

Original research article

## A study of the incidence of dermatophyte infections at MGM Hospital KMC Warangal

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### Abstract

**Introduction:** In countries like India with tropical hot and humid climates the incidence of dermatophyte infections is very common. However, the clinical presentations are varied which may lead to the application of broad-spectrum steroids and other self-medications. We in this study tried to evaluate the incidence of superficial fungal skin infection confirmed with laboratory diagnosis and their management.

**Methods:** The patients were taken from those visiting the Department of Dermatology, KMC, Warangal. All the suspected cases with dermatophyte infections were included. Samples were collected from skin, nails, and hairs. The specimens were processed in the Department of Microbiology with potassium hydroxide (KOH) mount for direct microscopy and culture. Identification of the organism was based on the colony characteristics, pigmentation, rate of growth, tease mount using lactophenol cotton Blue preparation, and slide cultures.

**Results:** n=150 cases were studied who showed signs and symptoms of superficial dermatophyte infections. In the current study the category of sample collected for laboratory diagnosis was n=91 (60.67%) were skin scrapings. N=31 (20.67%) were nail clippings and n=28 were hair stubs. The fungal isolated obtained shows *T. rubrum* in 30.8% of cases *T. mentagrophytes* in 29.3% cases, *T. verrucosum* in 26.2% cases, *T. violaceum* in 9.2% cases, *T. tonsurans* in 3% cases, and *N. gypsiium* in 1.5% cases.

**Conclusion:** This study concludes that the commonest prevalence of dermatophytosis is in males. The third decade is the most affected age group. *T. corporis* is a common clinical manifestation. *Trichophyton rubrum* was the commonest species of dermatophyte isolated by culture.

**Keywords:** *Dermatophytosis, Tinea corporis, Tinea unguium, Trichophyton rubrum.*

### Introduction

Superficial mycoses affect millions of people across the world and the estimated lifetime risk is about 10 – 20%. Approximately 20 – 25% of the world's population is affected by this disease. <sup>[1]</sup> Dermatophytes are the most frequently encountered causative agent of superficial fungal infections they are caused by a group of closely related keratinophilic fungi in the *Trichophyton*, *Microsporum*, and *Epidermophyton*. Infection is generally cutaneous; fungi invade the stratum corneum and are restricted to the nonliving cornified layers because in immunocompetent hosts the fungi cannot penetrate the deeper tissues or organs. Reactions to a dermatophyte infection may range from mild to severe because of the host's response to the metabolic products of fungus, the causative strain, species, and its virulence, and the local environmental factors. <sup>[2, 3]</sup> Dermatophytes are assuming greater clinical significance developed as well as developing nations due to the common use of immunosuppressive drugs

and diseases. <sup>[4]</sup> The hot and humid climate in tropical and subtropical countries like India is one of the reasons which make dermatophytosis or ringworm a common superficial fungal skin infection. Species distribution and prevalence vary with the geographical area and during the time and are governed by environmental conditions, personal hygiene, and individual susceptibility. <sup>[2, 5]</sup> The epidemiology of several clinically important dermatophytosis has changed in recent times. <sup>[2, 6]</sup> Therefore, a study of dermatophytosis in a population is important as it may reflect the climatic condition, customs, hygienic and socio-economic status of the people. <sup>[7-9]</sup> The clinical presentation is very often confused with other skin disorders particularly due to rampant application of broad-spectrum steroids and self-medications, making laboratory diagnosis and confirmation necessary and although it responds to conventional antifungals, dermatophytosis tends to recur at the same or different sites. Hence, a correct diagnosis is important to initiate appropriate treatment and essential for epidemiological purposes. <sup>[11-14]</sup> Warangal District lies in the Northern part of Telangana and it is a predominantly tropical climatic area. Although, superficial mycoses are commonly prevalent in this region a systematic study and analysis have not been made so far. With this background, we in the present study will be undertaken to isolate and identify the various etiological agents of dermatophytosis.

### **Material and Methods**

This cross-sectional study was conducted in the Department of Microbiology and dermatology, MGM Hospital, KMC Warangal. Institutional Ethical committee permission was obtained for the study. Written permission was obtained from all the participants of the study. Samples were collected from clinically suspected randomly selected cases of skin, nail, and hair fungal infections of patients attending the Dermatology OPD. The Collected samples will be processed in the Department of Microbiology for identification.

