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Clinico-Mycolological Spectrum Of Dermatophytosis: Insights From A South Indian Tertiary Hospital

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Keywords*Tinea cruris*, *Tinea corporis*,
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*Dermatophytic infections***ABSTRACT**

In several areas of the Asian country, dermatophytosis is equally prevalent. The diverse state of weather is advantageous for mycosis, which may lead to various clinical symptoms, and illness spreads quickly if left untreated over time. The purpose of the present study is to evaluate the clinical and mycolological pattern of dermatophyte infections in patients arriving at our dermatology outpatient department, and also to link the official clinical diagnosis with KOH positivity and culture positivity. The clinical specimens were examined by direct microscopy with a potassium hydroxide (KOH) mount and cultured on Sabouraud's Dextrose Agar (SDA). The study found that males were affected mostly, and the majority of the participants were students. Itching, scaling, and discolouration were the most often reported symptoms. *Tinea corporis* was the most frequently diagnosed infection, followed by *Tinea cruris*. *Trichophyton rubrum* and *Trichophyton violaceum* were the most commonly isolated organisms, followed by *Trichophyton mentagrophytes*. This study emphasizes the requirement for personal hygiene and the disadvantage of relatively few participants developing zoophilic infections of *Tinea* species. These identification and diagnosis techniques will also help to improve patient care.

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INTRODUCTION:

Dermatophytosis is one of the most frequent diseases in the world, caused by the dermatophytic fungi such as *Trichophyton*, *Microsporum*, and *Epidermophyton* colonising keratinised tissue of the hair, skin, and nails.^{1,2} The foot is the most common site of dermatophytic infection, with an estimated lifetime risk of 10–20% worldwide. These infections are commonly known as ringworm or tinea and typically involve the non-living keratinized layers of the skin, as the organisms are unable to penetrate deeper tissues in immunocompetent hosts.

^{3,4} Pruritus was reported to be the commonest indication that was identified in humans with dermatophyte infection, since it depends on the host's reaction and environmental components. Also, the infection may range in severity from seborrheic dermatitis to severe types like favus.^{5,6}

A preliminary diagnosis is helpful at the start of treatment since these infections might be mistaken for other skin conditions⁸. Even though the majority of dermatophytic infections are non-interventive and simple to treat, their widespread prevalence, social shame, impairment of quality of life, and damage to one's financial position due to treatment costs are significant societal concerns⁹. The purpose of the present study is to evaluate the clinical and mycological pattern of dermatophyte infections in patients arriving at our dermatology outpatient department, and also to link the official clinical diagnosis with KOH positivity and culture positivity.

MATERIALS AND METHODS:

The purpose of the illustrative study was to estimate the clinical-mycological profile of dermatophytic illness. The specimens were collected from people with a clinical diagnosis of dermatophytosis between January 2024 and June 2025. On December 7, 2023, the Institute Ethical Committee (Human Studies) granted ethical approval (1224/IEC/2023). Patients who have applied any form of topical treatments, including steroids, antifungals, antibacterials, antiseptics, native drugs over the previous month or on current use are excluded.

An Informed and written consent form has been gathered from all the study participants in our current inquiry. In the case of children, permission was taken from their parents.

A detailed history was obtained, including demographic details, clinical features (site, type, and duration of lesions), personal hygiene and lifestyle factors, comorbidities, exposure history (fomites and pets), recurrence pattern, previous episodes, and prior treatment details with any symptom-free interval.

SAMPLE COLLECTION:

The samples were taken based on the site of infection. If it is skin, scrapings from the edge of the lesion and clipping of nail and under the nail debris in case of nail infection were collected. Impaired hair was pulled from the base using clean aseptic forceps combined with scrapings. After collecting specimens from infected locations aseptically, the region was washed with 70% isopropyl alcohol and left to dry. A sample of the skin was scraped from the active fringe of the lesion; clippings of nails and subungual trash were gathered and diseased hair with the base was taken for analysis.

ISOLATION OF DERMATOPHYTES ON CULTURE:

The dermatophytic culture was divided into two sets of tubes of Sabouraud's dextrose agar (SDA), one containing chloramphenicol (0.05 mg/ml) and the other containing both chloramphenicol and cycloheximide (0.5 mg/ml). For four weeks, one will be incubated at 25°C and the other at 37°C, with measurements made twice a week. Macroscopic characteristics, including pigment and texture, as well as the colonies' growth rate, were monitored¹⁰⁻¹².

