

A clinico- mycological appraisal of Dermatophytosis

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ABSTRACT

Introduction: Cutaneous fungal infections have been reported worldwide as one of the most common dermatological disease in clinical practice. In spite of therapeutic advances in the last decade, the prevalence of cutaneous mycoses is still increasing and 10-15% of the human population is at risk of developing these infections.

Objectives To study the clinical types of dermatophytosis and to isolate and identify the causative agent with focus on sites of affliction.

Materials & Methods: One hundred and fifty consecutive patients with clinical suspicion of dermatophytosis, who consented and fulfilled the inclusion criteria attending Skin & STD outpatient department of Prathima Hospital attached to Prathima Institute of Medical Sciences, during January 2010 to June 2011 were enrolled for this observational study.

Results: Dermatophytosis was more common in males from rural areas between the age group of 21-30 years. *Tinea corporis* was the most common clinical type followed by *Tinea cruris*. Fungal elements could be demonstrated in 79% of cases. The commonest isolate was *Trichophyton rubrum* followed by *Trichophyton mentagrophytes*.

Limitations: A high percentage of study subjects were from rural areas though selection of subjects was randomized. Hence, the epidemiological trends in urban areas was poorly reflected.

Conclusion: The most common causative agents isolated were *Trichophyton rubrum* and *Trichophyton mentagrophytes*, which continue to be the major etiological agents for the past four decades across India despite changes in environment.

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

INTRODUCTION

Dermatophytic infections refer to the disease of the skin and its appendages caused by fungi, they are one of the

commonest infections throughout the world. The organisms are characterized by their ability to metabolise keratinized tissues such as corneous extract of epidermis, nails and hairs.¹

Indian subcontinent has a remarkably varied topography situated within the tropical and sub tropical belts. Although, dermatophytosis have worldwide distribution, the endemicity of species vary from one geographical area to another. Dermatophytes, unlike most other fungi produce keratinases (enzyme that breakdown keratin) which allow the invasion of fungi into the keratinized tissue.²

Socio economic factors which results in overcrowding, poor hygiene and malnutrition together with individual susceptibility play an important role. Dermatophytes does not cause mortality but it can be associated with significant morbidity and can pose a major health problem in hot and humid climate like India.

The present study was undertaken to estimate the incidence of different clinical types of dermatophytosis and to identify the causative species.

MATERIALS AND METHODS

In this prospective randomised observational study, a total of 150 clinically suspected cases of dermatophytosis attending the department of Dermatology in Prathima Hospital were randomly selected between January 2010 to June 2011. A written consent was obtained from the study participants after obtaining an approval from the Institutional Ethical Committee.

A detailed clinical history including age, sex, socio-economic status, occupation, duration of the disease, history of recurrence, type of lesion, similar complaints in the family and contact with animals or soil were recorded in a proforma. A history of associated systemic diseases and of treatment taken was recorded.

General physical examination and systemic examination were conducted in all cases and investigations like blood sugar, complete haemogram and ELISA for HIV 1 and 2 antibodies were done wherever deemed appropriate. Specimens of skin, hair and nail were collected and subjected for KOH examination

and culture. The data was tabulated and analyzed using SPSS20 version software.

All new cases of dermatophytosis irrespective of age and gender, who consented for the study were included and patients on antifungal treatment and non-dermatophytic infections like Pityriasis versicolor and Candidiasis were excluded.

Specimen collection

The affected area was cleaned with 70% ethyl alcohol and skin scales, crusts, pieces of nails and hairs were collected in clean white paper packets. Skin specimen was collected by scraping across the inflamed margin of lesion into the apparently healthy tissue.

Nail specimen was collected by taking clippings of the infected part and scraping beneath the nail / scraping the nail plate.

Hair specimen was collected by plucking with epilating forceps along with the root of hair and also by scraping across the infected patch with the blunt end of scalpel blade.

Direct Microscopic Examination

Specimen collected was subjected to potassium-hydroxide (KOH) wet preparation of various concentration (10%,20% & 40%) depending on type of clinical specimen for the presence of fungal elements. The material was placed on a glass slide. A few drops of 20% KOH were added on material and a cover slip was placed on it. It was then left for 20 minutes in case of skin scrapings and overnight for nails.

