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Original Research Article

Dermatophytosis in patients referred for evaluation at a tertiary care teaching hospital in Kashmir, India

Mansoor Ahmad, Aanisa Nazir, Syed Khursheed*, Suraiya Mir, Azhar Shafi

Department of Microbiology, SKIMS, Soura, Srinagar, J&K, India

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***Correspondence:**
Dr. Syed Khursheed,
E-mail: syedkhursheedmicro@gmail.com

ABSTRACT

Background: Dermatophytoses invade the stratum corneum of the skin and other keratinized tissues derived from the epidermis. They are quite common and can be fairly accurately identified by a simple laboratory test. We conducted this study to identify the common dermatophytic infections in our setting.
Methods: Clinically suspected tinea infections were referred to the Department of Microbiology of SKIMS Medical College Hospital, a tertiary-care teaching hospital in Srinagar, Kashmir. The affected area was cleaned with 70% alcohol, and scrapings were obtained. 10% KOH was used for keratinolysis. Samples were thoroughly examined for the presence of filamentous, septate, branched hyphae.
Results: A total of 206 samples were analyzed. The overall KOH positivity rate was 44.7%. Of the 206 patients, 119 (57.8%) were males, and 142 (68.9%) resided in rural areas. The mean age of the patients was 32 years (range 4-72). Tinea corporis was the typical clinical manifestation (58.3%).
Conclusions: Young and middle-aged males and people living in rural areas are at a higher risk of dermatophyte infections.

Keywords: Dermatophytosis, Mycoses, Trichophyton, Epidemiology

INTRODUCTION

Fungi exist worldwide, of which few are considered pathogenic. However, the pathogenic fungi may cause infections in animals and human beings. Dermatophytes are a closely-related keratinophilic group of fungi that can invade the stratum corneum of the skin or other keratinized tissues derived from the epidermis. They cause various cutaneous infections (dermatophytosis), colloquially known as ringworm (tinea). Dermatophytosis may affect almost all skin sites; feet, groin, scalp, and nails are the most commonly affected areas. The dermatophytic lesions grow centrifugally, forming irregular rings with inflammatory borders and some clearing in the central area of the lesion. Based on the location of the lesion on the body, these have been classified clinically into tinea corporis (glabrous skin), tinea cruris (groin), tinea faciei (face), tinea pedis (feet), tinea capitis (scalp, eyebrows, eyelashes), tinea manuum (hand), tinea unguium/onychomycosis (nail).

20-25% of the world's population is infected with superficial skin mycoses making them one of the most frequent forms of infection.[1] The high prevalence of skin mycoses demands awareness of the contributing risk factors and accurate identification.

The present study was undertaken to identify common dermatophytic infections in our setting. In addition, we

also aimed to evaluate the accuracy of clinical diagnosis vis-à-vis KOH-positivity.

METHODS

This cross-sectional, lab-based investigational study was conducted at the Department of Microbiology at a tertiary care teaching hospital (SKIMS Medical College Hospital) in District Srinagar. The study was conducted for a period of four months, from December 2019 to March 2020. Institutional ethical committee clearance was obtained before starting the study, and informed consent was obtained from patients before collecting the samples.

Patients are usually referred to this institute from other secondary care health centers from other districts. The patients referred to the dermatology outpatient department of the teaching hospital were evaluated for skin lesions. Patients with clinically suspected fungal lesions were investigated for fungal infection, irrespective of age and sex, at the Department of Microbiology of the institution. Patients who did not provide consent for participation were excluded. Nail clippings, skin scraping, and hair samples were collected as follows:

Nail clipping

The affected area of the nail was thoroughly cleaned with 70% ethyl alcohol to remove surface contaminants. The alcohol was allowed to dry by evaporation. The nail clippings were taken from proximal and lateral edges of the nail, 2-3 mm in thickness, using the sterile nail clipper or scalpel blade. A spoon excavator or any sterile blunt instrument was used to collect subungual debris. Once collected, nail samples were kept in universal containers, bijou bottles, or black sterile containers.

Skin/scalp scraping

The lesion was wiped with 70% ethyl alcohol. Margins of the lesions were scrapped with a sterile scalpel. The scrapings were collected in a dry sterile container.

