

## Original Research Article

# Clinicomycological evaluation of dermatophytosis at tertiary care hospital in central India

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## ABSTRACT

**Background:** Dermatophytoses are the infection of keratinized tissues such as the epidermis, hair, and nails caused by a group of closely related filamentous fungi known as dermatophytes.

**Methods:** It was a hospital based cross-sectional study. A total number of 150 clinically diagnosed cases of skin, hair and nail infections were randomly selected from all the age groups and of both the sexes, attending Dermatology Outpatient department of CMCH, Bhopal from January 2016-December 2017.

**Results:** Out of total 150 subjects, most common clinical type of dermatophytosis, identified in our study, was tinea corporis in 53 (35.3%) subjects followed by tinea cruris in 34 (22.6%) subjects. 134 (89.3%) subjects were tested positive by direct microscopy (KOH mount) and 69 (46.0%) by culture. Highest KOH mount positivity was seen in patient suffering from tinea corporis (94.3%) followed by tinea cruris (94.1%). Culture positivity was highest with tinea corporis (54.7%) followed by tinea lesions on more than one site (47.3%) and tinea cruris (47.0%). In our study, total 69 culture positive samples were isolated and the most common species isolated was *T. rubrum* in 41 (59.42%) cases.

**Conclusions:** The present study gives valuable insight regarding clinical and mycological pattern of superficial fungal infections in this region as well as shows the importance of mycological examination of dermatophytosis samples for planning effective management.

**Keywords:** Dermatophytosis, Tinea corporis, Tinea cruris, KOH smear, Culture

## INTRODUCTION

Dermatophytoses are the infections of keratinised tissues such as the epidermis, hair and nails, caused by a group of closely related filamentous fungi known as dermatophytes.<sup>1</sup> Cutaneous fungal infections are among the most common fungal infections in clinical practice worldwide. *Trichophyton*, *Epidermophyton* and *Microsporum* are common species implicated in superficial fungal infections.

The incidence of specific dermatophyte species in a particular region varies due to population movement, mass migration, socioeconomic status, lifestyle, cultural practices, change in climatic conditions and changing drug therapies.<sup>2,3</sup>

India is a large subcontinent with remarkably varied topography, situated within the tropical and subtropical belts of the world. Its climate is conducive to the acquisition and maintenance of mycotic infections.<sup>4</sup> Accurate assessment of the prevalence and etiological agent is desirable to estimate the size of therapeutic

problem and to prevent the transmission and spread of such infections with adequate measures.<sup>5</sup>

So the present study was conducted to assess the clinical profile of dermatophytic infections, to identify the etiological fungal species with the help of KOH smear and fungal culture and to compare and correlate the clinical diagnosis with KOH smear and culture positive cases in a tertiary care center.

## METHODS

### Study design

It was a hospital based cross-sectional study.

### Study setting

Dermatology OPD of CMCH Bhopal.

### Study subject

A total number of 150 clinically diagnosed cases of skin, hair and nail infections were randomly selected from all age groups and of both sexes, attending Dermatology Outpatient department of CMCH, Bhopal from January 2016-December 2017.

### Sample size

A sample size of 150 was taken from a similar type of study conducted by Rathod et al in Maharashtra in 2016.<sup>6</sup> The samples were collected from one hundred and fifty clinically diagnosed cases randomly selected by lottery method out of all clinically diagnosed cases of dermatophytosis from all age groups and of both sexes, attending Dermatology Outpatient Department.

### Methodology

Ethical clearance was taken from Institutional Ethical Committee before performing the study. The selected cases were studied with regard to their detailed history which was taken in relation to their name, age, sex, occupation, socioeconomic status, duration of illness, type of lesions and distribution, history of similar lesions in family members and involvement of more than one site.

Detailed clinical history, general and systemic examinations were carried out and routine laboratory investigations were done in necessary cases.

