

# Superficial Dermatophytosis: A Study of Clinical Variants and Mycological Isolates

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## ABSTRACT

**Introduction:** Fungi are ubiquitous in nature. Dermatophytosis is the infection of keratinized structures caused by members of the fungi of the genera *Trichophyton*, *Epidermophyton* and *Microsporum*. Because of varied clinical presentation of dermatophytosis, and also mimics various other dermatological condition, there is a need for appropriate diagnosis and management of the condition.

**Materials and method:** The study group comprised of 120 patients of clinically diagnosed superficial dermatophytosis. Depending on the site the samples were collected from skin, nails, hair, and scalp and sent to microbiology lab KOH mount and culture.

**Results:** Out of 120 cases 88 were males (73.33%) and 33 females (26.67%). Male to Female ratio was 2.75:1. Majority of the patient were in age the group 21-30 years (24.16%). Amongst the various clinical types of dermatophytosis, tinea corporis was the commonest clinical type (47.5%). Amongst the cases of tinea corporis, classical annular type was most common (35%) *Trichophyton rubrum* was the predominant species isolated from all clinical types except *Tinea capitis*. (77.5%)

**Conclusion:** Tinea corporis was the commonest clinical type and annular type of variant was the most common presentation. *Trichophyton rubrum* was the most common isolate, thus concluding that it is the most common cause of superficial dermatophytic infection. Many patients were diabetic or on steroid therapy in our study thus concluding that the associated diseases are predisposing factors for chronic and recurrent dermatophytic infection.

**Keywords:** dermatophytes, tinea corporis, clinical variants, t. rubrum

## INTRODUCTION

Fungi are ubiquitous in nature. It has been estimated that there are 2,50,000 to 3,00,000 species of fungi distributed in ecosystem. Pathogenic fungi include 80 genera and disease caused by fungi are collectively known as Mycoses.<sup>1</sup>

The prevalence of superficial fungal infections is highly variable, since it depends on climatic parameters such as humidity and temperature, and on each patient characteristics such as age, gender, predisposition to diseases, and anatomical site of lesion, socioeconomic status, and occupation.<sup>2-4</sup>

Dermatophytosis is the infection of keratinized structures caused by members of the fungi of the genera *Trichophyton*, *Epidermophyton* and *Microsporum*. These fungi are adapted to infect keratinized tissues by virtue of their ability to utilize keratin as a nutrient source. Sites of infection include hair, nails, and the stratum corneum of the skin. More than 40 dermatophyte species that infect humans (anthropophilic),

animals (zoophilic) or are present in soil (geophilic) have been identified. The infections caused by the anthropophilic species tend to be chronic but the resultant inflammation is minimal. About 90% of chronic dermatophyte infections are caused by *T. rubrum* and *T. mentagrophytes*, possibly because these organisms may suppress inflammation and cell-mediated immunity.<sup>5</sup> Various studies show increasing incidence of dermatophytosis in HIV infected patient in early stage of infection with its atypical presentation. Because of varied clinical presentation of dermatophytosis, and also mimics various other dermatological condition, there is a need for appropriate diagnosis and management of the condition. This study was undertaken to know the clinical variants in different types of superficial dermatophytosis and to determine the culture characteristics of the isolates.

## MATERIALS AND METHOD

The study group comprised of 120 patients of clinically diagnosed superficial dermatophytosis attending the outpatient Department of Dermatology, Venerology and Leprosy at KIMS, Hyderabad from 1<sup>st</sup> January 2013 to 31<sup>st</sup> December 2013.

The cases were selected on random basis, newly diagnosed and untreated cases were selected for the study. The study was approved by the ethical committee of the institution. Informed consent was taken from all cases.

**Inclusion criteria:** Clinically diagnosed cases of superficial dermatophytosis.

**Exclusion criteria:**

Only onychomycosis

Candidia lintertigo

Pityriasis versicolor.

**Method of collection of data:** A detailed clinical history including age, sex, socioeconomic status, occupation, duration of disease, history of recurrence and type of lesion, similar complaints in the family and contacts with animals

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or soil were elicited and recorded in all cases. General physical examination and systemic examination was conducted and investigations like hemoglobin, total count, differential count, blood sugar, and liver function test were done whenever necessary.

### Specimen collection

In case of skin lesion, the scraping was taken from the active border of the lesion by moving the scalpel perpendicular to the skin surface after cleaning the area with spirit. In case of nail infection, nail clippings of the affected nail were collected. In cases involving the hair, the affected hairs plucked. Scrapings were also collected from the scalp. All the specimens were collected in folded strips of sterile paper which were transported to the mycology laboratory.