Hair sample

The fungal infection affects the hair shaft closer to the base; therefore, dull, broken hair from the margin of the lesion was plucked using sterile forceps. The plucked hair was placed in sterile black paper.

Processing of samples

Direct potassium hydroxide (KOH) mount

Skin and hair: The sample (skin, scalp scraping, and hair) was placed on a clean, grease-free glass slide. A few drops of 10% KOH were put on the sample. After keratinolysis softens the sample, a clean coverslip was placed on the sample and pressed, preventing the formation of bubbles

Nail

Nail clippings were placed in test tubes or bijou bottles containing 10% KOH and incubated for keratinolysis. A drop from dissolved materials was placed on a clean glass slide, and a coverslip was placed on it.

Microscopic examination

Slides were examined at 400X magnification for the presence of fungal elements. Each slide was thoroughly examined for the presence of filamentous, septate, branched hyphae.

Further, samples were inoculated on Sabouraud Dextrose Cycloheximide Chloramphenicol Agar, incubated at 25°C, and examined for any growth at interval of three days. The growth on agar slants was examined to study the colony morphology: colour, consistency, and pigmentation.

In addition, information about the demographic characteristics of the study participants was collected.

Sample size

Sample size was not determined apriori. All eligible patients during the four-month study period were included in this study.

Statistical analysis

Data were summarized as frequencies and percentages. Cross-tabulation was done to compare the frequency and characteristics of lesions across demographic characteristics.

RESULTS

In this descriptive study, we evaluated 206 patients with a provisional diagnosis of dermatophytosis for laboratory confirmation. Out of 206 patients, 119 (57.8%) were male, and 142 (68.9%) resided in rural areas. The patients were between 4 and 72 years of age, with a mean age of 32 years.

Of the 206 samples examined, 92 (44.7%) showed evidence of fungal elements on direct microscopy. The proportion of laboratory-confirmed samples was significantly higher among males (64/119, 53.8%) as compared to females (28/87, 32.2%) (p=0.002). The proportion of laboratory-confirmed samples was lower towards the extremes of age (Table 1).

The most common site of involvement was skin (157/206, 58.3%), followed by nails (32/206, 15.5%) and hair (17/206, 8.3%). Table 2 shows the site-wise

distribution of lesions. The proportion of KOH-positive samples was significantly higher for nail samples (24/32, 75%) as compared to samples from the skin (63/157, 40.1%) and hair (5/17, 29.4%).

Table 1: Demographic characteristics.

	KOH positive*	KOH negative*	Total#	P value
Overall	92 (44.7)	114 (55.3)	206	
Gender				0.002
Male	64 (53.8)	55 (46.2)	119 (57.8)	
Female	28 (32.2)	59 (67.8)	87 (42.2)	
Age (years)				0.051
<=5	4 (28.6)	10 (71.4)	14 (6.8)	
6-10	12 (52.2)	11 (47.8)	23 (11.2)	
11-15	2 (50.0)	2 (50.0)	4 (1.9)	
16-30	34 (51.5)	32 (48.5)	66 (32.0)	
31-50	31 (50.8)	30 (49.2)	61 (29.6)	
>50	9 (23.7)	29 (76.3)	38 (18.4)	
Residence				0.278
Rural	67 (47.2)	75 (52.8)	142 (68.9)	
Urban	25 (39.1)	39 (60.9)	64 (31.1)	

Figures in parantheses are percentages; *Row percenatges; #Percentages out of 206

Table 2: Distribution of lesions.

