

Original research article

## Dermatophytosis and its Mycological Correlation in Patients Attending a Tertiary Care Hospital

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### Abstract

**Background and Objective:** Dermatophytes are fungi that parasitize keratin-rich components like skin, hair, and nails, causing a dermal inflammatory reaction that includes acute itching and cosmetic deformity. Eastern India's climate is generally hot and humid, with heavy rains that promote fungal infection. This study was conducted to find the prevalence of dermatophytosis and to isolate and classify the dermatophyte from clinically suspected cases attending tertiary care hospital.

**Materials and Methods:** This study was conducted from January 2019 to December 2019 and a total of 384 samples were included. Skin scrapings were collected and examined microscopically using 10% potassium hydroxide (KOH) mount. Culture was performed using Sabouraud dextrose agar and dermatophyte test medium. Speciation was done based on macroscopic and microscopic findings using lactophenol cotton blue staining and some special tests like urease test and slide culture.

**Results:** Infection was seen to be more common among males and predominant in the age group of 21 to 30 years. Tinea corporis was commonest among all dermatophytic infections followed by the combination of tinea corporis and tinea cruris. Culture positivity was 62.8% and KOH positivity was 60.4%. Trichophyton rubrum was the predominant dermatophyte isolated followed by Trichophyton mentagrophyte

**Conclusion:** Tinea corporis was the most commonly diagnosed clinical condition. T. rubrum has remained the predominant species of dermatophytes although its prevalence among the population has increased dramatically.

**Keywords:** dermatophytes, tinea corporis, trichophyton

## **Introduction**

Dermatophytes are a type of fungus that infects keratinized tissues in people and animals, such as skin, hair, and nails, and can cause a variety of dermal illnesses. This group of fungus is called as ringworm fungi because they are antigenically, physiologically, and visually similar. [1] Dermatophytes are divided into three genera: Epidermophyton, Microsporum, and Trichophyton, all of which are anamorphic (asexual or defective). [2] Dermatophytes are classified as anthropophilic, zoophilic, or geophilic based on their preferred habitat. Human infection can be caused by species from all three groups. [3] The intensity of dermatophytosis is determined by the infecting dermatophyte's strain, the host's sensitivity, and the infection site. [4] Dermatophyte infects about 20–25 % of the world's population, and the rate of infection is rapidly rising. [5] The occurrence of dermatophyte infection differs depending on where you live. This change in the distribution pattern can be linked to social activities, labour migration, troop movements, immigration, and regular international travel. [6] Due to favourable climatic circumstances such as temperature and humidity, fungus infection of the skin and its appendages is more common in India. In India, which is a tropical and developing country, economic issues such as poverty, inadequate cleanliness, and social situations such as overcrowding have a negative impact on the aetiology of dermatophytosis. [7] We decided to conduct this study since there was a scarcity of published data on dermatophytosis in the study location. The main objective of this study is to determine the prevalence of dermatophytosis and to isolate and classify the dermatophyte from clinically suspected cases attending tertiary care hospital.

## **Materials and Methods:**

This study is a prospective study conducted in the Department of Microbiology and Department of Dermatology in a tertiary care hospital, Lucknow, from January 2019 to December 2019. All clinically suspected cases of dermatophytosis had their samples mycologically examined. Patients with hair and nail infections, as well as those who were already receiving antifungal medication, were excluded from the study. The institutional ethics committee gave its approval for the study.

### ***Sample Collection***

After choosing on a suitable location, the affected area was sanitised with 70% ethanol and left to dry before the specimen was collected. With the blunt end of a sterile surgical blade (number-15) held at an angle of 90 degrees, skin scrapings were taken from the active edge of the lesion. On a sterile white paper envelope, samples were collected. Each specimen was split into two sections, one for microscopy and the other for fungal culture.

### ***Direct Microscopy***

Scrapings were mounted in fresh 10% KOH on a sterile grease-free glass surface and examined for the presence of fungal filaments and arthrospores at 10 and 40 magnifications.

### ***Fungal Culture***

Samples were inoculated into two Sabouraud dextrose agar (SDA) slopes, one with chloramphenicol (50 mg/L) + cycloheximide (500 mg/L) and the other with simply chloramphenicol (50 mg/L). At 20 to 25°C, the tubes were incubated in a BOD (biochemical oxygen demand) incubator. Cultures were checked for growth every other day and were deemed negative if no growth was seen after four weeks. Subculturing on maize meal agar yielded pure growth of the isolate. On the surface and reverse, the growth on the SDA slope was investigated for topography (margin, folding, elevation), texture (cottony, woolly, velvety, powdery, granular), and pigmentation. Dermatophytes were presumed to be identified by

