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Study of Dermatophytic Infections and Isolates in a Rural Tertiary Care Hospital

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Abstract
Background: *Dermaptophytes are dimorphic fungi which cause infections on skin, hair and nail. Dermatophytoses is an important health problem in both developed and developing countries.*
Aim: *To study about the dematophytic infections in different age groups of patients and to find out the common forms and isolates causing dermatophytoses in a rural tertiary care hospital.*
Method: *Samples from the actively infected patches of the patients were subjected to potassium hydroxide mount and culture on Sabouraud's dextrose agar. The colonies after sufficient growth were taken for wet mount preparation using Lactophenol Cotton Blue solution and the etiological agents were identified. Species identification is further confirmed based on pigment production on Cornmeal agar (CMA).*
Result: *A total of 112 positive samples were studied in which 71 were males and 41 were females. Tinea corporis and tinea cruris were isolated the most which is followed by lower percentage of other dimorphic fungi like tinea capitis, tinea faciei, tinea manuum and tinea pedis. Age group of 21-30 were found out to be affected more than other age groups. Trichophyton rubrum and Trichophyton mentagrophytes were the maximum isolated species. One case of Epidermophyton floccosum is also isolated.*
Conclusion: *Dermatophytic infections were found out to be more prevalent in males than females with a predominance of tinea corporis and tinea cruris. 21-30 years were the predominant age groups to have the infection. Trichophyton rubrum is the commonly isolated species.*
Keywords: *Dermatophytes, Dermatophytoses, Trichophyton rubrum, Trichophyton mentagrophytes, Epidermophyton floccosum.*

Introduction

Dermatophytes are a group of dimorphic keratinophilic fungi that infect keratinized tissues such as hair, nails and skin. The disease caused by dermatophytes is known as dermatophytoses. Dermatophytoses is an important public health problem, not only in underdeveloped countries but also worldwide in elderly and immuno-compromised patients[1]. Infection is generally cutaneous and confined to the nonliving cornified layers as the fungi are unable to penetrate the deeper tissues or organs[2]. They are predominantly

caused by Trichophyton, Microsporum, and Epidermophyton.

The dermatophytes are usually referred to as tinea or ringworm. Trichophyton causes infections on skin, hair, and nails, Epidermophyton causes infections on skin and nails, and Microsporum causes infections on skin and hair. Based upon mode of transmission, these have been classified as anthropophilic, zoophilic, and geophilic. According to the affected site, these have been categorised into tinea corporis (ring worm of the body), tinea cruris (ringworm of the groin), tinea capitis (ringworm of scalp and hair), tinea pedis (ringworm of the feet or "athlete's foot"), tinea barbae (ringworm of the beard), tinea manuum (ringworm of hand), and tinea unguium (ringworm of nail)[3].

Fungal products may be responsible for inciting local inflammation. Hypersensitivity to fungal antigens results in sterile vesicular lesions sometimes seen in sites distant from the ring worm. These lesions are called dermatophytidis or the "id" reaction. This study was conducted to obtain the dermatophytes from the active skin patches of affected patients through fungal culture and potassium hydroxide (KOH) preparation.

Different studies have been performed on dermatophytic infections and the etiological agents. This study is to find out the common causative agent of dermatophytoses in the rural parts of Bangalore including Avalahalli and Bidarahalli. This is the first study to be conducted on dermatophytoses in the Departments of Dermatology and Microbiology of East Point College of Medical Sciences and Research Centre, to find out the prevalence of dermatophytic infections in the surrounding area.

Materials and Methods

Study area: East Point College of Medical Science and Reserch Centre.

The study was conducted on patients with dermatophytic infection attending the dermatology outpatient department of East Point Medical College Hospital from July 2016 to June 2017. A detailed clinical history was taken in the Department of Dermatology 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 or soil were elicited and recorded in all cases.

Scrapings obtained from active infected skin patches were sent to the Microbiology Central Laboratory for KOH examination and fungal culture.

Study Design

Specimens are subjected to direct microscopy by mixing with 10% KOH solution. All clinical specimens are further inoculated on Sabouraud's dextrose agar plates with cycloheximide (0.05g/L) and chloramphenicol (0.005g/L). The plates are incubated at 25ºC and 37ºC for 21 days. The colony morphology was studied and species identification was done by Lactophenol Cotton Blue mount[4].

