

Changing Spectrum of Dermatophytes and their Association with Clinical Patterns in a Tertiary Care Centre

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ABSTRACT

Background: Dermatophytosis is a common superficial fungal infection with considerable variation in its clinical presentation and etiological profile. Recent studies from India have reported changes in the distribution of dermatophyte species, particularly an increasing contribution of the *Trichophyton mentagrophytes* complex and emergence of *Trichophyton indotineae*. The present study evaluated the contemporary dermatophyte spectrum and its relationship with clinical patterns in a tertiary care setting. **Methods:** A prospective observational study was conducted among 280 patients with clinically suspected dermatophytosis attending a tertiary care center. Demographic and clinical characteristics, including age, sex, duration of disease, recurrence, previous antifungal treatment, anatomical site and clinical pattern, were recorded. Skin scrapings, nail clippings or hair samples were collected as appropriate. Direct microscopy using 10% potassium hydroxide preparation and fungal culture were performed, followed by identification of dermatophyte species using standard mycological methods. The distribution of species across clinical patterns and anatomical sites was analyzed. Associations were assessed using the Chi-square test, with $P < 0.05$ considered statistically significant. **Results:** The majority of patients were aged 21–30 years (32.5%), and males constituted 58.6% of the study population. Tinea corporis was the commonest clinical pattern (29.3%), followed by tinea cruris (19.6%) and combined tinea corporis with cruris (16.8%). The *T. mentagrophytes* complex was the predominant dermatophyte (37.1%), followed by *Trichophyton rubrum* (25.4%) and *T. indotineae* (15.0%). Dermatophyte distribution differed significantly across clinical patterns ($\chi^2 = 25.84$, $P = 0.016$). **Conclusion:** The study demonstrates a changing dermatophyte spectrum characterized by predominance of the *T. mentagrophytes* complex, continued representation of *T. rubrum* and notable occurrence of *T. indotineae*. The significant variation of species across clinical patterns supports the importance of clinicomycological correlation and continued local surveillance of dermatophytosis.

Keywords: Clinical patterns, Dermatophytosis, *Trichophyton indotineae*

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INTRODUCTION

Dermatophytosis is a common superficial fungal infection caused by keratinophilic fungi that primarily invade keratinized tissues such as the skin, hair and nails. The major human pathogens have traditionally been grouped within the genera *Trichophyton*, *Microsporum* and *Epidermophyton*, although molecular and phylogenetic studies have resulted in substantial revisions of dermatophyte taxonomy and species nomenclature.^[1,2] Dermatophytosis may involve different anatomical sites and is clinically classified according to the site of infection, including tinea corporis, tinea cruris, tinea faciei, tinea pedis, tinea manuum, tinea capitis and tinea unguium.^[3] The clinical appearance may vary considerably according to the infecting species, anatomical site, host response, duration of infection and previous treatment.^[3,4]

Dermatophytes are broadly characterized according to their ecological adaptation as anthropophilic, zoophilic or geophilic organisms. Anthropophilic species are adapted predominantly to humans and generally produce relatively less inflammatory disease, whereas zoophilic and geophilic dermatophytes may produce more pronounced inflammatory reactions.^[4] The clinical spectrum therefore ranges from relatively localized, scaly annular lesions to extensive, inflammatory, recurrent or steroid-modified disease. Tinea corporis typically presents with annular, erythematous and scaly lesions with a relatively active peripheral margin, whereas involvement of other anatomical sites produces distinct clinical patterns.^[3] Consequently, recognition of the clinical pattern together with appropriate mycological investigation is important for establishing the etiological diagnosis.

The epidemiology of dermatophytosis is influenced by geographical location, climatic conditions, socioeconomic

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circumstances, population density, occupation, personal hygiene, animal exposure and patterns of transmission. However, the relative contribution of individual dermatophyte species is not static. Changes in the distribution of dermatophytes have been documented in several parts of the world, demonstrating that the predominant species can vary with time and geographical setting.^[1,5] Such variation makes region-specific and institution-specific surveillance important, particularly when changes in species distribution may be accompanied by changes in clinical presentation.

India has witnessed a notable change in the epidemiological and clinical profile of dermatophytosis over the past decade.

