

## Research Article



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## ESTIMATING THE CLINIC-MYCOLOGICAL PROFILE IN INDIANS WITH DERMATOPHYTOSIS

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### ABSTRACT

**Background:** In India, the incidence of superficial dermatophytosis has grown throughout the summer and rainy seasons in both urban and rural regions, regardless of financial background, eating habits, or lifestyle. The literature reports diverse etiological patterns and illness distribution. However, there is limited information on the clinicomycological characteristics of dermatophytosis in India.

**Aim:** The current study sought to examine the proportion of various fungal species related with dermatophytosis in Indian individuals attending tertiary healthcare institutions, as well as the potential relationship of various clinical characteristics with fungal species.

**Methods:** The current study evaluated 782 people of both genders who were new dermatophytosis patients attending the Institute during the study period. All specimens were evaluated using direct microscopic inspection and in vitro cultivation. Fungi were identified using microscopic and macroscopic traits, as well as the urease test and lactophenol cotton blue staining.

**Results:** The study results revealed a male tendency for dermatophytosis, with the bulk of the individuals falling between the ages of 21 and 40. *Trichophyton schoenleinii* was the most common fungal species seen in the study, accounting for 52.1% of study subjects produced in culture, followed by *Trichophyton rubrum*, which was found in 26.9%.

**Conclusion:** The current study indicated that *Trichophyton schoenleinii* was the most prevalent isolated fungal species detected in Indian participants, followed by *Trichophyton rubrum* and *Tinea corporis*, which was the most common clinical manifestation in dermatophytosis patients.

**Keywords:** Body surface area, dermatophytosis, *Trichophyton*, *tinea corporis*.

### INTRODUCTION

Dermatophytosis infections are one of the most prevalent illnesses encountered globally, and the trend has increased internationally, especially in India. This growth has been documented in several parts of India.

Dermatophytic fungi infect around 20-25% of the world's population, and the prevalence is steadily growing. Dermatophytic infections have several diverse clinical presentations termed after the anatomical areas affected. The illness severity is determined by the individual strains of the infecting dermatophyte, the location of infection, and the host's susceptibility.<sup>1</sup>

In many states, cutaneous fungal infection has been a difficult skin illness. The type of the most common fungus species that cause dermatophytosis varies by geography. Over the previous 5-6 years, there has been an epidemiological shift in illness patterns. The climatic conditions of various geographical backdrops in India are primarily humid and hot, with severe monsoons that contribute to fungal diseases.<sup>2</sup>

From April to September, both tribal and non-tribal inhabitants in the southern states see an upsurge in superficial dermatophytosis, despite having different socioeconomic backgrounds, eating habits, and lifestyles than those in the rest of India. Literature data from various locations revealed differing ecological distribution patterns of the illness. However, there is currently inadequate literature data on dermatophytosis in India, necessitating additional assessment of the proportions of different causative agents linked with dermatophytosis, as well as the search for any probable relationship between the kind of fungus and varied clinical characteristics. 3

According to a few studies in the literature, the majority of dermatophytosis cases occur in people aged 21 to 30 years. In addition to KOH mount positive, several sites of involvement and male predisposition have been documented. Previous research has also examined people with recurrent and recalcitrant dermatophytosis and discovered that *T. Mentagrophyte* is the most commonly linked species with dermatophytosis. 4

The current study sought to examine the proportion of various fungal species related with dermatophytosis in Indian patients attending tertiary healthcare institutions, as well as the potential relationship between fungal species and other clinical indicators.

## **MATERIALS AND METHODS**

The current prospective clinical investigation sought to examine the proportion of various fungal species related with dermatophytosis in Indian individuals attending tertiary healthcare facilities, as well as the potential connection of various clinical parameters with fungal species. The research subjects were from the Institute's Department of Dermatology. All individuals provided verbal and written informed consent before to participation.

The current study evaluated 782 patients with clinical suspicion of dermatophytosis who visited the Institute during the study period. Samples were taken from each of the research individuals. All research respondents provided a detailed history, including their gender, age, employment, duration, and infection location. Subjects who were currently receiving therapy were excluded from the research. Other information gathered included immunosuppression caused by any systemic illness, cancer treatment, and diabetes history. Each participant was extensively evaluated, including the nail, scalp, and body surface area affected. Samples collected from the suspected affected region were first cleaned with 70% alcohol and allowed to evaporate.