Only new cases of cutaneous dermatophytic infections were enrolled for study, patients who were on antifungal treatment (topical, systemic or both) or any other treatment for dermatophytosis were excluded from the study.

### Specimen collection

An informed written consent was taken from every patient before collection of specimen. The purpose study and methodology was explained to patients in the language best known to them. The specimen was collected by scrapping active margin of involved skin, similarly samples from nails and hairs were collected by nail scrapping and nail and hair clipping. Specimen collected were subjected to direct microscopy in potassium hydroxide mount (KOH mount) preparation with different concentrations (10% for skin and hairs and 40% for nail specimen) and examined under low and high power microscope for identification of branching and septate hyphae.

The clinical samples were also cultured in Sabourauds dextrose agar into two different sets, one containing chloramphenicol and other cycloheximide and incubated at 25°C and 37°C. The culture characteristics were examined and studied for morphology of colony, pigment production, production of conidia and their arrangement on weekly basis and were confirmed as negative if no growth was identified after 4 weeks.

### Statistical analysis

Data was entered into Microsoft Office Excel - 2007 and results were presented in terms of numbers & percentage charts.

## RESULTS

Out of total 150 subjects, 92 (61.3%) were males and 58 (38.6%) were females. Male to female ratio was 1.58:1. Maximum number of cases were found in the age group of 21-30 years which was 46 (30.6%) of the total study subjects followed by 33 (22%) cases in the age group of 31-40 years. Minimum number of cases 03 (2%) were found in the age group of >60 years age group. Distribution of cases according to age and sex is shown in Table 1.



**Figure 1: Lesions of tinea corporis on abdomen.**

Most common clinical type of dermatophytosis, identified in our study, was tinea corporis in 53 (35.3%) subjects (Figure 1) followed by tinea cruris in 34 (22.6%) subjects (Figure 2). Tinea barbae, in 02 (1.3%) subjects,

was found to be least common clinical variant in our study. 15 (10.0%) cases of tinea capitis were found. Only 04 (2.6%) cases of t. unguium (Figure 3) and 05 (03.3%) cases of t. faciei were found in our study. Interestingly 19 (12.6%) cases of tinea infections on more than one site (mixed lesions) were found.

**Table 1: Distribution of cases according to age and sex.**

Age in years	Males n (%)	Females n (%)	Total n (%)
<10	03 (2.0)	02 (1.3)	05 (3.3)
11-20	18 (12.0)	13 (8.6)	31 (20.6)
21-30	29 (19.3)	17 (11.3)	46 (30.6)
31-40	18 (12.0)	15 (10.0)	33 (22.0)
41-50	16 (10.6)	08 (5.3)	24 (16.0)
51-60	06 (4.0)	02 (1.3)	08 (5.3)
>60	02 (1.3)	01 (0.6)	03 (2.0)
<b>Total</b>	<b>92 (61.3)</b>	<b>58 (38.6)</b>	<b>150 (100)</b>