Culture

After direct microscopic examination irrespective of demonstration of fungal elements, the specimen was inoculated into three sets of test tubes, one containing Sabouraud's dextrose agar with 0.05% chloramphenicol, Sabouraud's dextrose agar with 0.05% chloramphenicol and 0.5% cycloheximide and the other to dermatophyte test medium (DTM).

Macroscopic examination of culture

The growth on Sabouraud's dextrose agar was examined to study the colony morphology based on following characteristics.

Colony characters on obverse: The colour (white, pearl, ivory) and consistency (cottony, velvety, fluffy and suede / folded).

Colony characters on the reverse: Presence or absence of pigment, whether diffusing or not.

RESULTS

A total of 1214 cases of dermatophytosis, attending the Department of Skin and STD, Prathima Hospital, attached to

Prathima Institute of Medical Sciences, and between January 2010 and June 2011, were screened and 150 patients who consented for the investigations were taken up for clinico mycological study. A total of 19,935 cases attended the outpatient department of Skin and STD during the study period, dermatophytosis constituted 1214 cases, contributing to 6.09% of all skin disorders.

Table 1: Showing distribution of cases with respect to sex and age

Age in years	Number of patients with percentage			
	Males		Females	
	Number	Percentage	Number	Percentage
0-10	18	18.1	11	21.6
11-20	10	10.1	6	11.8
21-30	26	26.3	10	19.6
31-40	14	14.1	11	21.6
41-50	12	12.1	6	11.8
51-60	11	11.1	6	11.8
>60	8	8.1	1	2
Total	99(66%)	100	51(34%)	100

A total of 150 cases were distributed between the range of 2 years to 75 years. The youngest patient was 2 years old and the oldest was 75 years old. In the present study majority of the patients belonged to the age group between 21-30 years (24%) followed by 0-10 years (19.3%) and 31-40 years (16.7%). The present study had 66% males and 34% females. The commonest age group among males was 21-30 years and in females it was 31-40 years. [Table 1]. Among the study subjects 30.6% were engaged in manual labour, students constituted 22% and housewives 16.6%. The ratio of incidence of dermatophytosis in rural (54.6%) to urban (45.9%) patients was 1.32:1.

Itching was the only symptom recorded in the subjects. It was observed in 91.4% of cases. 24% had severe itching and 46.7% had moderate itching and it was absent in 13% of cases.

Tinea corporis was the most common clinical type (33.3%) with statistical significance. Tinea cruris contributed to 23.3% of cases and Tinea capitis 11.3%. Tinea unguium, pedis, barbae and faciale were observed in 4.7%, 2%, 2% and 2.6% respectively. [Table 2 and Figure 1]

Table 2 : Showing clinical subtypes of Dermatophytosis.

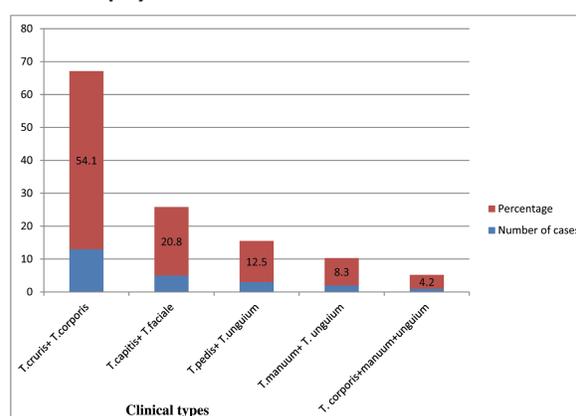
	Clinical type	Number	Percentage
	Tinea corporis	50	33.3
	Tinea cruris	35	23.3
	Tinea capitis	17	11.3
	Tinea pedis	3	2.0
	Tinea incognito	5	3.3
	Tinea unguium	7	4.7
	Tinea manuum	2	1.3
	Tinea barbae	3	2
	Tinea faciale	4	2.6
Multiple site involvement	Tinea corporis with Tinea cruris	13	8.7
	Tinea capitis with Tinea faciale	5	3.3
	Tinea pedis with Tinea unguium	3	2
	Tinea manuum with Tinea unguium	2	1.3
	Tinea corporis with Tinea manuum with Tinea unguium	1	0.7
	Total	150	100

In mixed clinical type, Tinea corporis with cruris was observed in 54% and Tinea capitis with faciale in 20.8% of the cases.

