

Clinico-mycological Profile of Dermatophytic Infections at a Tertiary Care Hospital in North India

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Abstract

Background- Dermatophytoses is a common fungal skin infection found worldwide. It is caused by a homogenous group of keratinophilic fungi called dermatophytes that have the capacity to invade keratinized tissues i.e. skin, hair and nails of humans and other animals. Dermatophytoses is commonly referred to as ringworm or tinea infections. **Aim-** The present study was undertaken to identify the species of fungi & to correlate clinical diagnosis with KOH positivity and fungal culture positivity among the patients of dermatophytic infections attending the outpatient department of Dermatology in Dayanand Medical College and Hospital, Ludhiana. **Material and methods-** A total of 100 clinically diagnosed cases of dermatophytoses were included in the study. After detailed history and clinical examination, specimens like skin, hair & nail scrapings were sent for KOH (potassium hydroxide) smear and fungal culture in the Mycology laboratory. The clinical and mycological findings thus obtained were correlated. **Results:** In this study, male to female ratio came out to be 1.3:1. Most common clinical type seen was tinea corporis followed by tinea unguium. KOH positivity was 83% and 56% of the cases were culture positive. Most common fungal isolate was *Trichophyton rubrum* followed by *T. mentagrophytes*. **Conclusion:** Among the dermatophytic skin infections, tinea corporis was the predominant clinical type and *Trichophyton rubrum* was most common dermatophyte isolated.

Key words: Dermatophytoses; *Trichophyton rubrum*; *T. mentagrophytes*

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INTRODUCTION

The dermatophytes are a group of closely related fungi that have the capacity to invade keratinized tissues i.e. skin, hair and nails of humans and other animals to produce an infection known as dermatophytoses.^[1] Dermatophytic infection is limited to non living cornified layers because of

the inability of the fungi to penetrate deeper tissues or organs. The etiological agents of dermatophytoses are classified in three asexual genera on the basis of conidiospore formation- *Trichophyton*, *Microsporum* and *Epidermophyton*.^[2] Hot and humid climate, poverty, poor hygiene, social conditions like overcrowding are some of the factors favoring dermatophytoses in India. Immunocompromised states due to underlying malignancy,

administration of steroids or immunosuppressive drugs, Acquired immunodeficiency syndrome or endocrinological disorders such as diabetes mellitus & Cushing's disease can lead to generalized and atypical presentation that can be confused with other skin disorders.^[3] A correct knowledge of the etiological agents of dermatophytoses is therefore important to initiate appropriate treatment, and is also essential for epidemiological purposes. Thus, the present study was undertaken to identify the species of fungi & to correlate clinical diagnosis with KOH positivity and fungal culture positivity among the patients of dermatophytic infections attending the outpatient department of Dermatology in Dayanand Medical College and Hospital, Ludhiana.

MATERIAL AND METHODS

A total of hundred clinically diagnosed cases of dermatophytic infections who attended the dermatology OPD of Dayanand Medical College & Hospital, Ludhiana over a period of 1 year (September 2014- September 2015) were included in the study. Patients who had taken oral or topical antifungal treatment in the past 3 weeks, applied topical corticosteroids and patients of tinea incognito were excluded from the study. Detailed history of the patients including age, sex, duration of disease, history of previous treatment, family history, history of pets, site of infection was taken. Patients were thoroughly examined and grouped in various clinical types. Specimens like skin, hair and nail scrapings were collected in sterile petri dishes and processed in the department of Microbiology. One portion of the sample was used for direct KOH examination and the other half was used to inoculate SDA medium for culture. Ten percent KOH was used for skin and hair samples while the concentration of KOH was increased to twenty percent for nail samples for direct microscopic examination.^[4] For fungal culture, two sets of culture media were used- (a) Sabouraud's Dextrose Agar (SDA) with antibiotic (chloramphenicol 0.05mg/ml) & cycloheximide (0.5mg/ml) and (b) Sabouraud's Dextrose Agar (SDA) with antibiotic (chloramphenicol 0.05mg/ml) alone. These were separately inoculated and incubated at 22-30°C and 37°C for a minimum period of three weeks. Positive cultures were examined both microscopically as well as macroscopically for the identification of species. Special tests like urease production test, slide culture techniques (for filamentous fungi) and hair

perforation tests were performed wherever required.