**Figure 2: Tinea cruris with classical distribution.**

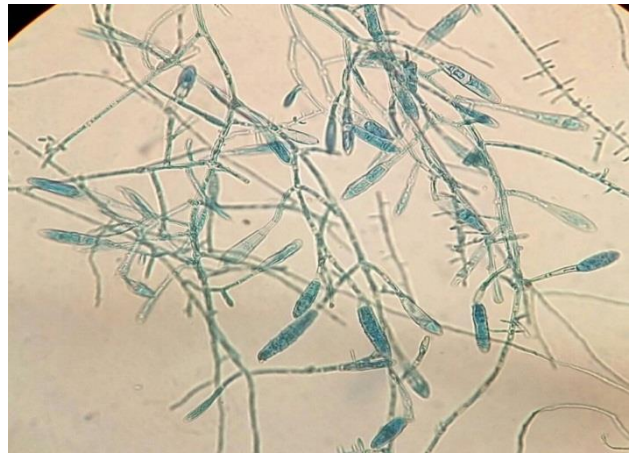


**Figure 3: Tinea unguium on middle finger.**

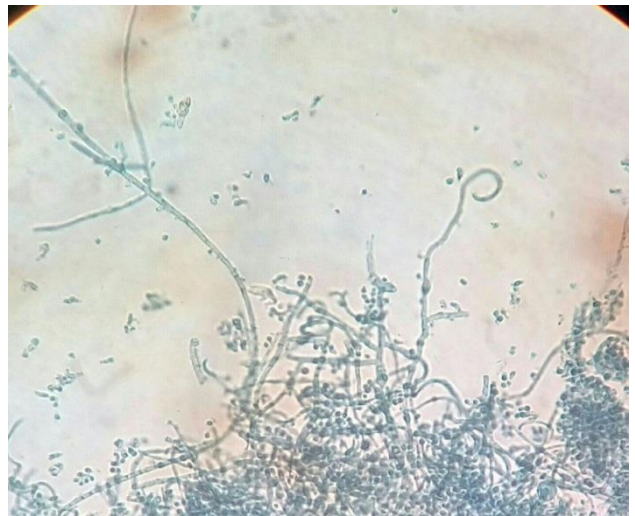
Out of total 150 patients, 134 (89.3%) were tested positive by direct microscopy (KOH mount) and 69 (46.0%) by culture. Highest KOH mount positivity was seen in patient suffering from tinea corporis (94.3% of all tinea corporis cases) followed by tinea cruris (94.1%) and tinea manuum (90.9%), lowest positivity was seen in tinea unguium and tinea barbae (each 50.0%).

Culture positivity was highest with tinea corporis (54.7%) followed by tinea lesions on more than one site (47.3%) and tinea cruris (47.0%) and lowest with tinea barbae (0%).

Distribution of cases according to clinical presentation, KOH smear positivity and culture positivity is shown in Table 2.



**Figure 4: Microscopic morphology of *Microsporium gypseum*: abundant thin walled macroconidia with 4-6 septa.**



**Figure 5: Microscopic morphology of *trichophyton mentagrophytes*: Numerous grape like microconidia and spiral hyphae.**

In our study, total 69 culture positive samples were isolated and out of total culture positive cases, maximum number of isolates was seen in t. corporis in 29 (42.02%) subjects followed by t. cruris in 16 (23.18%) subjects. The most common species isolated was t. rubrum in 41 (59.42%) subjects followed by t. mentagrophytes in 21 (30.43%) subjects (figure 4), m. gypseum in 03 (4.34%) subjects (figure 5), t. violaceum in 02 (2.89%) and t. floccosum in 02 (2.89%) subjects. Distribution of cases according to the species isolated is shown in Table 3.