### ***Inclusion Criteria***

1. All skin, hair, and nail samples of all age groups from clinically suspected cases of
2. dermatophytosis.
3. No history of topical or systemic antifungal therapy for the past two weeks.

### ***Exclusion Criteria***

1. Cases of dermatophytosis with secondary bacterial infection, on antifungal treatment
2. and patients on follow-up.

### ***Specimen collection***

**Skin:** Lesions with defined borders were disinfected with 70% alcohol. Small scales scraped off from the margin by blunt scalpel blade or glass slide. Collected on the sterilized paper envelope. **Hair:** Infected scalp hairs were collected over a sterile paper envelope by using epilation forceps by plucking along with the base of the hair shaft. **Nail:** Nail cleaned with 70% alcohol. Nail clippings were collected. In superficial white onychomycosis scrapping from white spots discarding the uppermost layer were collected in sterile black paper. Samples were processed immediately in the laboratory. Direct microscopic examination by Potassium hydroxide (KOH) mount was done by using 10% KOH solution for skin scrapings, infected hairs, and 20%-40% KOH for nail clippings. After keratolysis, the KOH smear samples were observed under high power objective for the presence of filamentous, septate, branched hyphae with or without anthropores. The samples were cultured irrespective of demonstration of fungal elements by direct microscopy and were inoculated on two tubes of SDA (Sabouraud Dextrose Agar) with antibiotics (Gentamycin/ Chloramphenicol): one with actidione and one without actidione, with minor adjustment of pH to 5.4. Inoculation of tubes

was done at 25°C-30°C for 3-4 weeks and observed weekly for fungal growth. If no growth was found after four weeks, it was taken as negative for the growth of fungi. Identification was done based on colony characteristics, pigment production, rate of growth, tease mount using Lactophenol Cotton Blue preparation and slide culture techniques and urease test and hair perforation test. Cultures were examined microscopically by removing a portion of aerial mycelium with a spud and placed on a glass slide into a drop of lactophenol cotton blue and matted mycelial mass was gently teased with a pair of teasing needles and the cover-slip was placed on it. Urease test: Christensen's urease medium was inoculated at 25°C-30°C with the test fungus for 7-8 days to distinguish between *T. mentagrophytes* and *T. rubrum*. All the available data were analyzed by SPSS version 19 on windows format for descriptive statistics.

## Results

Based on the inclusion and exclusion criteria during the study, a total of n=150 cases were studied who showed signs and symptoms of superficial dermatophyte infections. Results obtained through age-wise and sex-wise analysis of the cases are presented in table 1. Critical analysis of table 1 revealed the commonly affected males (80%) and females (20%) the male to female ratio was 4: 1 probably to the effect of hormones in males. The distribution of cases was from 3 years to 70 years common age group involved in the lesions was between the second and third decade of life. The highest incidence was seen between 21 – 30 years. The mean age of males in the study was 29.5 ± 5.5 years. The mean age of females in the study was 24.0 ± 6.0 years.