Analysis of various clinical types of dermatophytosis in relation to age and sex revealed that Tinea corporis was more common in males (54%) in age group of 21-30 years than in females (46%). Tinea cruris was also more common in males (80%) between the ages of 21-30 years (28.5%). Tinea capitis was predominantly observed in cases who were less than 10 years old (94.1%) and it was more common in males. Tinea incognito, Tinea pedis and Tinea faciale was more common in females (60%, 66.6% and 75% respectively).

In mixed type, Tinea corporis with Tinea cruris was a more common finding in adults whereas Tinea capitis and Tinea faciale was common in children. Dermatophytosis was associated with diabetes mellitus in 57.4% of cases and with HIV infection in 11%. Other ailments like tuberculosis, bronchial asthma and nephrotic syndrome together was seen in 2% of patients. Dermatophytosis was also associated with other skin disorders like molluscum contagiosum, candidiasis, leprosy and atopy in nearly 9% of patients.

Figure 1: Showing percentage of mixed clinical type of Dermatophytoses



The fungal elements were demonstrated in 79% of the specimens either by direct microscopy and or by culture. 36% of specimens were positive by microscopy alone and 12.6% were positive by culture.

The present study had 48.6% of culture positivity and the commonest isolate was *Trichophyton rubrum* (58.9%) followed by *Trichophyton mentagrophytes* (24.6%). *Microsporum gypseum*, *Trichophyton tonsurans* and *E. floccosum* contributed 8.2%, 5.4% and 2% respectively. Among the clinical types of dermatophytosis, specimens from *Tinea corporis* had the highest rate of culture positivity 43.8% followed by *Tinea cruris* (23.2%) and *Tinea capitis* (6.8%). *Trichophyton rubrum* was isolated in 62.5% from cases of *Tinea corporis* and 70.5% from cases of *Tinea cruris*. *Trichophyton tonsurans* (80%) was the predominant isolate from cases of *Tinea capitis*. Even in mixed clinical types *Trichophyton rubrum* was isolated in 66.6% and *Trichophyton mentagrophytes* in 22.22%.

DISCUSSION

The incidence of dermatophytosis in this hospital based study was 6.09%. In various Indian studies, the incidence was recorded to be between 8.06%, 8.4%, and 9.73%.^{3,4,5} The minor differences in the incidence could be attributable to epidemiological variations. The study cohort had majority of patients between 21-30 years. The age incidence in studies conducted by Siddappa K et al,⁶ Singh S et al,⁷ and Grover S et al⁸ had same trends with regards to age incidence of dermatophytosis. In this study males were affected more than females and the incidence of male to female ratio was 1.94:1. The studies conducted in the Indian subcontinent had similar findings^{4,7,9,10}. Since Indian males in rural areas are engaged extensively in agriculture, there is increased possibility of exposure to causative fungal agents.

Tinea corporis was the commonest clinical type of dermatophytosis seen in 33.3% of study subjects followed by *Tinea cruris* (23.3%) [Figure 2]. Studies done by Siddappa K et al,⁸ Huda MM et al¹⁰ and Bindu V¹¹ had similar findings with minor differences. The incidence of *Tinea capitis* was 11.3% which can be compared with study by Bindu V¹¹. *Tinea faciale* accounted for 2.6% of cases in our study. A higher incidence was noted in studies undertaken by Bindu V (6%)¹¹ and Kaviarasan PK et al (14.7%)¹². *Tinea barbae* was relatively rare and was observed in 2% of patients, Rao RB et al¹³ and Bindu V¹¹ recorded an incidence of 1.5% and 2% respectively. *Tinea unguium* was observed in 4.7% of cohort which is comparable with studies by Rao RB et al¹³ and Sudarshan V⁹ (3.57%). The incidence of *Tinea manum* was 1.3% which was closely congruent to studies by Siddappa K et al (1.53%) and Kaviarasan PK et al (1.5%).