RESULTS

Out of hundred clinically diagnosed patients, males were more commonly affected than females with M: F ratio of 1.3:1. The most commonly affected age group was 21 – 30 years (27%) followed by 31-40 years (23%) and 41-50 years (15%). Least number of patients were seen above sixty years of age (6%). The mean age was 34.49 years. (Table 1) In our study, maximum number of patients were students (28%) and housewives (25%) followed by laborers and service class people. Most of the patients (71%) were of urban background as compared to rural. Tinea corporis was the most common clinical presentation (31/100) followed by tinea unguim (20/100). (figure 1 and 2). Many cases of tinea corporis were also associated with dermatophytic infections of other sites. Tinea corporis et cruris occupied third position with 13 cases. (table 2) Family history was positive in 33% of the patients and all had history of sharing of fomites. Thirty percent of the patients of dermatophytoses were diabetics in our study. Confirmation of the diagnosis by direct microscopic examination was obtained in 83% of the patients while fungal culture confirmation was obtained only in 56% of patients. (figure 3, table 3). *Trichophyton rubrum* was the most common isolate (46.4%) (figure 4) followed by *Trichophyton mentagrophytes* (30.35%). Maximum KOH and culture positivity was seen in tinea corporis (93.5% and 61.3% respectively) followed by tinea unguim (80% and 45% respectively) Table 4 depicts clinic mycological correlation of dermatophytoses. The most common isolate was *Trichophyton rubrum* mainly isolated from cases of tinea corporis and tinea unguim followed by *Trichophyton mentagrophytes* which was mostly isolated from cases of tinea corporis and tinea cruris.

DISCUSSION

In the present study of 100 clinically diagnosed cases of dermatophytic infections majority of the patients seen were in the age group of 21-30 years (27%) followed by 31-40 years (23%) and 41-50 years (15%). This may be due to greater mobility of this age group and the potential for contact with other patients, making them prone to infection. The infection being common in third followed by fourth decade is in concordance with various other studies from India and abroad.^[1,5] In contrast, a study from Jaipur, India found 5-10 years as commonest age group for dermatomycoses^[6] while in another

Table 1: Distribution of patients according to the age-groups and gender						
Age group (in years)	Female		Male		Total	
	No.	%age	No.	%age	No.	%age
Less than 10	3	42.9%	4	57.1%	7	100.0%
11-20	4	40.0%	6	60.0%	10	100.0%
21-30	12	44.4%	15	55.6%	27	100.0%
31-40	15	65.2%	8	34.8%	23	100.0%
41-50	6	40.0%	9	60.0%	15	100.0%
51-60	2	16.7%	10	83.3%	12	100.0%
More than 60	2	33.3%	4	66.7%	6	100.0%
Total	44	44.0%	56	56.0%	100	100.0%

Table 2: Clinical types of Dermatophytic Infections		
Type of Dermatophytic Infection	No. of patients (n=100)	Percentage (%age)
Tinea corporis	31	31.0
Tinea unguium	20	20.0
Tinea corporis et cruris	13	13.0
Tinea cruris	10	10.0
Tinea faciei	5	5.0
Tinea capitis	7	7.0
Tinea cruris et corporis et faciei	4	4.0
Tinea pedis	4	4.0
Tinea corporis et faciei	2	2.0
Tinea pedis et manuum et unguium	2	2.0
Tinea manuum	1	2.0
Tinea barbae	1	1.0
Total	100	100.0

Table 3: Correlation of KOH examination with growth on SDA						
KOH findings (n=100)	Culture (n=100)				Total	
	Negative (n=44)		Positive (n=56)			
	No.	%age	No.	%age	No.	%age
Negative (n=22)	16	94.1%	1	5.9%	17	100.0%
Positive (n=78)	28	33.7%	55	66.3%	83	100.0%
Total	44	44.0%	56	56.0%	100	100.0%

Table 4. Clinicomycological correlation of dermatophytosis				
Clinical diagnosis	KOH results	Culture results		
		<i>Trichophyton rubrum</i>	<i>Trichophyton mentagrophytes</i>	No Growth
Tinea corporis (n=31)	29	13	6	12
Tinea unguium(n=20)	16	6	3	11
Tinea corporis et cruris (n=13)	13	8	5	0
Tinea cruris (n=10)	8	5	1	4
Tinea faciei (n=5)	3	2	0	3
Tinea capitis (n=7)	3	1	0	6
Tinea cruris et corporis et faciei (n=4)	4	1	1	2
Tinea pedis (n=4)	3	1	1	2
Tinea corporis et faciei (n=2)	2	2	0	0
Tinea pedis et manuum et unguium (n=2)	2	1	0	1
Tinea manuum (n=1)	0	0	0	1
Tinea barbae (n=1)	0	0	0	1
Total	83	26	17	43