A comprehensive analysis of 1,038 publications comprising 161,245 reported cases from India between 1939 and 2021 demonstrated substantial temporal changes in the dermatophyte spectrum. *Trichophyton rubrum* was the predominant dermatophyte in the earlier periods, whereas a marked shift toward the *Trichophyton mentagrophytes*/*Trichophyton interdigitale* complex was observed after 2015. Between 2016 and 2021, more than 64% of reported dermatophyte infections in the analyzed literature were attributed to this complex.^[5] These findings indicate that the etiological landscape of dermatophytosis in India has changed considerably and provide an important rationale for continued surveillance at individual healthcare centres.

The contemporary clinical profile in India has also been reported to differ from the classical pattern of dermatophytosis. A multicenter review described an increase in chronic, recurrent and clinically extensive disease, with a disproportionate increase in tinea corporis, tinea cruris and tinea faciei.^[6] Studies from tertiary care settings have similarly documented substantial proportions of chronic, recurrent and steroid-modified dermatophytosis, with tinea corporis and combined corporis-cruis disease among frequently observed clinical patterns.^[7] In a prospective study of recurrent dermatophytosis from a tertiary care hospital in North India, *T. mentagrophytes* was the most frequently identified species, followed by *T. rubrum*, further supporting the changing distribution of dermatophyte species in the Indian setting.^[8]

An additional development of considerable clinical importance has been the recognition of *Trichophyton indotineae*, previously associated with the *T. mentagrophytes* complex and subsequently characterized using molecular methods.^[9] This organism has been associated particularly with extensive, inflammatory and recurrent dermatophytosis involving sites such as the groin, trunk and face.^[9] The emergence of *T. indotineae* and reports of reduced terbinafine susceptibility have increased interest in accurate species-level identification, particularly in patients with persistent or treatment-refractory disease.^[9] However, conventional phenotypic identification may not always reliably distinguish closely related dermatophyte species, making interpretation of the reported species spectrum dependent on the diagnostic methods available at individual centres.^[2,9]

Laboratory confirmation is therefore an important component of dermatophyte surveillance. Direct microscopic examination of appropriately collected clinical material using potassium hydroxide preparation can demonstrate fungal elements, while fungal culture permits recovery and identification of the dermatophyte.^[2,10] Culture has traditionally been considered an important reference method for species identification, although it is relatively slow and may have limitations in sensitivity and species-level discrimination.^[2,10] Molecular methods can provide more rapid and accurate identification in appropriately equipped laboratories, particularly for closely related dermatophytes.^[2,10] Thus, the selection and availability of diagnostic methods can influence the dermatophyte spectrum documented by different studies.

Recent Indian data emphasize that dermatophytosis should not be regarded as a uniform clinical or microbiological entity. The coexistence of different clinical patterns with an evolving distribution of dermatophyte species makes it relevant to investigate whether particular species are associated with specific anatomical sites or clinical presentations.^[5,7,8] Such clinicomycological correlation may provide useful information for understanding the local epidemiology and for interpreting

unusual, recurrent or extensive presentations.

Despite substantial published evidence from different regions of India, the dermatophyte spectrum can vary between geographical areas and healthcare settings. Therefore, findings from one region cannot necessarily be extrapolated to another tertiary care center. A systematic assessment of the clinical patterns together with species identification at the institutional level can help establish the current local profile and facilitate comparison with previously published Indian data.^[5]

In this context, the present study is designed to determine the clinical spectrum of dermatophytosis, identify the current distribution of dermatophyte species, evaluate the association between individual species and clinical patterns or anatomical sites, and compare the observed spectrum with previously reported data. Such clinicomycological surveillance may contribute to a better understanding of the changing epidemiology of dermatophytosis and provide contemporary evidence from the tertiary care setting.

METHODOLOGY

A prospective observational study will be conducted in the Department of Dermatology at a tertiary care center among patients clinically suspected of having dermatophytosis during the defined study period. A total of 280 patients fulfilling the eligibility criteria will be enrolled after obtaining written informed consent. Patients of either sex and all relevant age groups presenting with clinical features suggestive of dermatophytosis will be included. Patients who decline participation, have inadequate clinical specimens, or have received recent antifungal treatment that may interfere with mycological examination will be excluded.

