlights the impact of inappropriate corticosteroid use on disease morphology and clinical presentation.

Mycological examination demonstrated culture positivity in the majority of patients, with *Trichophyton rubrum* being the predominant isolate, followed by *Trichophyton mentagrophytes*. Similar findings have been reported by Reddy and Vani (2018) and Kalita et al. (2019), supporting the continued predominance of *T. rubrum* as the principal etiological agent of dermatophytosis.

Overall, the findings highlight the increasing burden of atypical, chronic, and recurrent dermatophytosis and underscore the need for rational antifungal therapy, regulation of topical corticosteroid-containing formulations, patient education, and early mycological confirmation for effective disease control (Dogra & Narang, 2017; Verma et al., 2021).

## CONCLUSION

The present study highlights the changing epidemiological and clinical profile of dermatophytosis in Western Uttar Pradesh, with an increasing burden of atypical, chronic, and recurrent disease. Young adults were most commonly affected, and tinea corporis was the predominant clinical presentation. Topical corticosteroid and fixed-dose combination cream misuse emerged as the most important risk factor and showed a significant association with both recurrence and chronicity of disease. Family history, occlusive clothing, sharing of clothes and towels, excessive sweating, and overcrowding were additional contributing factors.

Steroid-modified dermatophytosis was the most frequent atypical morphological variant, emphasizing the impact of irrational corticosteroid use on disease presentation and progression. Mycological evaluation identified *Trichophyton rubrum* as the predominant etiological agent, followed by *Trichophyton mentagrophytes* and *Trichophyton indotineae*.

These findings underscore the need for increased awareness regarding atypical manifestations of dermatophytosis, routine mycological confirmation of suspected cases, rational use of antifungal therapy, and stricter regulation of over-the-counter corticosteroid-containing combination preparations. Early diagnosis, identification of risk factors, and treatment of affected household contacts may help reduce disease recurrence, chronicity, and transmission within the community.

The study was limited by its single-centre design and relatively small sample size, which may restrict generalizability of the findings. Larger multicentric studies with molecular characterization of dermatophyte species are recommended to further understand the evolving epidemiology and antifungal resistance patterns of atypical dermatophytosis in India. Nevertheless, the study provides valuable insights into the epidemiological profile and changing clinical spectrum of atypical dermatophytosis in Western Uttar Pradesh.

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## ETHICAL APPROVAL AND PATIENT CONSENT

The study was approved by the Institutional Ethics Committee (IEC) of Teerthankar Mahaveer Medical College and Research Centre (Approval No.: \_\_\_\_\_). Written informed consent was obtained from all participants prior to enrolment in the study. Separate consent was obtained for publication of clinical photographs, and all efforts were made to maintain patient anonymity.

## CONFLICT OF INTEREST

The authors declare no conflict of interest.

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