

Dermatophytoses and spectrum of dermatophytes in patients attending a teaching hospital in Western Rajasthan, India

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ABSTRACT

Introduction: About 20–25% of the world's populations are infected with dermatophyte and the incidence of the disease is increasing steadily. In India, the cause of dermatophytoses is adversely influenced by economic factors such as poverty, poor hygiene and social conditions like overcrowding. The main objective of this study was to determine the prevalence, etiological agents, and distribution patterns of the disease among the patients attending a teaching hospital, Jodhpur. **Materials and Methods:** This is a retrospective study conducted in the Department of Microbiology and Department of Dermatology of a teaching hospital, Jodhpur from January 2017 to May 2018. The microbiological records of potassium hydroxide (KOH) mount examination and the fungal culture report of skin, hair, and nail samples during the study period were analyzed. **Results:** A total 363 skin, hair, and nail samples were received for fungal culture as investigations requested by dermatologist. Out of total 363 samples, KOH mount was positive in 58.4% and the culture was positive in 44.07% cases. Dermatophyte was isolated in 40.22% cases. *Trichophyton mentagrophytes* was the predominant dermatophyte (55%) isolated followed by *T. tonsurans* (22.5%) and *T. rubrum* (6.25%). **Conclusion:** The present study gives an insight about the prevalence and distribution pattern of dermatophytoses in Jodhpur, India. Tinea corporis was the most commonly diagnosed clinical condition followed by Tinea cruris. *T. mentagrophytes* was implicated as the predominating species.

Keywords: Dermatophytoses, tinea corporis, *trichophyton mentagrophytes*

Introduction

Dermatophytes are a distinct group of fungi that infect the keratinized tissues like skin, hair, and nails of humans and animals and can produce a variety of cutaneous infections. This group of fungi are closely related antigenically, physiologically, and morphologically and are commonly known as ringworm fungi.^[1] Dermatophytes are classified into three anamorphic (asexual or imperfect) genera, *Epidermophyton*, *Microsporum*, and *Trichophyton*.^[2] On the basis of their primary habitat, dermatophytes can also be divided into anthropophilic, zoophilic, and geophilic. Species of

all the three groups can cause human infection.^[3] The severity of the dermatophytoses depends on the specific strain of the infecting dermatophyte, the sensitivity of the host, and the site of infection.^[4] About 20–25% of the world's population is infected with dermatophyte and the incidence is increasing steadily.^[5] The prevalence of dermatophyte infection varies according to geographical areas. This variance in the distribution pattern is attributed to the social practices, migration of laborer, movements of troops, immigration, and frequent worldwide traveling.^[6] Fungal infection of the skin and its appendages is more prevalent in India due to favorable climatic conditions like temperature and humidity. India is a tropical and developing country, and the cause of dermatophytoses is adversely

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influenced by economic factors such as poverty, poor hygiene and social conditions like overcrowding.^[7] The availability of limited published data on dermatophytoses from the study region prompted us to take up this study. The main objective of this study is to determine the prevalence of dermatophytoses and their etiological agents and distribution patterns.

Materials and Methods

This study is a retrospective study conducted in the Department of Microbiology and Department of Dermatology in a teaching hospital, Jodhpur, from January 2017 to May 2018. The microbiological records of potassium hydroxide (KOH) mount examination and fungal culture report during the study period were analyzed. Culture positive cases were correlated with clinical diagnosis. A total of 363 samples (skin scrapings, nail clippings, and hair) were received for fungal culture in Mycology laboratory during the study period. All the specimens received in the Mycology laboratory were subjected to KOH mount before culture. Specimens were subjected to culture on modified Sabouraud's dextrose agar media containing antibiotics (gentamicin and cycloheximide) and incubated at 25°C and 37°C for a period of 4 weeks. Species identification was done on the basis of colony morphology, finding of teased mount by using lactophenol cotton blue stain, slide culture finding, and urea hydrolysis test positivity. The study was approved by hospital ethical committee.