The scrapings were collected from the edges of the lesions with the blunt end of a sterile surgical blade no. 15 held at a 90-degree angle. Scalp scraping was performed in hair involvement cases using forceps, and a few hairs were epilated along with the roots. Nail clippings and undersurface scrapings were taken from suspected instances of onychomycosis. In circumstances where there were several involved locations, samples were collected from the site with the highest activity.

Each collected specimen was separated into two parts: one for KOH mount and the other for fungal culture. The sample was taken on a sterile paper folder and was then labeled and transported to the laboratory at room temperature without using any specific transport medium. Further processing was done.

To analyze fungal components, a direct microscopic examination was performed with 10% KOH on the skin and 40% KOH on the nails. After a direct microscopic examination, specimens were infected in test tubes with Sabouraud cycloheximide chloramphenicol agar medium. This was followed by a 4-week incubation period at 28 degrees Celsius. When no growth was seen after 4 weeks, it was interpreted as negative fungal growth. Fungal isolates were evaluated using slide culture, microscopy (Lactophenol Cotton Blue mount), growth rate, pigmentation, and colony shape. Special tests for species identification included a urease test and a hair perforation test.

The collected data were statistically analyzed using SPSS (Statistical Package for the Social Sciences) software version 24.0 (IBM Corp., Armonk, NY, USA) for descriptive measures, Student t-test, ANOVA (analysis of variance), and Chi-square test. The data were presented in the form of mean and standard deviation, as well as frequency and percentage. A p-value of <0.05 was considered.

## **RESULTS**

The current prospective clinical investigation sought to examine the proportion of various fungal species related with dermatophytosis in Indian individuals attending tertiary healthcare facilities, as well as the potential connection of various clinical parameters with fungal species.

The current study evaluated 782 people of both genders who were new dermatophytosis patients attending the Institute during the study period. All specimens were evaluated using direct microscopic inspection and in vitro cultivation. The present study included 53.45% males and 46.5% females. Skin scrapings and nail clippings were obtained from 93.3%

(n=720) and 6.6% (n=52) of the clinically diagnosed dermatophytosis patients, respectively. The bulk of the research participants were between the ages of 21 and 60, accounting for 51.1% and 25.6%, respectively.

The research individuals had a mean age of 35.95±14.84 years and a BSA of 9.05±4.95. The study found a strong association ( $p<0.001$ ) between mean age and percentage of body surface area in study respondents (Table 1). Microscopic results were shown to correlate with culture findings and infection type in study patients. In KOH mount positive subjects, culture results were positive in 52% (n=208) and negative in 48% (n=192). In KOH-negative individuals, culture findings were positive and negative in 7.85% (n=30) and 92.1% (n=352), respectively, with statistical significance ( $p<0.001$ ).

The nature of the infection was first, recurrent, and chronic in 92.5% (n=370), 6% (n=24), and 1.5% (n=6) of KOH positive subjects, and 83.25% (n=318), 13% (n=50), and 3.7% (n=144) of KOH negative subjects, respectively, which was statistically significant ( $p=0.02$ ) (Table 2).

The study results showed that for the association of various types of dermatophytes to the nature of infection in study subjects, *T. Schoenleii* was most prevalent and was seen in 88.7% (n=110), 11.3% (n=14), 0, and 52.1% (n=124) study subjects respectively, followed by *T. rubrum* in 87.5% (n=56), 6.25% (n=4), 4.5% (n=2), and 26.9% (n=64) subjects, *T. Mentagrophytes* in 86.4% (n=38), 9.09% (n=4), 4.5% (n=2), and 18.5% (n=44) subjects respectively, and A The difference was statistically significant ( $p=0.04$ ; Table 3).

The most common clinical type of dermatophytes in study subjects was *Tinea cruris* (33.2%, n=2600), followed by *Tinea unguium* (11.55, n=90), *Tinea pedis* (8.4%, n=66), and *Tinea faciei* (5.4%, n=42) (Table 4).

## DISCUSSION

The current study evaluated 782 people of both genders who were new dermatophytosis patients attending the Institute during the study period. All specimens were evaluated using direct microscopic inspection and in vitro cultivation.

The present study included 53.45% males and 46.5% females. Skin scrapings and nail clippings were obtained from 93.3% (n=720) and 6.6% (n=52) of the clinically diagnosed dermatophytosis patients, respectively. The bulk of the research participants were between the ages of 21 and 60, accounting for 51.1% and 25.6%, respectively. The research individuals had a mean age of 35.95±14.84 years and a BSA of 9.05±4.95. The study found a strong association ( $p<0.001$ ) between mean age and percentage of body surface area engaged among study participants. These findings were comparable to earlier studies by Jha B et al<sup>5</sup> in 2019 and Bhatia VK et al<sup>6</sup> in 2014, in which authors evaluated patients with demographic data similar to the current research.