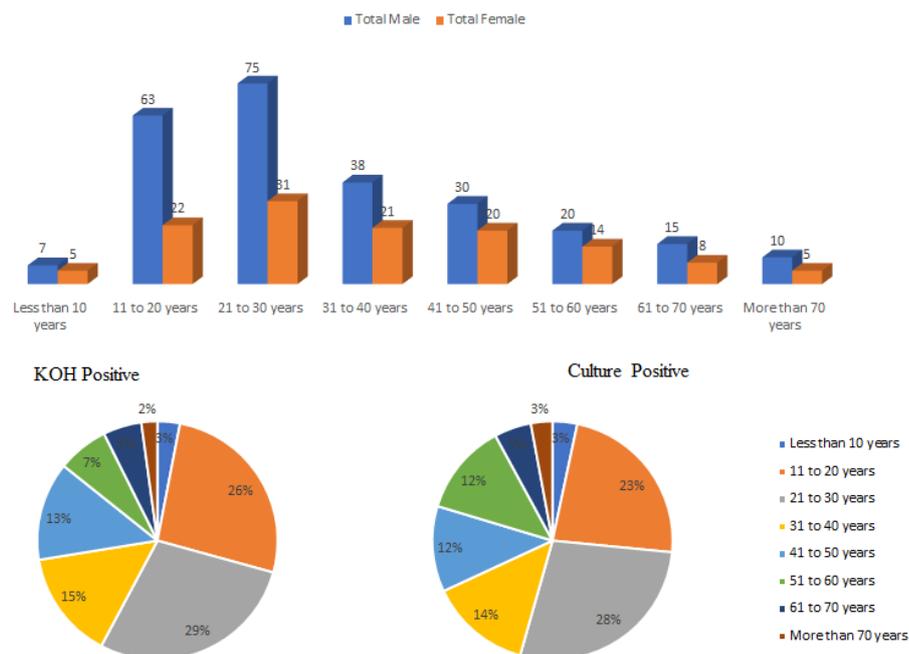
DTM. Lactophenol cotton blue staining (LPCB) mount, cellophane tape mount, urease test, and slide culture were used as needed for speciation. Microconidia and macroconidia characteristics on the LPCB mount aid in the identification of distinct genera and species.

### Statistical analysis:

The collected data were coded and entered into an excel software (Microsoft office Excel 2010) database. Data were analyzed using Statistical Package for Social Sciences, version 16.0 (SPSS, Inc., Chicago, IL, USA). Under descriptive statistics, frequency distribution table and graph were used for categorical variables. Appropriate tests of significance were applied to find out the statistical significance of the difference in percentages or proportions. Statistical significance will be assessed at  $P < 0.05$ .

### Results:

A total of 384 clinically suspected cases of dermatophytosis were included in this study. Of 384 cases, the infection was seen to be more common among males (67.19%) as compared with females (32.81%) with approximately male: female ratio of 2:1. The infections were predominant in the age group of 21 to 30 years (106/384), followed by 11 to 20 years (85/384), 31 to 40 years (59/384), and least common in < 10 years of age (12/384) and > 70 years of age (15/384). KOH was positive for fungal elements in (60.4%) cases and culture was positive for fungal isolate in (62.8%) cases. (figure 1)



**Figure 1: Age and gender distribution along with mycological findings in these cases**

Table 1 depicts that the gender wise variation of clinical forms of dermatophytic infections. Among the clinical forms, the most common presentation was that of tinea corporis (51.04%), followed by the combination of tinea corporis and tinea cruris (20.05%). in which majority of cases were male. Minimum number of cases were found in Tinea incognito (0.78%) and Tinea barbae (0.52%) forms. (table 1)

**Table 1: Gender distribution of clinical presentations of dermatophytic infections**

Clinical types	Male	Female	Total
Tinea corporis	128	68	196
Tinea corporis + tinea cruris	55	22	77
Tinea cruris	42	14	56
Tinea faciei	14	5	19
Tinea cruris + tinea faciei + tinea manuum	11	6	17
Tinea pedis	3	6	9
Tinea manuum	4	1	5
Tinea incognito	0	3	3
Tinea barbae	1	1	2
<b>Total</b>	258	126	384

Table 2 showed that out of 384 samples, 160 sample displayed positive by both. In addition, both tests showed that there were 71 samples displayed negative. Out of total 241 sample were positive by culture whereas 232 were positive by KOH. There were statistically significant association found between Culture and KOH. ( $P < 0.05$ ) (table 2)

**Table 2: Distribution of outcome of direct microscopy and culture**

	KOH Positive	KOH Negative	Total	P value
<b>Culture Positive</b>	160	81	241	0.00
<b>Culture Negative</b>	72	71	143	
<b>Total</b>	232	152	384	

Out of the 241 culture positives few of them could not be speciated because it was overgrown with contamination. Out of total culture positive 237 were dermatophytes and 4 were non-dermatophytes. *Trichophyton rubrum* (115/237) was the predominant dermatophyte isolated followed by *Trichophyton mentagrophyte* (85/237). (table 3)