**Table 1: Distribution of cases age-wise and sex-wise in the study**

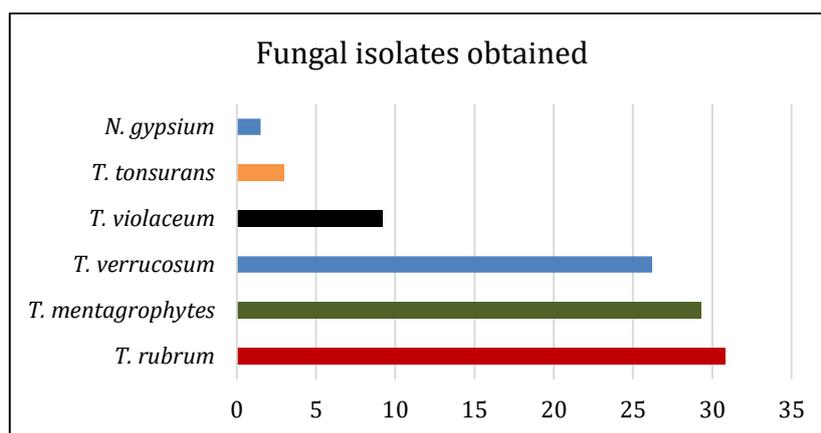
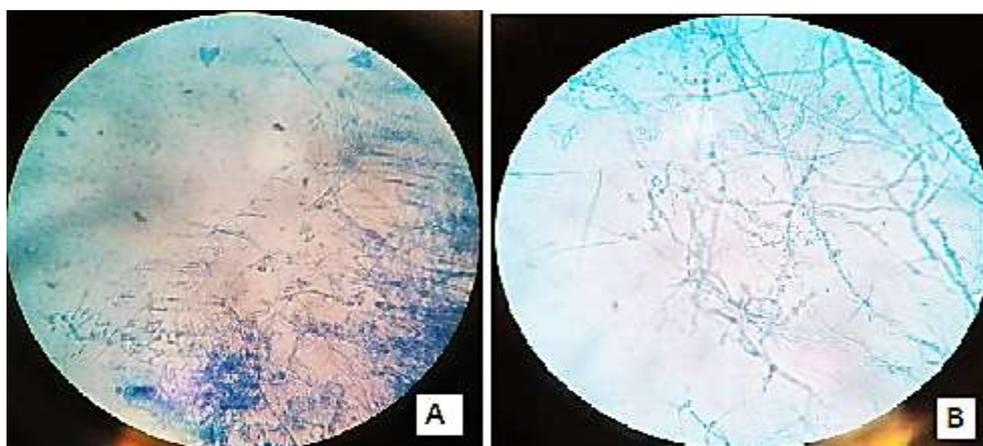
Age Group (yrs)	Male	Female	Total	Percentage
0 – 10	2	6	8	5.5
11 – 20	21	14	35	23.3
21 – 30	47	3	50	33.3
31 – 40	28	3	31	20.6
41 – 50	8	1	9	6.1
51 – 60	11	2	13	8.6
61 – 70	3	1	4	2.8
Total	120	30	150	100

Among the n=150 cases included in the study n=95 cases were from the lower socio-economic background. N=45 were from the middle-income group and n=10 were from higher-income groups. The higher incidence of infections in the lower socioeconomic group reveals that there may be an issue of hygiene. In lower socioeconomic groups there is a practice of sharing clothes and bathing towels which may lead to cross infections. Also, the availability of nutritious food is lesser in lower socioeconomic groups. Based on the locations in our study we found n=80 cases from rural areas, n=40 from the semi-urban area, and n=30 from urban areas. The occupational status of the cases involved was studied because it could be a major factor that predisposes people to certain diseases. An analysis revealed that the incidence was n=35 cases students, n=30 laborer, n=15 office workers, n=10 farmers, n=20 housewives, n=18 petty shop keepers, n=5 drivers, n=17 others. The lesion wise distribution is depicted in (table 2). *T. cruris* was the commonest lesion with 29.5% cases out of which 24.6% were positive for culture. *T. corporis* was the next predominant lesion with 24% cases out of which 36.9% were positive for culture. Mixed infections of more than one type were found in 6.6% of cases with clinical lesions being present in different parts of the body.

**Table 2:** Relative incidence of different clinical types of dermatophytosis in the study.

	Male	Female	Total	Percentage
<i>T. corporis</i>	32	4	36	24
<i>T. cruris</i>	43	1	44	29.5
<i>T. capitis</i>	8	24	32	21.5
<i>T. pedis</i>	4	0	4	2.6
<i>T. manuum</i>	1	0	1	0.6
<i>T. faciei</i>	1	0	1	0.6
<i>T. unguium</i>	17	1	18	12
<i>T. barbe</i>	1	0	1	0.6
<i>T. incognatio</i>	3	0	3	2
Mixed infections	10	0	10	6.6
Total	120	30	150	100

In the current study the category of sample collected for laboratory diagnosis was n=91 (60.67%) were skin scrapings. N=31 (20.67%) were nail clippings and n=28 were hair stubs. The fungal isolated obtained shows *T. rubrum* in 30.8% of cases *T. mentagrophytes* in 29.3% cases, *T. verrucosum* in 26.2% cases, *T. violaceum* in 9.2% cases, *T. tonsurans* in 3% cases, and *N. gypsiium* in 1.5% cases given in graph 1.