**Direct microscopy:** The scraping was placed on a clean sterilized glass slide, and drop of 10% KOH and covered with a cover slip using a gentle pressure. For hair and nail sample 20%KOH was used. The slides were examined under low power for evidence of fungal hyphae and spores.

**Culture:** For culture, the medium used was commercially available Sabouraud's Dextrose agar with cycloheximide and chloramphenicol to prevent growth of contaminants. The scrapings were inoculated into the agar slant and was incubated at 25°C. The identification of the fungal colonies was done based on their gross morphology and microscopic features. Microscopic examination was done by preparing teased mounts from the isolates with a drop of lactophenol cotton blue.

After collection of clinical specimen the patients were treated with appropriate local and / or oral antifungals on the basis of clinical diagnosis.

## RESULTS

120 cases of clinically diagnosed superficial dermatophytic infection patient were included in the study after obtaining consent.

Out of 120 cases, 88 were males (73.33%) and 33 females (26.67%). Male to Female ratio was 2.75:1.

Majority of the patient were in the age group 21-30 years (24.16%). The lowest age was 20-day-old female and the highest 78 yr old male. (Table 1)

Most of the patients belonged to low socio-economic status (46.67%). Labourers were commonly affected (48.34%). Majority of patient presented within 10 weeks of infection

(30.8%).

Among the various clinical types, tinea corporis was commonest clinical type (47.5%), tinea cruris was second most common (20.8%), followed by tinea faciei, mixed and tinea pedis and tinea manuum (fig.1).

Amongst the cases of tinea corporis, classical annular type 42 cases (35%), was most common; papulosquamous variant (17.5%) was the most common variant in T.cruris, Chronic intertriginous type (7.5%) in T.pedis, Hyperkeratotic type (4.17%) in T.manuum and annular (7.5%) in T.faciei (table 2)

Distal superficial onychomycosis was (3.70%) was the most common variant of t.unguium seen in mixed infection.

In 93 cases, (77.5%) fungal elements were demonstrated by direct microscopy. 49 cases (40.83%) were culture positive. 41 cases (34.16%) were positive both microscopically as well on culture. Out of 49 culture positive cases, 46 (93.88%) cases belonged to genera Trichophyton.

T.rubrum was the predominant species isolated from all clinical types except t.capitis. T.mentagrophytes was isolated from many clinical type except tinea.pedis, tinea.manuum. Fusarium (NDM) was isolated for one case of tinea corporis in immunocompromised patient.

22 cases were associated with diabetes mellitus, 8 cases with atopy, 5 cases were HIV positive, 1 HBs Ag positive and 4 cases were on steroid therapy.

## DISCUSSION

Superficial mycosis is more prevalent in tropical and sub tropical countries including India where heat and moisture play an important role in promoting growth of these fungi.<sup>6,7</sup> The difference in incidence of ring worm infection between the age group and sexes seems in general to reflect differing rates of exposure and of sebum production, differing clothing and fluctuation of immunity with old age.<sup>8</sup>

Dermatophyte infections are in general less prevalent in females. Hormonal factors may predispose to infection, progesterone is an effective inhibitor of fungal growth. The male dihydrotestosterone is an effective inhibitor of progesterone binding site.<sup>9,10</sup>

Atopic individuals are notoriously susceptible to chronic dermatophytosis. A likely explanation is that atopy, in which over active type2 T-helper lymphocytes (T<sub>H</sub>2) induce immediate hypersensitivity responses to antigen, inhibits or over powers the ability of T<sub>H</sub>1 cells to maintain a DTH responses.<sup>11</sup>

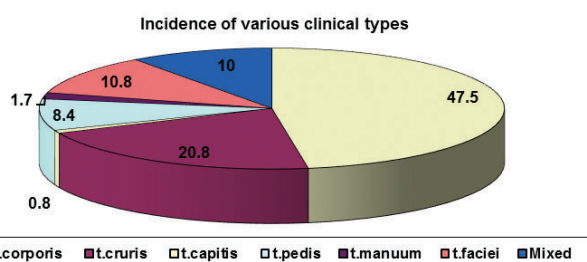
Clinical type	<1 yr	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71 & above	Total
T.corporis			8	15	11	8	11	4		57
T.cruris			4	7	5	4	3		2	25
T.capitis		1								1
T.pedis			5	2	1		2			10
T.manuum					1				1	2
T.faciei	1		3	5	2	2				13
Mixed		1	1	2	2	3	1	2		12
Total	1	2	18	29	25	17	19	6	3	120