The mycological identification was based on macroscopic and microscopic examination of the culture isolates. The macroscopic examination of dermatophytes was characterized by duration of growth, surface morphology and pigment production on the reverse. Cornmeal agar (CMA) was used to differentiate Trichophyton rubrum from Trichophyton mentagrophytes based on pigment production on the media[5]

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 or soil were elicited and recorded in all cases[6].

Analysis

The results of KOH mount, microscopy and macroscopy were combined and analysed according to the age, sex, type of infection and isolates.

Result

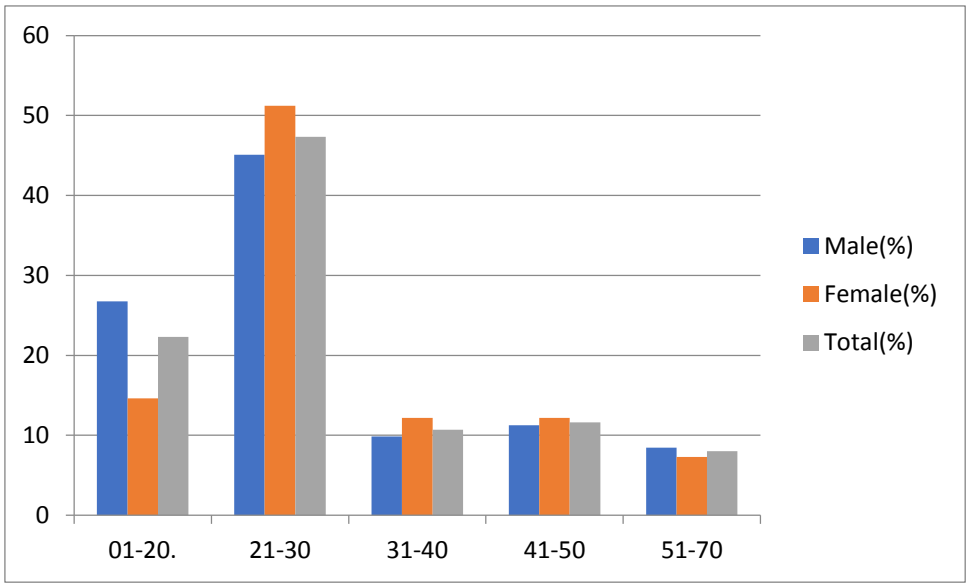
A total number of 112 positive samples were included for the study out of which 71 (63.39%) were males and 41 (36.60%) were females. Age wise analysis showed that 19 males out of 71 (26.76%) and 6 females out of 41 (14.63%) belonged to the age group 1-20 years. 32 males (45.07%) and 21 females (51.21%) belonged to 21-30 age group, 7 males (9.85%) and 5 females (12.19%) belonged to 31-40 age group, 8 males (11.26%) and 5 females (12.19%) belonged to 41-50 age group. 6 males (8.45%) and 3 females (7.31%) were above 50 years (Table 1).

Table 1 Distribution of the samples with respect to age groups

Age group	01-20	21-30	31-40	41-50	51-70
Male (%)	26.76	45.07	9.85	11.26	8.45
Female (%)	14.63	51.21	12.19	12.19	7.31
Total (%)	22.32	47.32	10.71	11.6	8.03

25 out of the total population (22.32%) were between 1-20 years age group, 53 (47.32%) were between 21-30 years of age, 12 (10.71%) were between 31-40 age group, 13 (11.60%) were between 41-50 years and 9 (8.03%) were above 50 years (Figure 1).

Figure 1: Graph showing the percentage distribution of the samples with respect to age groups.



The etiological agents were isolated from the samples and the data is analysed (Table 2).