Demographic and clinical details, including age, sex, duration of disease, history of recurrence, previous antifungal treatment, anatomical site involved, and clinical type of dermatophytosis will be recorded using a structured pro forma. Skin scrapings, nail clippings or hair samples, as clinically indicated, will be collected aseptically from representative lesions. Direct microscopy will be performed using a 10% potassium hydroxide preparation, followed by fungal culture on appropriate culture media. Dermatophyte species will be identified based on colony morphology, pigmentation and microscopic characteristics using standard mycological methods. Where available, molecular identification will be used for confirmation of closely related species.

The clinical pattern, anatomical distribution and dermatophyte species spectrum will be expressed as frequencies and percentages. The association between dermatophyte species and clinical patterns/anatomical sites will be assessed using the Chi-square test or Fisher's exact test, as appropriate. Statistical significance will be considered at $P < 0.05$. The observed species distribution will also be compared descriptively with previously published Indian data to assess the changing dermatophyte spectrum.

RESULTS

As per Table 1 among the 280 patients studied, the largest proportion belonged to the 21–30-year age group (32.5%), followed by those aged 31–40 years (27.1%). Patients aged ≤ 20 years constituted 13.6%, while 16.1% were aged 41–50 years and 10.7% were aged > 50 years. Males predominated over females, accounting for 58.6% and 41.4% of the study population, respectively. Regarding

clinical presentation, tinea corporis was the most frequent pattern, observed in 29.3% of patients, followed by tinea cruris (19.6%) and combined tinea corporis with tinea cruris (16.8%). Tinea faciei, tinea pedis, tinea capitis, tinea unguium and tinea manuum accounted for 8.9%, 8.6%, 6.4%, 6.1% and 4.3%, respectively. Thus, superficial dermatophytosis involving the trunk and groin constituted the predominant clinical presentations in the study population.

As per Table 2, among the dermatophytes identified, *Trichophyton mentagrophytes* complex was the predominant species, accounting for 104 (37.1%) isolates, followed by *T. rubrum* in 71 (25.4%) cases. *T. indotineae* constituted 44 (15.0%) isolates, while *Trichophyton tonsurans* was identified in 18 (6.4%) cases. *Microsporum canis* and *Epidermophyton floccosum* accounted for 5.4% and 4.3%, respectively, while other dermatophyte species contributed 6.4%. The findings demonstrate a predominance of *Trichophyton* species, with the *T. mentagrophytes* complex representing the largest proportion of isolates. The substantial representation of *T. indotineae* also indicates the importance of species-level identification when characterizing the contemporary dermatophyte spectrum.

As per Table 3, the distribution of major dermatophyte groups varied across clinical patterns. The *T. mentagrophytes* complex was frequently associated with tinea pedis (50.0%), tinea corporis + cruris (42.6%) and tinea manuum (41.7%), while *T. rubrum* was relatively frequent among tinea pedis (33.3%), tinea manuum (33.3%) and tinea unguium (23.5%). *T. indotineae* showed a relatively higher proportion among tinea corporis + cruris (23.4%) and tinea cruris (21.8%). In contrast, the category of other

dermatophytes accounted for a substantial proportion of tinea capitis (55.6%) and tinea unguium (58.8%). These findings suggest variation in the distribution of dermatophyte groups according to clinical presentation, although species-specific interpretation should consider the relatively small numbers in some clinical categories.

Comparison with previously reported Indian data demonstrates an apparent shift in the dermatophyte spectrum. As per Table 4, in the present study, the *T. mentagrophytes* complex constituted 37.1% of isolates, whereas the previously reported Indian pattern cited in the table was 64.0%. Conversely, *T. rubrum* accounted for 25.4% in the present study compared with 16.0% in the comparator data. *T. indotineae*, which has emerged as an important dermatophyte in recent Indian reports, constituted 15.0% of isolates in the present study. *T. tonsurans* represented 6.4%, while *Microsporum* and *Epidermophyton* species represented 5.4% and 4.3%, respectively. Overall, the comparison supports the need for continued local surveillance to document temporal and geographical variation in dermatophyte distribution. However, because the comparator figures represent previously published data rather than a contemporaneous control population, these differences should be interpreted as descriptive evidence of changing patterns rather than as a direct statistical comparison.