**Table 3: Clinical types in correlation to dermatophytes**

Clinical Type	<i>T. rubrum</i>	<i>T. mentagrophyte</i>	<i>E. floccosum</i>	<i>M. Gypseum</i>	<i>T. tonsurans</i>	<i>M. audouinii.</i>	<i>T. schoenleinii</i>	<i>T. verrucosum</i>	<i>T. violaceum</i>
Tinea corporis	61	28	-	14	5	-	-	-	-
Tinea cruris	28	6	3	3	1	1	-	-	-
Tinea corporis + tinea cruris	12	41	2	0	0	1	1	0	2
Tinea faciei	3	2	-	-	-	-	-	-	-
Tinea pedis	3	2	2	-	-	-	1	-	-
Tinea manuum	1	1	-						
Tinea barbae	1	1	-	-	-	-	-	-	-
Tinea cruris + tinea faciei + tinea manuum	5	3	1	-	-	-	-	-	-
Tinea incognito	1	1	-	-	-	-	-	-	-
<b>Total</b>	115	85	8	17	6	2	2	0	2

**Discussion:**

A considerable number of people are affected by basic fungal infections, which are a worldwide problem. Infections caused by dermatophytes are more frequent in underdeveloped countries. The climate of Uttar Pradesh is mostly demarcated as humid subtropical with dry winter type with parts of Western U.P. as hot semi-arid type. Alternatively, some authors refer to it as tropical monsoon, which are regarded to be the optimum environments for dermatophyte infections. This study identified the mycological and clinical profile of dermatophytosis, as there are few studies documenting the profile of dermatophyte infections in the northern region of Uttar Pradesh. Furthermore, data collection suffered the influence of other variables such as frequent tourist visits, labour migration and an unsanitary lifestyle may have contributed to the development of dermatophytosis in this region. Other studies from India have also found a high incidence of males. [12,13] Similar findings were reported in present study. This could be attributed to disparities in occupational exposure between men and women, as men are more engaged in extracurricular activities. The majority of the patients in this study were between the ages of 21 years to 30 years, and another study found essentially identical results. [14] Reason for high frequency in this group might be for the reason that the persons in this group are frequently more energetic and taking part in outdoor activities such as school, college and work. A total of 241 samples were found to be positive by culture, whereas 232 were found to be positive by KOH. Culture and KOH were shown to have a statistically significant relationship. This finding is similar to one that found that direct microscopy positives were 85% and culture positives were 64% in a study. [11] Direct microscopy positives were 64% and culture positives were 45%, according to Bindu et al, [12]. Direct microscopy was 60% positive, and culture was 44% positive, according to Singh et al. [13] Direct microscopy was 72% positive, while culture was 62% positive, according to Jain et al. Direct microscopy is 60% positive, while culture is 49% positive, according to Singla et al. [15] Discussing to these researches, both direct microscopy and culture play a significant role in the diagnosis of fungal infection. The dermatologist diagnosed several dermatological disorders based on the clinical description in this investigation. Tinea corporis was the most frequent form (51.04%), followed by a coexistence of tinea corporis and tinea cruris among culture positive cases in this investigation. Some other research [8,16] revealed similar findings; although, clinical situations vary by region. Tinea corporis is the most commonly diagnosed forms in most other studies, with the exception of Peerapur et al, who found Tinea corporis with Tinea cruris to be the most commonly diagnosed forms [17], and Bhavna et al, who found tinea corporis with tinea cruris to be the most commonly diagnosed forms. [15] It is critical for physicians to underline that dermatophytosis clinical diagnosis might be incorrect due to the numerous mimics that can present with similar lesions. As tinea corporis, tinea capitis, and onychomycosis, for example, might be misdiagnosed with eczema, alopecia areata, and dystrophic toe nails as a result of repetitive mild injuries. KOH mount preparation or culture should be used to confirm probable dermatophytosis. Before dispensing drugs, KOH mount can be used as a point-of-care test. Topical antifungal medicines usually work for Tinea corporis, Tinea pedis and Tinea cruris, however oral antifungal drugs should be considered in cases of failed topical treatment, severe disease, immunocompromised patients, or severe moccasin type Tinea pedis. Oral terbinafine should be used as a first-line therapy for Tinea capitis and onychomycosis because of its tolerability, high cure rate, and inexpensive cost. Unless Trichophyton has been identified as the pathogen, kerion must be managed with griseofulvin. [18]

**Conclusion:**

Tinea corporis was shown to be the most often diagnosed clinical condition. Although its incidence in the population has increased considerably, *T. rubrum* has remained the most

common dermatophyte. There has also been an increase in the number of cases demonstrating resistance to new antifungals, recurrence of dermatophytic infections, and the length of antifungal therapy. Misdiagnosis of dermatophytosis leads to ineffective steroid treatment, intensifying the illness.

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