SPECIES IDENTIFICATION:

After four weeks, the tubes were checked for growth, and the results were noted. Microscopic features were observed by lactophenol cotton blue stain. Identification of species is finalized based on various arrangements of hyphae (coiled, pencil, spindle or club form, their septate, nodular organ), the agamogenesis pattern and the presence of microconidia and macroconidia. When necessary, biochemical identification tests, such as hair perforation and urea hydrolysis, are carried out.

STATISTICAL ANALYSIS:

Descriptive analysis is distributed through the mean and variance for quantitative, proportion and frequency for unconditioned variables. The gathered data was represented using appropriate diagrams, such as box plots and pie charts. Cross-tabulation and percentage comparison were used to assess the correlation between diagnosis, culture, and KOH positivity. The chi-square test is used to determine the analytical significance. P values < 0.05 were deemed important. For mathematical analysis, IBM SPSS version 13 was utilised.

RESULT:

In this study, the mean age was 28.47 ± 15.23 (Table 1) with 194 (64.50%) male and 106 (35.50%) female participants. Out of 300 participants, 26 (8.70%) were agriculturists, 141(47%) participants were students, 47 (15.70%) participants were housewives, 36 (12%) participants were labourers, and 50 (16.70%) participants were Itching, scaling and discolouration are the most prevalent symptoms, with 114 (38.00%) individuals having a recurrence and 81 (27%) participants had a family history. Of the participants, 131 (43.70%) owned pets. Among the study population, 36 (12%) people had type II diabetes mellitus, 3 (1%) participants had systemic hypertension, 4 (1.30%) participants had bronchial asthma, and 5 (1.70%) participants had hypothyroidism.

About 16% of patients got a groin infection. The proportions of involvement were 8.3% for the scalp, 7.3% for the abdomen and groin, 8% for the abdomen and back, 6.7% for the face, and 6% for the abdomen. The bulk of the study subjects had infections caused by *Tinea corporis*, as it accounted for roughly 31.30%. *T. cruris* (16%), *T. capitis* (8.30%), *T. faciei* (6.70%), and *T. pedis* (5%) came next. Among those with *tinea corporis*, 83 (27.7%) had an annular type (figure 1), 5 (1.7%) had an eczematous type, 4 (1.3%) had a Black Dot *tinea*, and 1 (0.3%) had a crusted type and psoriasiform type (figure 2). Thirteen (4.3%) of the individuals with *Tinea capitis* exhibited black patches, eight (2.7%) had grey patches, and four (1.3%) had kerion.

Four individuals (1.3%) had a Circinate form of *Tinea barbae*, while seven individuals (2.3%) had a Superficial type. Among the *Tinea pedis*-infected individuals (figure 3), 11 (3.7%) participants had a chronic intertriginous type, and 4 (1.3%) participants had a vesicular or vesiculobullous type. Among the *Tinea manuum*-infected patients, 9 (3%) participants exhibited non-inflammatory squamous form. Among the study population, 48 (16%) subjects had *Tinea cruris*. Among the study population, 20 (6.7%) subjects had *Tinea faciei* (figure 4 and figure 5). The majority of individuals (8.7%) with the mixed type had an annular type (*Tinea corporis* + *Tinea cruris*). The proportion of Annular type (*Tinea corporis*) + chronic intertriginous type (*Tinea pedis*) and *Tinea cruris*, chronic intertriginous type (*Tinea pedis*) was 8.7% and 2% respectively (Table 2).

Among the study population, 156 (52%) participants had KOH positive + Culture positive, 27 (9%) participants had KOH negative + Culture positive, 104 (34.70%) participants had KOH positive + Culture negative and 13 (4.30%) participants had Culture + KOH negative. (Table 3). Amidst the study population, 96 (32%) persons had *Trichophyton mentagrophytes*, 45 (15%) participants had *Trichophyton rubrum*, 24 (8%) participants had *Trichophyton violaceus*, and 18 (6%) participants had *Microsporum canis*.

DISCUSSION:

The incidence of dermatophyte infections varies significantly across different geographic regions and climatic conditions. Despite advances in life sciences, fungal infections remain among the most common diseases worldwide, affecting individuals of all ages, genders, and occupations, and imposing considerable economic and psychological burden. Fungal infections continue to be considered one of the major public health challenges in many parts of the world.

In order to investigate the clinical and mycological patterns of dermatophyte infections, the current study involved 300 clinically diagnosed individuals with dermatophytosis. Additionally, this study evaluated the relationship between clinical diagnosis and KOH and culture-positive.