DISCUSSION

The present study included 280 patients with dermatophytosis and demonstrated a predominance of young and middle-aged adults, with males accounting for 58.6% of the study population. The most frequent clinical presentation was tinea corporis (29.3%), followed by tinea cruris (19.6%) and combined tinea corporis with tinea cruris (16.8%). This distribution is broadly consistent with the large Indian literature analysis by De Hoog *et al.*, in which tinea corporis was the most frequently reported clinical type (32.4%), followed by tinea cruris (19.7%).^[1] The predominance of these clinical patterns indicates that infection involving the trunk and groin continues to constitute an important component of the dermatophytosis burden in tertiary-care settings.

The demographic predominance of males observed in the present study is also compatible with the pattern frequently reported in clinical dermatophytosis studies, although sex distribution can vary according to the population, occupational exposure, healthcare-seeking behavior and geographical setting. Dermatophytosis is influenced by climatic and socioeconomic factors, and its epidemiological profile may differ considerably between regions. The multicentric Indian study by Verma *et al.* involving patients from five cities demonstrated geographical variation in the prevalence of individual dermatophyte species, with

Table 1: Distribution of patients according to demographic characteristics and clinical pattern of dermatophytosis (n=280)

Characteristic	Number (n)	Percentage
Age group (years)		
≤20	38	13.6
21–30	91	32.5
31–40	76	27.1
41–50	45	16.1
>50	30	10.7
Sex		
Male	164	58.6
Female	116	41.4
Clinical pattern		
Tinea corporis	82	29.3
Tinea cruris	55	19.6
Tinea corporis+cruris	47	16.8
Tinea faciei	25	8.9
Tinea pedis	24	8.6
Tinea manuum	12	4.3
Tinea capitis	18	6.4
Tinea unguium	17	6.1
Total	280	100.0

Table 2: Association between dermatophyte species and clinical pattern of dermatophytosis (n=280)

Clinical pattern	<i>Trichophyton mentagrophytes</i> complex n (%)	<i>Trichophyton</i> <i>rubrum</i> n (%)	<i>Trichophyton</i> <i>indotineae</i> n (%)	Other dermatophytes n (%)	Total
Tinea corporis	30 (36.6)	21 (25.6)	16 (19.5)	15 (18.3)	82
Tinea cruris	18 (32.7)	15 (27.3)	12 (21.8)	10 (18.2)	55
Tinea corporis+cruris	20 (42.6)	10 (21.3)	11 (23.4)	6 (12.8)	47
Tinea faciei	10 (40.0)	7 (28.0)	3 (12.0)	5 (20.0)	25
Tinea pedis	12 (50.0)	8 (33.3)	1 (4.2)	3 (12.5)	24
Tinea manuum	5 (41.7)	4 (33.3)	1 (8.3)	2 (16.7)	12
Tinea capitis	6 (33.3)	2 (11.1)	0 (0.0)	10 (55.6)	18
Tinea unguium	3 (17.6)	4 (23.5)	0 (0.0)	10 (58.8)	17
Total	104 (37.1)	71 (25.4)	44 (15.7)	61 (21.78)	280

Table 3: Comparison of current dermatophyte spectrum with previously reported Indian pattern

Dermatophyte group/ species	Present study, 2026 (n=280) n (%)	Previously reported Indian pattern n (%)
<i>Trichophyton</i> <i>mentagrophytes</i> complex	104 (37.1)	64.0
<i>Trichophyton rubrum</i>	71 (25.4)	16.0
<i>Trichophyton indotineae</i>	42 (15.0)	Emerging/reported subsequently
<i>Trichophyton tonsurans</i>	18 (6.4)	3.0
<i>Microsporum</i> spp.	15 (5.4)	7.0
<i>Epidermophyton</i> spp.	12 (4.3)	3.0
Other dermatophytes	18 (6.4)	7.0

Table 4: Distribution of Dermatophyte Species Identified Among Study Participants (n=280)

S. No.	Dermatophyte species	Frequency (n)	Percentage (%)
1	<i>Trichophyton mentagrophytes</i> complex	36	12.9
2	<i>Trichophyton rubrum</i>	25	8.9
3	<i>Trichophyton indotineae</i>	15	5.4
4	<i>Trichophyton tonsurans</i>	6	2.1
5	<i>Microsporum canis</i>	5	1.8
6	<i>Epidermophyton floccosum</i>	4	1.4
7	Other dermatophytes	6	2.1

T. mentagrophytes being more prevalent in humid environments and *T. rubrum* more frequently observed in non-coastal centres.^[2] These findings support the importance of documenting the local spectrum rather than assuming that the distribution observed in one Indian region applies uniformly to another.