**Graph 1:** Depicting the percentage of Fungal isolates obtained in the cases of studyA: *T. mentagrophytes* in 10x magnification; B: *T. tonsurans* 10x magnification**Figure 2:** Potassium hydroxide (KOH) mount microscopy

## Discussion

In the current study, we found the occurrence of dermatophytosis was more common in males with a male to female ratio of 4:1. Venkat et al.,<sup>[15]</sup> in their study on dermatophytosis reported a male to female ratio of 2.07:1. The male predominance of dermatophytosis was due to increased outdoor physical activities and increased opportunity for exposure to infection than females. In this study highest number of cases were found between the 21 – 30 years age group. Kamothi et al.,<sup>[16]</sup> and Sahai S et al.,<sup>[9]</sup> also found the common age group affected was 21 – 30 years. Veer P et al.,<sup>[17]</sup> of Aurangabad found the common age affected was 31 – 40 years. Most of the studies showing a higher incidence of dermatophytosis in this group of patients because of higher physical activity in this age group, higher incidence of trauma, and increased sweating in tropical climatic conditions. The occurrence of disease by occupation revealed the incidence was highest in students 23.33%. It appears that students usually wear synthetic thigh undergarments in which sweat does get absorbed and they are engaged in a lot of physical activity such as playing sports etc. long-standing moisture predisposes for fungal infections. The next commonly affected are laborers which are engaged in heavy physical works and are exposed to unhygienic conditions. *T. cruris* was the commonest lesion with 29.5% cases *T. corporis* was the next predominant lesion with 24% cases. The results of this study correspond with studies of Kanwar AJ et al.,<sup>[18]</sup> Prasad PVS et al.,<sup>[19]</sup> Suman et al.,<sup>[21]</sup> have also found that *Tinea corporis* was found in > 50% of cases and *Tinea cruris* in > 15% of cases. In this study, *Tinea capitis* cases were in 8% cases most of them were below 10 years of age group. This is consistent with the reports that tinea capitis is commonly found in children. A culture positive rate of 24.6% was observed in this study for *Tinea corporis* and 36.9% *Tinea cruris*. An over isolation rate of 30% has been reported by several studies in this field.<sup>[20-22]</sup> The difference between the KOH positive rates and culture rates may be due to discrepancy in detecting fungal hyphae in direct microscopy and culture and he due to various contributory factors which include collection, inoculation, culture conditions, stage of lesions use of steroids, etc. There are chances that some scanty fungal elements might be missed during direct microscopy. Therefore, KOH preparation and culture have their role and importance in the diagnosis of lesions. Common fungal isolates obtained in this study were the fungal isolated obtained shows *T. rubrum* in 30.8% of cases *T. mentagrophytes* in 29.3% cases, *T. verrucosum* in 26.2% cases. Our findings are comparable to the findings of Sumana MN et al.,<sup>[5]</sup> in their study found 52.7% isolated were *Trichophyton rubrum* 30.55% were *Trichophyton mentagrophytes* and 11.1% were *Trichophyton violaceum*. Bindu V et al.,<sup>[23]</sup> showed *T rubrum* was the predominant species isolated (66.2%) in all clinical types followed by *T. mentagrophytes* (25%), *T tonsurans* (5.9%), and *E. floccosum* (2.9%). Lavanya V et al.,<sup>[22]</sup> reported *T. rubrum* (51.35%) was predominant followed by *T. mentagrophytes* (43.24%) and *E. floccosum* (5.4%). The *T. rubrum* was also the commonest in the studies done by Sen SS et al.,<sup>[25]</sup> (68.63%), and Mishra M et al.,<sup>[24]</sup> 76%. Various studies done in India have shown *T. rubrum* as the commonest isolate.<sup>[8, 12, 19]</sup>

## Conclusion

This study concludes that the commonest prevalence of dermatophytosis is in males. The third decade is the most affected age group. *T. corporis* is a common clinical manifestation. *Trichophyton rubrum* was the commonest species of dermatophyte isolated by culture. There is a greater incidence of dermatophyte infections in India due to the widespread use of corticosteroids and antibacterial agents. Increased use of synthetic clothing and exposure to hot and humid environments is increasing the burden of the disease, especially in the younger population.

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