Table 2: Infectious forms and the number of samples

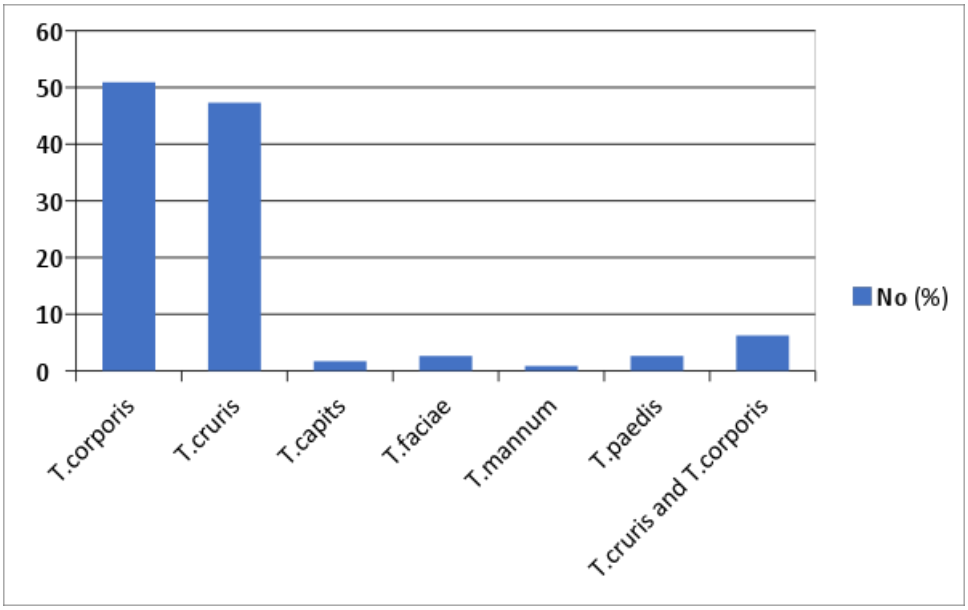
Infectious Forms	No of samples (%)
Tinea corporis	50 (44.64%)
Tinea cruris	46 (41.07%)
Tinea capits	2 (1.70%)
Tinea faciei	3 (2.67%)
Tinea manuum	1 (0.89%)
Tinea paedis	3 (2.67%)
Tinea cruris and Tinea corporis	7 (6.25%)

Tinea corporis was the most isolated form of infection that is from 50 out 112 samples (44.64%) and tinea cruris was found in 46 patients (41.07%) which is followed by tinea capitis from 2 patients (1.70%), tinea faciei from 3 samples (2.67%), tinea manuum from one (0.89%) and tinea pedis from 3 samples (2.67%) respectively. In 7 out of 112 patients (6.25%) both tinea cruris and tinea corporis were observed (Figure 2 and Table 3).

Table 3: Distribution of the form of infection with respect to sex

Form of infection	Male	Female	Total
Tinea corporis	34	16	50
Tinea cruris	27	19	46
Tinea capitis	1	1	2
Tinea faciei	2	1	3
Tinea manuum	1	0	1
Tinea pedis	2	1	3
Tinea corporis and Tinea cruris	4	3	7

Figure 2: Distribution of isolated forms of infection with respect to the number of samples in percentage



From the colony morphology and LPCB mount examination we found out that 94 were Trichosporon rubrum species, 17 were Trichosporon mentagrophytes and 1 was Epidermophyton floccosum species (Table 4).

Table 4: Percentage of organisms isolated.

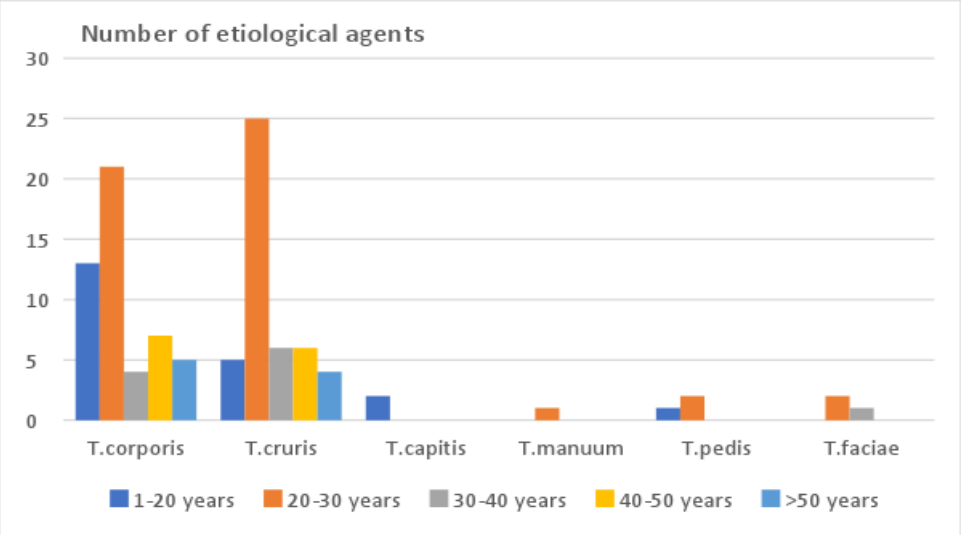
Species	No. of cases	Percentage
Trichophyton rubrum	94	83.92
Trichophyton mentagrophytes	17	15.17
Epidermophyton floccosum	1	0.89
Total	112	100