The majority of study participants in this study were between the ages of 11 and 20 (33%), followed by those between the ages of 21 and 30 (26%). Our study findings were comparable with those of Singh S et al (2003), who found people in the age category of 16-30 years to be the commonly affected group by superficial dermatophyte infections¹³. The bulk of the literature shows a majority of the affected people to be in the age range of 20 to 40 years, with relatively little proportion in the paediatric and older demographic groups. This can be explained by the economically productive age groups working physically, frequently in hot and muggy conditions that result in profuse perspiration and damp body surfaces.

The most affected group was students, this condition was due to the immature immune system, progressive exhibition to inapparent suppuration carried in the home and school, incapability to sustain hygiene, which makes them prone to recurrent infections by Fungi. Like our study, Kucheria, M., et al (2016) revealed that a larger no. of patients were students (28%) and housewives (25%), followed by workers and service class persons¹⁴. However, in contrast to our research, Pandit, V. S. et al. (2018) found that the majority of patients—32.6%—were housewives, followed by labourers (20%) and students (14%)¹⁵.

A recurrence occurred in 38.00% of the research subjects. Deepasri, A., et al (2018) study also found virtually identical findings where recurrence was seen in 31.3% of cases¹⁶. There are very few studies that have described the recurrence of infection in the literature. There is a definite need to do further studies on this issue to understand the elements linked with recurrence so that appropriate actions may be implemented to prevent it. The variables that can be closely linked to recurrence include inadequate treatment, poor compliance of the affected patient, and improper treatment frequently obtained over-the-counter.

KOH and culture results reveal that 54% (n=156) of the cases were both KOH positive and culture positive. About 34% of the instances were KOH positive and culture negative, followed by 9% showing KOH negative and culture positive results, and 4.30% of the study participants showed KOH negative and culture negative results. Therefore, the

present study findings were in accordance with the study findings of Deepasri, A. et al (2018), which reported that nearly 63% of the cases were both KOH positive and culture positive ¹⁶

Among the study population, type II diabetes mellitus has been the most frequent disease association, in accordance with Kucheria, M., et al (2016) study, whose findings showed that 30% of the dermatophytosis cases were diabetic patients ¹⁴. The majority of individuals in the current study—31.30%—had tinea corporis. According to a study by Das S et al., the most prevalent laboratory illnesses were Tinea corporis (21.4%), onychomycoses (14.7%), and Tinea capitis (6.2%) ¹⁷. In a research by Maraki S et al (2007), Tinea unguium followed by Tinea pedis were the commonest locations of dermatophyte infections, in contrast to the current study findings ¹⁸.

The results of our investigation differed from those of some previous studies. The most often isolated dermatophyte in Kucheria, M., et al. (2016) was *Trichophyton rubrum* (46.4%), followed by *Trichophyton mentagrophytes* (30.4%). In a study by Maraki S et al (2007), *Trichophyton rubrum* was the most often separated dermatophyte, comprising 48% of the infections, followed by *Microsporum canis* (17.9%), *Trichophyton mentagrophytes var. interdigitale* (14.2%) and *Epidermophyton floccosum* (6%). Gupta, A. K. et al (2018) have shown that the very commonly isolated organism was *Trichophyton verrucosum* (35.5%).

According to the results of the current investigation, *Trichophyton rubrum* accounted for 20.8% and *Trichophyton mentagrophytes* for 30.8% ^{18,19}. *Trichophyton rubrum* and *Trichophyton mentagrophytes* were unquestionably the two common fungi responsible for the total dermatophyte infection, despite differences in the relative proportions of several fungi. Observation of the findings presented by research from India, done over the last 10 to 15 years, suggests that *Trichophyton mentagrophytes* is gradually displacing *Trichophyton rubrum* as the most frequent fungus isolated. The changing demographic profile of the affected population, changes happening in the fungi, the pattern of pharmacological therapies and susceptibility of fungi to them may be responsible for this changing tendency ¹⁸. This study provides facts on the present situation of the sickness in a given region. The epidemiology of dermatophytoses may shift throughout time. Thanks to this study, we now have a better understanding of the mycological pattern of dermatophytoses in this region.