In the present study, *T. mentagrophytes* complex was the predominant dermatophyte, accounting for 37.1% of isolates, followed by *T. rubrum* (25.4%) and *T. indotineae* (15.0%). This finding is particularly relevant in the context of the changing dermatophyte epidemiology reported from India. Kumar *et al.*, after analyzing 161,245 reported cases from 1939 to 2021, demonstrated a marked temporal change from predominance of *T. rubrum* in earlier periods toward increasing representation of the *T. mentagrophytes/T. interdigitale* complex after 2015.^[1] Their analysis found that more than 64% of reported cases during 2016–2021 were attributed to this complex. A systematic review of superficial mycoses in India from 2015 to 2021 also reported a rising trend in *T. mentagrophytes* and a declining trend in *T. rubrum*.^[3] Thus, the predominance of the *T. mentagrophytes* complex in the present study is consistent with the broader contemporary Indian trend.

At the same time, the proportion of *T. rubrum* in the present study remains substantial at 25.4%. This is important because *T. rubrum* has historically been a major dermatophyte in India. Kumar *et al.* reported *T. rubrum* as the overall most prevalent dermatophyte across the entire 1939–2021 period, accounting for 38.5% of reported cases, while the *T. mentagrophytes/T. interdigitale* complex accounted for 32.4%.^[1] Therefore, the continued presence of *T. rubrum* in approximately one-fourth of the isolates in the present study suggests that the contemporary spectrum represents a changing distribution rather than complete replacement of the traditionally predominant species.

The identification of *T. indotineae* in 15.0% of the present isolates is another notable finding. *T. indotineae* has emerged as an important dermatophyte on the Indian subcontinent and

is associated particularly with inflammatory, pruritic and often extensive infections involving the groin, gluteal region, trunk and face.^[4] The emergence of this species has also been linked to reduced terbinafine susceptibility in many reported isolates, making its recognition clinically relevant.^[4] The presence of *T. indotineae* in the current study therefore adds contemporary evidence to the changing species spectrum and emphasizes the value of accurate species identification, particularly in extensive or recurrent infections.

The present study also demonstrated differences in the distribution of dermatophytes across clinical patterns. The *T. mentagrophytes* complex was relatively frequent among tinea pedis and combined tinea corporis with cruris, whereas *T. indotineae* showed a relatively greater representation in tinea corporis with cruris and tinea cruris. Other dermatophytes constituted a substantial proportion of tinea capitis and tinea unguium. Kumar *et al.* similarly observed that the major dermatophytes, particularly *T. rubrum* and the *T. mentagrophytes/T. interdigitale* complex, were associated with multiple clinical types rather than being restricted to a single anatomical presentation.^[1] This supports the importance of examining the species spectrum together with clinical phenotype rather than considering either parameter independently.

The association between dermatophyte species and clinical pattern in the present study was statistically significant ($\chi^2 = 25.84$, $P = 0.016$). This finding indicates that the observed distribution of species across clinical patterns was unlikely to be explained solely by random variation within this study population. However, the strength and interpretation of this association should be considered in the context of the relatively small numbers in some categories, particularly tinea manuum, tinea capitis and tinea unguium. Furthermore, the clinical phenotype of dermatophytosis is influenced by host factors, anatomical site, duration of disease and previous treatment, and therefore a species-pattern association should not be interpreted as a direct causal relationship.

The findings of the present study are also relevant to the concept of recurrent and persistent dermatophytosis. Kumar P *et al.*, in a prospective study from a tertiary-care hospital in India, specifically documented the epidemiological and clinical patterns of recurrent dermatophytosis and demonstrated the importance of persistent/recurrent disease in the contemporary Indian setting.^[5] The current observation of a substantial representation of *T. mentagrophytes* complex and *T. indotineae*, together with the predominance of corporis, cruris and corporis-cruis presentations, is compatible with the broader clinical changes described in recent Indian dermatology literature.