Out of 94 *Trichosporon rubrum* isolates, 46 were from 21-30 years group, 18 were from 1-20 years group, 10 from 31-40 years group, 12 from 41-50 years group and 8 from >50 years group. Out of 17 *Trichosporon mentagrophytes*, 8 were isolated from 21-30 years group, 5 from 1-20 years group, 2 from 31-40 years group, 1 from 41-50 years group and 1 from >50 years group. *Epidermophyton floccosum* was isolated from 21-30 years group (Table 5).

Table 5: Distribution of form of infections with respect to age group

Form of infection	1-20 years	21-30 years	31-40 years	41-50 years	>50 years
Tinea corporis	13	21	4	7	5
Tinea cruris	5	25	6	6	4
Tinea capitis	2	0	0	0	0
Tinea faciei	0	2	1	0	0
Tinea mannum	0	1	0	0	0
Tinea pedis	1	2	0	0	0
Tinea corporis and Tinea cruris	2	5	0	0	0

Figure 3: Age-wise distribution of the etiological forms



Discussion

In this study of 112 cases of dermatophytic infections the following clinical forms were observed- tinea corporis, tinea cruris, tinea pedis, tinea manuum, tinea capitis and tinea faciei. This study showed that males are infected more when compared to females with a male female ratio of 2:1 (Table 3). Meanwhile there are studies which show a higher prevalence of dermatophytic infections in females than males[7] .

In the age-wise analysis, maximum number of cases were observed within the age group of 21-30 years (47.32%) whereas 1-20 years showed only 22.32% followed by 41-50 (11.60%), 31-40 (10.71%) and above 50 (8.03%). Dermatophytoses was observed to be more among male patients of 21-30 years age group (Figure 3). Among the clinical types, tinea corporis was the highest isolated form (50 cases) followed by tinea cruris infection (46 cases). Other dermatophytic infections were also are of skin origin, tinea pedis, tinea mannum, tinea capitis and tinea faciei ,but in a few patients. Other commonly encountered infection skin infections are tinea incognito and tinea barbiae which are not found among the patients that indicates the low incidence of the infections in this locality. It was possible to demonstrate fungi on direct microscopy with KOH in 25 cases while others were isolated only by culture (87 cases). This clearly indicates the upper hand of culture over direct microscopy.

Trichophyton species were more commonly isolated followed by one isolate of Epidermophyton. We have isolated Trichophyton rubrum, Trichophyton mentagrophyte, and Epidermophyton floccosum. Among these, Trichophyton rubrum was the most commonly isolated form (83.92%) followed by Trichophyton mentagrophytes (15.17%) and Epidermophyton floccosum (0.89%). This is comparable with other studies from India[8]. Exposure to high temperature is common in rural areas because most of them are farmers who work in the hot weather. Frequent exposure to dirty water may affect the prevalence of tinea pedis infections. Earlier reports have shown that dogs and cats may play a significant role in spreading dermatophytes[9]. The incidence of tinea corporis and the involvement of *Trichophyton rubrum*, which is the commonest isolate in this region, confirm the earlier findings regarding dermatopytosis in India[10].

Conclusion

Dermatophytes are commonly found fungal infections. They are predominantly found among males than femlaes and more among 21-30 age groups. Skin infection types (tinea corporis and tinea cruris) are isolated more than other forms of Dermatophytoses. The most significant results of our study are Trichophyton rubrum and Trichophyton mentagrophytes are the most common dermatophytes isolated in our study

population and effective diagnosis and treatment on time can cure the disease.

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