Statistical analysis

The interpretation and analysis of the data were done by using Microsoft Excel. The quantitative data were expressed as numbers and percentages in a tabular form.

Results

A total of 363 samples were received for fungal culture, out of which 304 (83.75%) were skin scrapings, 52 (14.33%) were nail clippings, and seven (1.92%) were hair samples, respectively. A total of 248 (68.32%) samples were received from male patients and 115 (31.68%) from females. KOH mount was positive for fungal elements in 212 (58.4%) cases and culture was positive for fungal isolate in 160 (44.07%) cases. On the KOH mount, hyaline septate hyphae were reported in 207 (57.02%) cases and yeast cells in 5 (1.38%). In culture positive cases, dermatophytes were reported in 146 (40.22%) cases, *Candida* species in 8 (2.2%), and other fungus was reported in 6 (1.65%) cases. The age and sex distribution along with mycological findings in these cases are shown in Table 1. Dermatophytes were isolated from 139 skin scrapings, 4 nail clippings, and 3 hair samples. *Trichophyton species* was isolated in 142 (39.12%) cases and *Microsporum* and *Epidermophyton species* in 2 (0.55%) cases each. *T. mentagrophytes* (55%) was the most common fungal isolate among the culture positive cases. Contaminant was reported in 88 (24.24%) cases. Clinical correlations among the culture positive cases are shown in Table 2.

Table 1: Distribution of Fungal culture positive cases in relation to age and sex

Age group	Male	Female	KOH positive		Culture positive	
			Male	Female	Male	Female
0-10 yrs	5	4	2	2	1	2
11-20 yrs	62	20	51	8	35	9
21-30 yrs	74	31	50	14	41	10
31-40 yrs	37	20	22	8	12	5
41-50 yrs	29	19	19	9	11	6
51-60 yrs	19	12	10	6	11	5
61-70 yrs	13	6	6	2	7	1
>70 yrs	9	3	3	0	4	0
Total	248	115	163	49	122	38

Discussion

Superficial fungal infections are a worldwide problem, constituting a large number of cases. Dermatophyte infections are more prevalent in the developing world. Hot and humid environment of the tropical and subtropical regions are considered to be best suited for the dermatophyte infections and have been reported from various parts of India. As there is scarcity of studies documenting the profile of dermatophyte infections in the western part of Rajasthan, this study highlights the mycological and clinical profile of dermatophytoses. In addition to the hot climatic condition in Jodhpur, other factors like migration of laborers, frequent visit of tourists, and unhygienic lifestyle might contribute to the development of dermatophytoses in this region. Out of total 363 samples, KOH mount was positive in 58.4% and culture was positive in 44.07% cases. Dermatophyte was isolated in 40.22% cases. Similar type of culture positive finding was also observed by other studies.^[8,9] Contrary to the present study, some other studies observed much high percentage (62–70%) of fungal culture positivity.^[10,11] The overall male and female ratio in both groups is approximately 2.1:1. Of the culture positive cases, 76.25% were males. High prevalence in males have been also reported by other studies from India.^[12,13] This may be due to the differences in occupational exposure of both the sexes as males are more involved in outside activities. Most of the patients belonged to the age group of 21–30 years in this study, almost similar observations have been reported by another study as well.^[14] The main reason for higher prevalence in this group may be because the individuals in this group are often most active and involved in outdoor activities such as studies and jobs. In this study, various dermatological conditions were diagnosed by the dermatologist based on the clinical presentation. Tinea corporis (75%) was the most common clinical condition diagnosed followed by Tinea cruris (18.75%) among culture positive cases in this study. Similar observations were also reported by some other studies;^[12,15] however clinical conditions varies in different geographical areas. In the present study, *T. mentagrophytes* was the predominant dermatophyte (55%) isolated followed by *T. tonsurans* (22.5%) and *T. rubrum* (6.25%). *Microsporum* species and *Epidermophyton* species were isolated