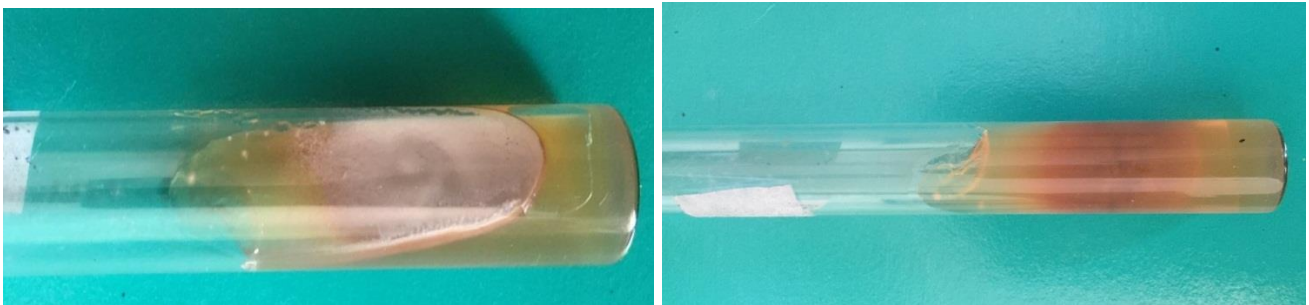


**Table 2: Distribution of cases according to clinical presentation.**

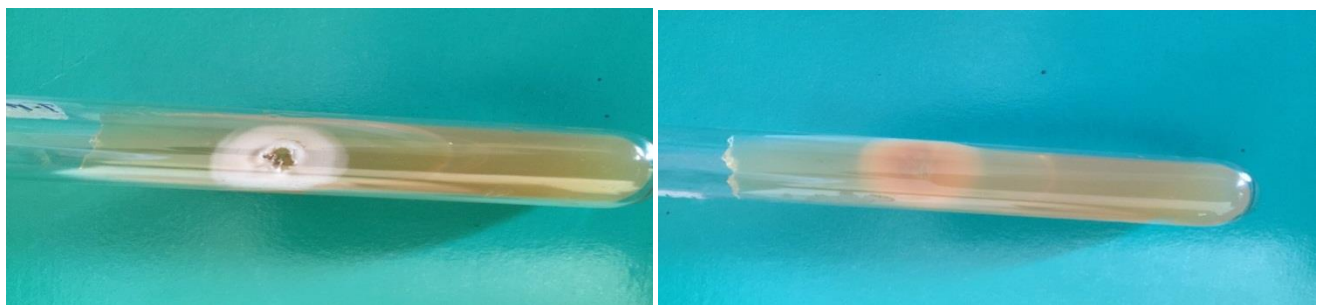
Clinical disease	Total no. of cases n (%)	No. of positive cases by culture n (%)	No. of positive cases by KOH smear n (%)
<b>Tinea corporis</b>	53 (35.3)	29 (19.3)	50 (33.3)
<b>Tinea cruris</b>	34 (22.6)	16 (10.6)	32 (21.3)
<b>Tinea capitis</b>	15 (10.0)	04 (2.6)	13 (8.6)
<b>Tinea unguium</b>	04 (2.6)	01 (0.6)	02 (1.3)
<b>Tinea mannum</b>	11 (7.3)	05 (3.3)	10 (6.6)
<b>Tinea pedis</b>	07 (4.6)	03 (2.0)	06 (4.0)
<b>Tinea barbae</b>	02 (1.3)	00 (0.00)	01 (0.6)
<b>Tinea faciei</b>	05 (3.3)	02 (1.6)	04 (2.6)
<b>Mixed lesions</b>	19 (12.6)	09 (6.0)	16 (10.6)
<b>Total</b>	150	69 (46.0)	134 (89.3)

**Table 3: Distribution of cases according to the species isolated.**

Clinical variants	T. rubrum n (%)	T. mentagrophytes n (%)	T. violaceum n (%)	M. gypseum	T. floccosum n (%)	Total isolates n (%)
<b>Tinea corporis</b>	20 (28.98)	07 (10.14)	01 (1.44)	-	01 (1.44)	29 (42.02)
<b>Tinea cruris</b>	11 (15.94)	03 (4.34)	01 (1.44)	01 (1.44)	-	16 (23.18)
<b>Tinea capitis</b>	-	04 (5.79)	-	-	-	04 (5.79)
<b>Tinea unguium</b>	01 (1.44)	-	-	-	-	01 (1.44)
<b>Tinea mannum</b>	03 (4.34)	02 (2.89)	-	-	-	05 (7.24)
<b>Tinea pedis</b>	01 (1.44)	01 (1.44)	-	01 (1.44)	-	03 (4.34)
<b>Tinea barbae</b>	-	-	-	-	-	00 (0.00)
<b>Tinea faciei</b>	01 (1.44)	01 (1.44)	-	-	-	02 (2.89)
<b>Mixed</b>	04 (5.79)	03 (4.34)	-	01 (1.44)	01 (1.44)	09 (13.04)
<b>Total</b>	41 (59.42)	21 (30.43)	02 (2.89)	03 (4.34)	02 (2.89)	69 (100)