There was a high association of dermatophytosis with diabetes mellitus (46.55%) and HIV infection (13.7%). This was high compared to study by Bindu V¹¹, where Diabetes mellitus was associated with 10% and HIV infection with 2% of patients.

Diabetes mellitus and HIV infection have increased rapidly over the years and individuals with these disorders are naturally prone to be affected with dermatophytosis.

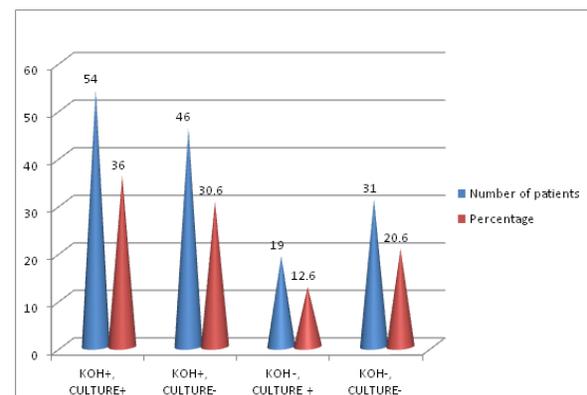
In the present study specimens subjected to both KOH examination and culture yielded 36% positivity. 30.6% specimens were positive for KOH examination alone and 12.6% by culture alone [Figure 3]. The result in the present study is comparable with studies by Karmakar S et al³ and Bindu V¹³. A total of 48.6% species were isolated. *Tinea rubrum* was the commonest isolate (58.9%), followed by *Trichophyton mentagrophytes* (24.6%), *M. gypseum* (8.2%), *Trichophyton tonsurans* (5.4%) and *Epidermophyton floccosum* (2.7%). The culture results closely matched the studies by Ranganathan S et al¹⁴ and Venkatesan G et al¹⁵. The present study had a higher percentage of geophilic species *M. gypseum*. This could be attributed to the fact that majority of the cohort were from agricultural background.

Figure 2- Photograph showing extensive tinea corporis over abdomen



Trichophyton rubrum was the most common isolate causing *Tinea cruris* (70.5%), *Tinea pedis* (50%) *Tinea unguium* (50%) and *Tinea manum* (10%). *Trichophyton mentagrophytes* was isolated from 23.5%, 20%, and 50% of *Tinea cruris*, *Tinea capitis* and *Tinea pedis* respectively. The variation in the percentage of species isolated in different studies depend on the epidemiological factors and host parasite interactions. Culture with SDA shows fluffy white colonies on observe with deep wine on reverse [Figure 4].

Figure 3: Showing KOH and culture results



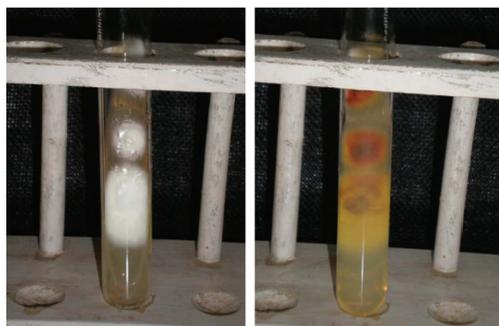


Figure 4- Culture with SDA showing fluffy white colonies on obverse with deep wine red on reverse

CONCLUSION

Dermatophytosis are one of the oldest and widespread disease amongst the skin disorders. The distribution of the disease and the causative species differs across the globe. In the Indian subcontinent *Tinea corporis* and *Tinea cruris* have a high occurrence across various regions and the most common causative agents being *Tinea rubrum* and *Tinea mentagrophytes*. These two species have been isolated the most in many Indian studies conducted in the past four decades and the same was observed in our study.

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