	Skin		Nails		Hair		Total
	KOH-positive n (%)*	Sub-total#	KOH-positive n (%)*	Sub-total#	KOH-positive n (%)*	Sub-total#	
Overall	63 (40.1)	157 (76.2)	24 (75.0)	32 (15.5)	5 (29.4)	17 (8.3)	206
Gender							
Male	47 (50.0)	94 (79.0)	15 (75.0)	20 (16.8)	2 (40.0)	5 (4.2)	119
Female	16 (25.4)	63 (72.4)	9 (75.0)	12 (13.8)	3 (25.0)	12 (3.8)	87
Age (years)							
<=5	2 (16.7)	12 (85.7)	2 (100.0)	2 (14.3)	0 (0.0)	0 (0.0)	14
6-10	12 (54.5)	22 (95.7)	0 (0.0)	0 (0.0)	0 (0.0)	1 (4.3)	23
11-15	1 (33.3)	3 (75.0)	1 (100.0)	1 (25.0)	0 (0.0)	0 (0.0)	4
16-30	22 (47.8)	46 (69.7)	8 (66.7)	12 (18.2)	4 (50.0)	8 (12.1)	66
31-50	21 (47.7)	44 (72.1)	9 (75.0)	12 (19.7)	1 (20.0)	5 (8.2)	61
>50	5 (16.7)	30 (78.9)	4 (80.0)	5 (13.2)	0 (0.0)	3 (7.9)	38
Residence							
Rural	49 (45.0)	109 (76.8)	13 (81.3)	16 (11.3)	5 (29.4)	17 (12.0)	142
Urban	14 (29.2)	48 (75.0)	11 (68.8)	16 (25.0)	0 (0.0)	0 (0.0)	64

Figures in parantheses are percentages; *Row percenatges out of corresponding sub-total; #Row percentages out of total

Table 3: Presumptive clinical diagnosis.

Presumptive clinical diagnosis	KOH-negative	KOH-positive	Total
Tinea corporis	79 (65.8)	41 (34.2)	120 (58.3)
Tinea unguium	8 (25.0)	24 (75.0)	32 (15.5)
Hair	12 (70.6)	5 (29.4)	17 (8.3)
Tinea capitis	4 (25.0)	12 (75.0)	16 (7.8)
Tinea faciei	5 (62.5)	3 (37.5)	8 (3.9)
Tinea cruris	2 (33.3)	4 (66.7)	6 (2.9)
Tinea pedis	3 (75.0)	1 (25.0)	4 (1.9)
Tinea manuum	1 (33.3)	2 (66.7)	3 (1.5)
Total	114 (55.3)	92 (44.7)	206 (100.0)

Figures in parentheses are percentages

Tinea corporis was the predominant clinical manifestation (120/206, 58.3%), followed by Tinea unguium (32/206, 15.5%) and Tinea capitis (17/206, 8.3%). (Table 3) Trichophyton rubrum was the most commonly identified organism. Other organisms identified included Trichophyton mentagrophyte, and Microsporum canis (Figure 1).

DISCUSSION

We conducted this study to identify common dermatophytes in our setting. We identified the common sites of dermatophytosis and the concordance between clinical and laboratory diagnosis.

In our study, dermatophytes were more common in adults and in males (Table 1). Male preponderance has been reported almost consistently in the literature.[2–4] Earlier studies have shown a much higher male preponderance as compared to recent studies. A recent review of dermatophytosis in India has reported that the age and gender difference in the prevalence of dermatophytosis is getting blurred with an increase in cases detected in females and children.[5] The possible reasons for male preponderance can be a higher disease risk or a higher case detection. Outdoor activities are more common among males exposing them to hot, humid conditions leading to excessive sweating – conditions predisposing them to fungal infections. Males are more likely to seek care as compared to females. In our study, most of the cases were in their third and fourth decades (Table 1). This finding is concordant with most of the available literature.[4,6–11] However, it has been reported that chronic dermatophytoses are more common in the late middle age and older age groups, a consequence of waning immunity.[12]