**Figure 6: Culture tube showing growth of t. rubrum: velvety colony, flat periphery, reverse is wine red in colour.**



**Figure 7: Culture tube showing growth of t. mentagrophytes: white powdery colony, reverse varies from yellow to reddish brown in colour.**

## DISCUSSION

In our study, we found 92 (61.3%) males and 58 (38.6%) females out of total 150 clinically identified patients of dermatophytosis. Male to female ratio was 1.58:1 which was similar to study conducted by Surendran et al where male to female ratio was 1.63:1.<sup>7</sup> Maximum cases were found in the age group of 21-30 years which was 46 (30.6%) of the total study cases followed by 33 (22%) cases in the age group of 31-40 years. Similar age distribution has been identified in various studies.<sup>8,9</sup> Minimum cases 03 (2%) were found in the age group of >60 years age group in our study. In a study conducted by Lakshmanan et al in 2015, they observed similar findings that predominant age group affected in dermatophyte infection was 22-45 years and a higher incidence of dermatophytosis in males than in females with male to female ratio of 1.28:1 was reported.<sup>10</sup>

Out of total 150 subjects in our study, 53 (35.3%) were diagnosed with tinea corporis followed by tinea cruris in 34 (22.6%) subjects, making the former infection more common. Tinea barbae was least in occurrence as only 01(0.6%) patient was diagnosed with it. In another study conducted by Venkatesan et al in 2006 in Chennai, they found the maximum incidence of tinea corporis followed by tinea cruris and tinea pedis.<sup>11</sup> In present study, dermatophytosis of more than one anatomical site (mixed variant) was found to be more common than isolated cases of other clinical types except tinea corporis and cruris.

In our study, 134 (89.3%) of the samples were tested positive by direct microscopy and 69(46.0%) by culture. Highest KOH mount positivity was seen in patient suffering from tinea corporis (94.3%) followed by tinea cruris (94.1%) and tinea manuum (90.9%), lowest positivity was seen in tinea unguium and tinea barbae (each 50.0%). Highest culture positive cases were seen in tinea corporis (54.7%) followed by tinea lesions on more than one site (47.3%) and tinea cruris (47.0%) and lowest with tinea barbae (0%). Jain N et al reported that out of 120 diagnosed cases, 87 (72.50%) were found to be positive by KOH examination and 70 (58.33%) by culture with tinea corporis being the most common clinical type having highest culture positivity.<sup>12</sup>

In our study, the species which were isolated from the dermatophytosis included *t. rubrum* 41 (59.42%) followed by *t. mentagrophytes* 21 (30.43%), *m. gypseum* 03(4.34%), *t. violaceum* 02 (2.89%) and *t. floccosum* 02 (2.89%). Trichophyton species were more commonly isolated than epidermophyton and microsporum. In a study conducted by Agarwal et al in 2014 in Jaipur, they observed that *t. rubrum* was grown in 82 (34.2%), trichophyton *violaceum* in 27 (11.3%), trichophyton *tonsurans* in 20 (8.3%) cases.<sup>13</sup> In another study conducted by Peerapur et al in 2004, *t. rubrum* was found to be commonest etiological agent (43.7%).<sup>14</sup>

## CONCLUSION

In our study we found that the incidence of tinea corporis is more than the incidence of tinea cruris and other clinical patterns. *t. rubrum* was the most common species followed by *t. mentagrophytes* in our study. The epidemiology of dermatophyte infections may vary with time of onset, duration and distribution of infection and geographical condition, our study only provide hospital based information on the current status of dermatophytes. The present study gives valuable insight regarding clinical and mycological pattern of superficial fungal infections in this region as well as shows the importance of mycological examination of dermatophytosis samples for planning effective management.

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