Note: T-Tinea

**Table-1:** Age (yrs) wise distribution of clinical types of dermatophytosis

Clinical variants	Tinea corporis	Tinea cruris	Tinea Capitis	Tinea pedis	Tinea Manum	Tinea faciei	Mixed	Total
Annular	9						3	42
Eczematous annular	10							10
Plaque	8						1	9
Papulosquamous		19					2	21
Vesiculopustular		6						6
Non-inflammatory (grey patch)			1					1
Chronic intertriginous				8			1	9
Vesicular				2				2
Chronic hyperkeratotic				0			3	3
Vesicular					1			1
Hyperkeratotic					1		4	5
Annular						7	2	9
Papular						3		3
Erythematous patch						3		3
DSO							5	5
TDO							3	3
Total	57	25	1	10	2	13		

**Table-2:** Clinical variants of dermatophytosis



**Figure-1:** incidence of various clinical types of dermatophytosis

In our study it was observed that males were more commonly affected than females giving a male: female ratio of 2.75:1. Most of the workers in India have also reported a higher male incidence with male to female ratio ranging from 1.5:1 to 3:1.<sup>12</sup> This higher male incidence is due to higher physical activity in males leading to excess of perspiration in a hot humid climate.

In the present study, incidence was seen to be highest in age group 21-30 years. The next highest incidence was in group 31-40 years. The two extremes of age showed the least incidence of infection. The findings are consistent with other studies.<sup>13-16</sup> This is probably due to the heavy physical activity predisposing to increased perspiration.

An analysis of socioeconomic states of the patient indicates that majority of patients with dermatophyte infection belong to low-income groups (46.6%). These findings are similar to other studies.<sup>17,18</sup> The reason that low socioeconomic strata of society is more affected, is due to prevalence of poor hygienic practices and overcrowding. Labourers formed majority of our cases (48.34%). This is due to heavy physical work which predisposes them to excess perspiration in a humid environment.

Tinea corporis was the commonest clinical type (47.5%) followed by Tinea cruris (20.8%) which was the next commonest. This finding is consistent with other studies in India.<sup>13</sup> The lowest incidence was of Tinea capitis, (0.8%) which was

similar in other studies.<sup>7</sup> In our study, there was not a single case of Tinea barbae. This was similar to other study.<sup>17</sup>

Our KOH positivity rate 77.5% was close to that found by other workers in rest of the country 76% and 77% respectively.<sup>6,7</sup> our culture positivity rate is 40.83%, the findings were close to other studies.<sup>13</sup> In the present study, NDM was isolated from a case of Tinea corporis in a HIV patient. The similar finding was found in other study.<sup>19</sup>

Although we could detect fungal hyphae, on direct microscopy in 77.5% cases, we could culture the fungus in only 40.83% of cases. This discrepancy among the 2 methods of fungal detection has been noticed by all other workers and could possibly be the result of various contributory factors involved in collection, transport, inoculation and incubation of specimen.

In the present study, 6.6% of cases showed a negative KOH, but a positive culture result. The reason for this could be due to the fungal hyphae being missed in KOH smear.

Among the Trichophyton genera the majority of case showed T.rubrum species (79.59%) followed by T.mentagrophytes (12.25%) and then T. Schoenleinii (2.04%). Several reports from various parts of India also show Trichophyton as the commonest genus and T.rubrum as the commonest species. Our finding was close to other studies.<sup>13-16</sup>

The reason for overall high isolation of T.rubrum from most of clinical variants are T.rubrum has an affinity for inhospitable and tough keratin, like that of palms, soles and nails. No age group is spared. T. rubrum infection are highly, communicable. The species have remarkable adaptability.

22 of our patients were diabetics. There is an association reported between diabetes and T.rubrum infection.<sup>20</sup> 21.05% incidence of atopy was recorded. One study has reported that chronic dermatophytic infections are approximately 3 fold more frequent in atopics.<sup>21</sup>

In our study 4 patients were on steroid therapy for different disease. Similar findings were reported in other study.<sup>22</sup>

## CONCLUSION

The study showed a male preponderance and greater association with labourers and low-income group. Majority of patients were in 3<sup>rd</sup> decade and came within a duration of <10 weeks of getting infection.

Tinea corporis was the commonest clinical type and annular type of variant was the most common presentation. Trichophyton rubrum was the most common isolate, thus concluding that it is the most common cause of superficial dermatophytic infection.

Many patients were diabetic or on steroid therapy in our study thus concluding that the associated diseases are predisposing factors for chronic and recurrent dermatophytic infection.

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