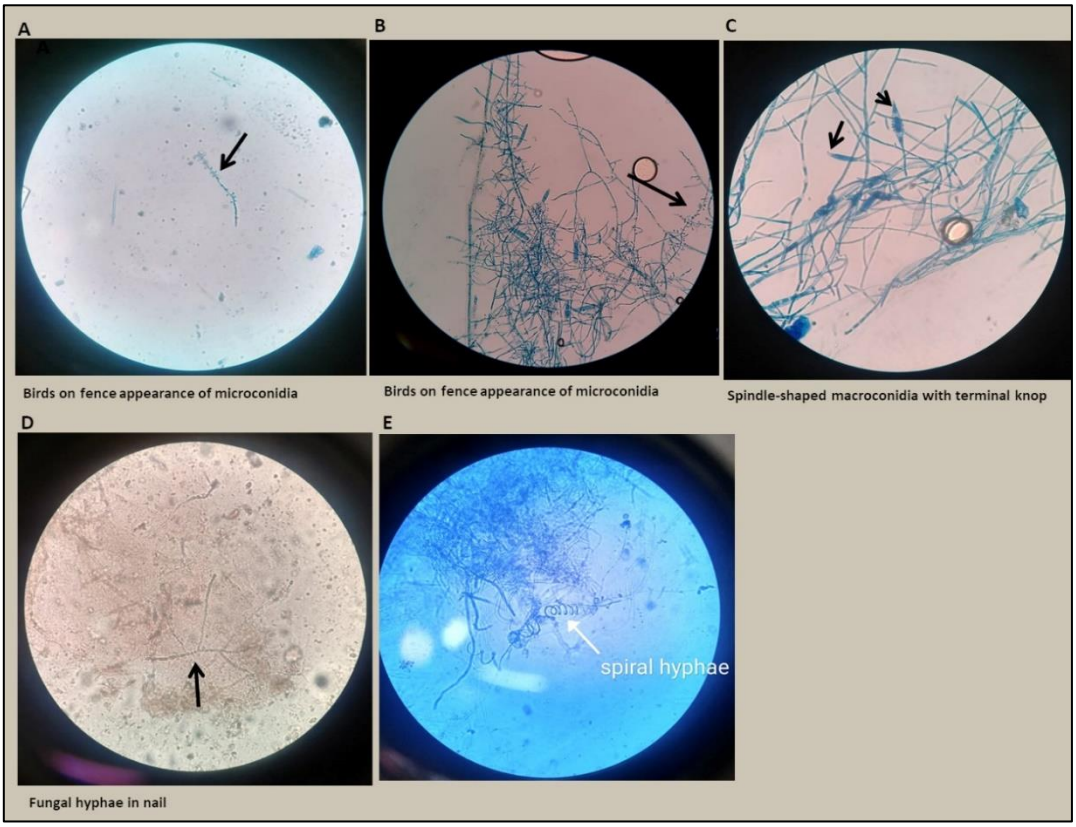

Figure 1: (A), (B) Trichophyton rubrum; (C) Microsporum canis; (D) Fungal hyphae; (E) Trichophyton mentagrophytes.

We found a higher proportion of rural residents among our study population (Table 1). This finding is similar to reports from Hanumanthappa et al and Vyas et al.[13,14] Increased prevalence in rural areas can be attributed to frequent outdoor labor, including agriculture predisposing to increased sweating.

Tinea corporis was the common clinical entity in our study (58.3%), followed by Tinea unguium (15.5%) (Table 3). This is in accordance with most of the other reported studies.[2,4,7–9,15–17] However, Tinea pedis was reported to be the most common form of dermatophytosis by Grover et al and tinea unguium was reported as the most common form by Ray et al.[18,19]

Trichophyton rubrum was the most common organism isolated in our study, followed by Trichophyton mentagrophytes. Trichophyton rubrum has been reported

as the most common organism by most of the studies on dermatophytes.[2,4,7–9,11,17,20,21] However, Trichophyton mentagrophytes seems to be snatching the number one position in recent studies.[3,15,22] Interestingly, Ghosh et al. report Trichophyton verrucosum as the common organism in their study.[18] Trichophyton mentagrophytes was the common organism worldwide before 1935 before being replaced by Trichophyton rubrum. Environmental, host-parasite and immunological factors have been suggested as the reason for this shift.[23–25] In recent years, the reported prevalence of Trichophyton mentagrophytes has reportedly increased.[14,26–28]

Limitations

This was a single-centre, hospital-based study. Hence, the results of this study may not reflect the true prevalence and pattern of dermatophytoses in Kashmir.

CONCLUSION

In our setting, dermatophytoses are more common in males and during the third and fourth decades of life. People living in rural areas are at a higher risk of contracting dermatohytoses. Tinea corporis is a common clinical manifestation in our setting. Trichophyton rubrum and Trichophyton mentagrophytes are the commonly implicated organisms in dermatophytoses.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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