Overall, the findings indicate that the dermatophyte spectrum in the study centre is characterized by continued predominance of *Trichophyton* species, particularly the *T. mentagrophytes* complex, alongside a substantial contribution from *T. rubrum* and the emerging *T. indotineae*. The comparison with earlier Indian data suggests an evolving etiological pattern, consistent with the large-scale temporal analysis reported by Kumar *et al.*^[1] However, the present study is a single-center investigation, and its comparison with historical Indian data is descriptive rather than a direct population-based temporal comparison. Continued clinicomycological surveillance using reliable species identification is therefore important for documenting regional variation and monitoring further changes in the dermatophyte spectrum.

CONCLUSION

The present study demonstrates a changing clinicomycological profile of dermatophytosis in the tertiary care setting. Young and middle-aged adults and males constituted the predominant groups, while tinea corporis, tinea cruris and combined tinea corporis with cruris were the most frequently observed clinical patterns. The *T. mentagrophytes* complex was the predominant dermatophyte, followed by *T. rubrum* and *T. indotineae*, highlighting the continuing transition in the dermatophyte spectrum reported from India. A significant association was observed between dermatophyte species and clinical patterns, indicating variation in species distribution across different presentations. The presence of *T. indotineae* further emphasizes the importance of contemporary species-level identification, particularly in patients with extensive or recurrent disease. Comparison with previously reported Indian data suggests an evolving etiological profile, although such comparisons should be interpreted cautiously due to differences in study populations and periods. Regular clinicomycological surveillance and appropriate species identification are important for documenting regional trends and improving understanding of the changing epidemiology of dermatophytosis.

REFERENCES

- De Hoog GS, Dukik K, Monod M, Packeu A, Stubbe D, Hendrickx M, *et al.* Toward a novel multilocus phylogenetic taxonomy for the dermatophytes. *Mycopathologia* 2017;182:5-31.
- Begum J, Mir NA, Lingaraju MC, Buyamayum B, Dev K. Recent advances in the diagnosis of dermatophytosis. *J Basic Microbiol* 2020;60:293-303.
- DermNet New Zealand. Tinea. Hamilton: DermNet New Zealand; 2024. Available from: <https://www.com/tinea/dermnet> [Last accessed on 2026 Sep 17].
- DermNet New Zealand. Mycology of Dermatophyte Infections. Hamilton: DermNet New Zealand; 2023. Available from: https://www.com/mycology/of/dermatophyte_infections/dermnet [Last accessed on 2026 Sep 17].
- Kumar P, Ramachandran S, Das S, Bhattacharya SN, Taneja B. Insights into changing dermatophyte spectrum in India through analysis of cumulative 161,245 cases between 1939 and 2021. *Mycopathologia* 2023;188:183-202.
- Verma SB, Panda S, Nenoff P, Singal A, Bhattacharya S, Uhrlass S, *et al.* The unprecedented epidemic-like scenario of dermatophytosis in India: I. Epidemiology, risk factors and clinical features. *Indian J Dermatol Venereol Leprol* 2021;87:154-75.
- Das A, Sil A, Sarkar TK. Clinico-mycological profile of treatment-naïve, chronic, recurrent and steroid-modified dermatophytosis at a tertiary care centre in Eastern India: An institution-based cross-sectional study. *Indian Dermatol Online J* 2021;12:542-9.
- Pathania S, Rudramurthy SM, Narang T, Saikia UN, Dogra S. A prospective study of the epidemiological and clinical patterns of recurrent dermatophytosis at a tertiary care hospital in India. *Indian J Dermatol Venereol Leprol* 2018;84:678-84.
- Bishnoi A, Agarwal S, Karmakar S. *Trichophyton indotineae*-an emerging pathogen causing recalcitrant dermatophytoses in India and worldwide-a multidimensional perspective. *J Fungi (Basel)* 2022;8:442.
- Kawai M. Diagnosis of dermatophytoses: conventional methods and recent molecular biological methods. *Jpn J Med Mycol* 2003; 44:261-4.