CONCLUSION:

There may be a geographical variance in the dissemination of dermatophyte species, which are observable from studies from diverse regions of India. According to our research, *Trichophyton mentagrophyte* is the primary organism responsible for dermatophytosis. In the era of dermatophytosis, numerous researchers have seen a toxicological shift in the type of fungus. While *Trichophyton mentagrophytes* is currently considered a common species, *Trichophyton rubrum* was formerly a highly common organism. This is the cause of recurring and recalcitrant dermatophytosis. The dermatologists and various physicians treating the dermatophyte illnesses have to be sensitised regarding the dynamic profile of fungi causing dermatophytes, acceptable approaches of diagnosis and management.

Table 1: Descriptive analysis of age group in the study population (N=300)

Age group	No. of cases	Percentage
Up to 10	21	7.0%
11 to 20	99	33.00%
21 to 30	78	26.00%
31 to 40	39	13.00%
41 to 50	34	11.30%
51 to 60	13	4.30%
61 and above	16	5.30%

Table 2: Descriptive analysis of morphological patterns with the site of involvement of the disease in the study population (N=300)

Subtype	No. of cases	Percentage
<i>Tinea corporis</i> (N=94)		
Annular type	83	27.7%
Eczematous type	5	1.7%
Plaque type	4	1.3%
Crusted type	1	0.3%
Psoriasiform type	1	0.3%
<i>Tinea Capitis</i> (N=25)		
Black Dot	13	4.3%
Grey patch	8	2.7%
Kerion	4	1.3%
<i>Tinea barbae</i> (N=11)		
superficial type	7	2.3%
Circinate type	4	1.3%
<i>Tinea pedis</i> (N=15)		
chronic intertriginous type	11	3.7%
vesicular or vesiculobullous type	4	1.3%
<i>Tinea unguium</i> (N=14)		
DLSO	11	3.7%
Total dystrophic onychomycosis	3	1.0%
<i>Tinea manuum</i> (N=9)		
Non inflammatory Squamous form	9	3.0%
<i>Tinea cruris</i> (N=48)		
<i>Tinea faciei</i> (N=20)		
Mixed types		
Annular type (<i>Tinea corporis</i>) + <i>Tinea Cruris</i>	26	8.7%
Annular type (<i>Tinea corporis</i>) + chronic intertriginous type (<i>Tinea pedis</i>)	6	2.0%
<i>Tinea cruris</i> , chronic intertriginous type (<i>Tinea pedis</i>)	6	2.0%
<i>Tinea cruris</i> + Non inflammatory	4	1.3%

Squamous form (<i>Tinea manuum</i>)		
Non inflammatory Squamous form (<i>Tinea manuum</i>)+ DLSO (<i>Tinea unguium</i>)	4	1.3%
chronic intertriginous type (<i>Tinea pedis</i>) +DLSO (<i>Tinea unguium</i>)	4	1.3%
<i>Tinea faciei</i> + superficial type (<i>Tinea barbae</i>)	3	1.0%
plaque type (<i>Tinea corporis</i>) + <i>Tinea cruris</i>	3	1.0%
Annular type(<i>Tinea corporis</i>) + <i>Tinea cruris</i> + DLSO (<i>Tinea unguium</i>)	3	1.0%
Psoriasis form(<i>Tinea corporis</i>) + <i>Tinea cruris</i>	2	0.7%
<i>Tinea faciei</i> + Inflammatory type (<i>Tinea barbae</i>)	2	0.7%
<i>Tinea faciei</i> + circinate type (<i>Tinea barbae</i>)	1	0.3%

Table 3: Descriptive analysis of KOH and culture in the study population (N=300)

KOH and culture	No. of cases	Percentage
KOH positive+culture positive	156	52.00%
KOH negative+culture positive	27	9.00%
KOH positive+culture negative	104	34.70%
KOH negative + culture negative	13	4.30%

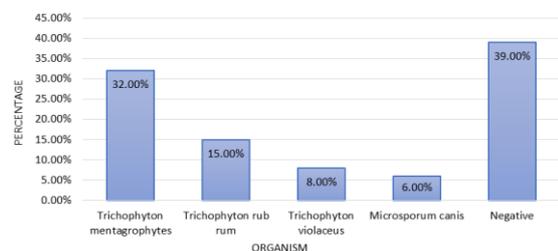


Figure 4: Bar chart of descriptive analysis of organism in the study population (N=300)

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None

CONFLICT OF INTEREST:

The authors declare that there is no conflict of interest.

ETHICAL STATEMENT:

Ethical approval was obtained from the Institute Ethical Committee (Human Studies) on 7th December 2023 (1224/IEC/2023).

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