Table 2: Fungal isolate and their correlation with type of skin infections

Fungal isolate	Clinical diagnosis among culture positive cases							Total (%)
	Tinea corporis	Tinea cruris	Tinea capitis	Tinea incognito	Tinea pedis	Onychomycosis	Intertrigo	
<i>T. mentagrophytes</i>	72	14	1	1	-	-	-	88 (55)
<i>T. tonsurans</i>	27	6	-	1	1	1	-	36 (22.5)
<i>T. rubrum</i>	6	4	-	-	-	-	-	10 (6.25)
<i>T. violaceum</i>	3	1	2	-	-	-	-	6 (3.75)
<i>T. schoenleinii</i>	1	-	-	-	-	-	-	1 (0.625)
<i>T. terrestre</i>	-	1	-	-	-	-	-	1 (0.625)
<i>Microsporum audouinii</i>	1	-	-	-	-	-	-	1 (0.625)
<i>Microsporum gypseum</i>	1	-	-	-	-	-	-	1 (0.625)
<i>Epidermophyton floccosum</i>	2	-	-	-	-	-	-	2 (1.25)
<i>Candida species</i>	4	2	-	-	-	-	2	8 (5)
Other fungus	3	2	-	-	-	1	-	6 (3.75)
Total	120	30	3	2	1	2	2	160

in 1.25% cases each. *T. mentagrophytes* as a predominant dermatophyte isolated also described by some other studies as well.^[12,16] This interesting finding is contrary to the observation of other recent study.^[17] *T. rubrum* was reported as a predominant dermatophyte by this study. The plausible explanation for this reverse trend may be in the fact that *T. rubrum* is generally linked to chronic dermatophytoses.^[18] However, the exact data about the chronic cases of dermatophytoses included in the study were not available. Clinically, only 20% cases did not respond to local antifungal treatment and required oral therapy. *Candida species* and nondermatophytic molds were isolated in 2.2% and 1.65%, respectively, in this study. Among nondermatophytic molds, fungi isolated were *Aspergillus*, *Alternaria*, *Curvularia*, *Acremonium*, and *Fusarium species*, but without repeated isolation from the lesion they carry no significance. In a study, Lakshmanan *et al.* reported 24.4% nondermatophytic fungi, mostly comprising *Candida*, *Aspergillus*, *Alternaria*, *Curvularia*, and *Fusarium*, suggesting that nondermatophytic molds are emerging agents of superficial mycoses.^[19] It is important for family physicians to emphasize that clinical diagnosis of dermatophytoses can be unreliable because these infections have many mimics, which can manifest identical lesions. For example, Tinea corporis may be confused with eczema, Tinea capitis may be confused with alopecia areata, and onychomycosis may be confused with dystrophic toe-nails due to repeated minor trauma. Physicians should confirm suspected dermatophytoses with KOH mount preparation or culture. KOH mount can be used as a point of care test before prescribing medications. Tinea corporis, Tinea cruris, and Tinea pedis generally respond to topical antifungal agents, but oral antifungal agents should be considered for severe disease, failed topical treatment, immunocompromised patients, or severe moccasin-type Tinea pedis. Due to tolerability, high cure rate, and low cost oral terbinafine should be used as a first-line therapy for Tinea capitis and onychomycosis. However, kerion should be treated with griseofulvin unless *Trichophyton* has been established as the pathogen.^[20] The limitations of this study are its retrospective nature, in which antifungal susceptibility was not performed. Genomic and proteomic studies were not performed, which could have given better clarification about fungal species.

Conclusion

In conclusion, present study gives an insight about the prevalence and distribution pattern of dermatophytoses in western part of Rajasthan, India. Tinea corporis was the most commonly diagnosed clinical condition followed by Tinea cruris. *T. mentagrophytes* was implicated as the predominating species followed by *T. tonsurans* and *T. rubrum*. This data could help in the diagnosis of the disease and thus the spread of the disease can be controlled with specific control measures.

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Conflicts of interest

There are no conflicts of interest.

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