The study findings revealed a link between microscopic results, culture findings, and infection nature in study patients. In KOH mount positive subjects, culture results were positive in 52% (n=208) and negative in 48% (n=192). In KOH-negative individuals, culture findings were positive and negative in 7.85% (n=30) and 92.1% (n=352), respectively, with statistical significance ( $p<0.001$ ).

The nature of the infection was first, recurrent, or chronic in 92.5% (n=370), 6% (n=24), and 1.5% (n=6) of KOH positive subjects, and 83.25% (n=318), 13% (n=50), and 3.7% (n=144) of KOH negative subjects, respectively, which was statistically significant ( $p=0.02$ ). These findings were congruent with those of Singh S et al<sup>7</sup> in 2003 and Poluri LV et al<sup>8</sup> in 2015 in 2016, both of whom showed a link of microscopic results to culture findings and infection type comparable to the current investigation.

*T. Schoenleii* was found in 88.7% (n=110), 11.3% (n=14), 0, and 52.1% (n=124) study subjects, followed by *T. rubrum* in 87.5% (n=56), 6.25% (n=4), 4.5% (n=2), and 26.9% (n=64) subjects, *T. Mentagrophytes* in 86.4% (n=38), 9.09% (n=4), 4.5% (n=2), and 18.5% (n=44) subjects, and A. The difference was statistically significant ( $p = 0.04$ ). These findings were consistent with the findings of Manjunath M et al<sup>9</sup> and Kurukkanari R et al<sup>10</sup> in 2020, who stated that the correlation of various types of dermatophytes with the form of infection in their investigations was equivalent to the results of the current study. The most common clinical type of dermatophytes in study subjects was *Tinea cruris* (33.2%, n=260), followed by *Tinea unguium* (11.55, n=90), *Tinea pedis* (8.4%, n=66), and *Tinea faciei* (5.4%, n=42).

These findings were consistent with those of Agarwal US et al<sup>11</sup> in 2014 and Bindu V et al<sup>12</sup> in 2002, who both found *Tinea cruris* as the most prevalent clinical form of dermatophytosis, followed by *Tinea unguium*, as described in the current research.

## CONCLUSIONS

Considering its limitations, the present study concludes that *Trichophyton schoenleinii* was the most common isolated fungal species found in Indian subjects followed by *Trichophyton rubrum* and *Tinea corporis* which was the most

prominent clinical manifestation in subjects with dermatophytosis. However, future studies are warranted with a larger sample size and longer monitoring to reach a definitive conclusion.

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Parameters	Mean ± S. D	p-value
Age (years)	35.95±14.84	<0.001
BSA (body surface area) involved	9.05±4.95	

**Table 1: Correlation of mean age to percentage of body surface area involved in study subjects**

KOH mount	Culture result				Nature of infection				
	Positive n (%)	Negative n (%)	Total n (%)	p-value	First n (%)	Recurrent n (%)	Chronic n (%)	Total n (%)	p-value
Positive	208 (52)	192 (48)	400 (51.1)	<0.001	370 (92.5)	24 (6)	6 (1.5)	400 (51.1)	0.02
Negative	30 (7.85)	352 (92.1)	382 (48.8)		318 (83.25)	50 (13)	144 (3.7)	318 (83.25)	
Total	238 (30.4)	544 (69.6)	782		688 (87.9)	74 (9.5)	20 (2.55)	782	

**Table 2: Correlation of microscopic results to culture findings and infection nature in study subjects**

Species involved	Nature of infection				p-value
	First	Recurrent	Chronic	Total	
A. Nijer	2 (3.33)	4 (66.6)	0	6 (2.5)	0.04
T. Rubrum	56 (87.5)	4 (6.25)	4 (6.25)	64 (26.9)	
T. Mentagrophytes	38 (86.4)	4 (9.09)	2 (4.5)	44 (18.5)	
T. Schoenlenii	110 (88.7)	14 (11.3)	0	124 (52.1)	

**Table 3: Association of various types of dermatophytes to the nature of infection in study subjects**

<b>Clinical types</b>	<b>Number (n)</b>	<b>Percentage (%)</b>
<b>Tinea faciei</b>	42	5.4
<b>Tinea pedis</b>	66	8.4
<b>Tinea unguium</b>	90	11.5
<b>Tinea cruris</b>	260	33.2
<b>Tinea corporis</b>	324	41.4

**Table 4: Clinical types of dermatophytes in study subjects**