Figure 1- Tinea circinata in a 30 year old male



Figure 2- Tinea unguium of bilateral toenails



Figure 3- KOH mount showing hyaline septate hyphae

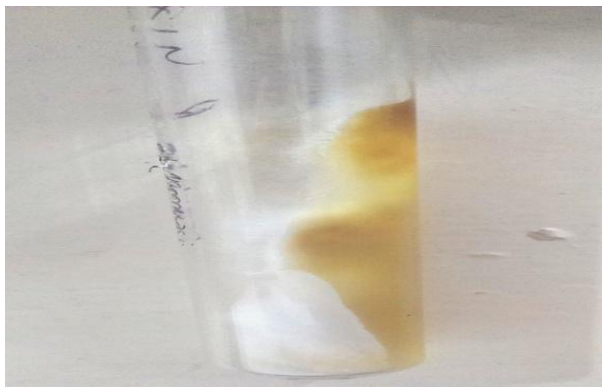


Figure 4- White cottony colony of *Trichophyton rubrum* on SDA medium

study by C M Gupta *et al*, most common age for dermatomycoses was above 60 years of age^[7] In our study, males (56/100) outnumbered females (44/100), supporting the male preponderance seen in most of the studies done earlier also^[8] This could be due to the fact that males are more involved in the outdoor physical activities and wear occlusive footwear which leads to excessive sweating making a favorable environment for the fungus to grow. Amongst different age groups affected, most of the patients were in adult age group i.e. 21-60 years constituting 77% cases. Most of the cases of tinea capitis (6/7) were seen in younger age group, 66.6% below 10 years and 28.6% between 11-20 years and 1 case was seen in an adult female.(figure 1).These findings are in agreement with studies by other workers.^[9] Various factors explaining tinea capitis in younger age group includes their immature immune system, enhanced exposure to subclinical infection carriers in the school and at home, inability to maintain hygiene, hence making them prone to repeated and frequent trauma.The hot and humid climate of Indian subcontinent is highly favorable

for the acquisition of fungal infections. Maximum number of cases (40%) in our study were seen in the summer season. Similarly, more cases in hot and humid months of year have been reported by Rangnathan S *et al*.^[10] Our study comprised more of urban patients (71%) as compared to patients from rural background (29%). This can be attributed to the fact that our institute is a tertiary care hospital, situated in a city. Therefore, most the people attending outpatient department are from urban background. Similar findings have been reported by in a study from Shimla.^[8] Urban people seek medical advice sooner due to more awareness and easy accessibility of medical care. While in rural areas, early lesions are neglected and only chronicity forces people to seek medical advice.^[11] An infected family member is also an important source of infection in superficial mycoses. In our study, family history of superficial fungal infections was seen in 33 % cases. Insanitary conditions and sharing of fomites within the family contributes to the spread of infection.^[1] (figure 2). A study by Kalla *et al* also reported positive family history in 29% cases.^[12] This confirms dermatophytic infections are transmitted from person to person by sharing common household clothes. In our study, overall KOH positivity and culture positivity was 83% and 56% respectively. Fifty five cases were both KOH and culture positive while sixteen were negative on both microscopy and culture. One case was diagnosed negative in KOH preparation but was culture positive. Various other studies revealed KOH positivity rates ranging from 49% to 100% and culture positivity ranging from 20.15 % to 79.1%.^[9,13] Results of the present study compare well with the other studies. *Trichophyton rubrum* (46.4%) was the commonest dermatophyte isolated in the present study followed by *Trichophyton mentagrophytes* (30.4%) (figure 3 and 4). This is in accordance with the other studies.^[7,14] However Aruna Vyas *et al* found *Trichophyton violaceum* followed by *Microsporum audouinii* as the commonest dermatophyte^[6] whereas U S Aggarwal *et al* observed *Trichophyton mentagrophytes* as most common dermatophyte.^[5] Tinea corporis showed culture positivity of 61.3% with most common isolate being *Trichophyton rubrum* followed by *Trichophyton mentagrophytes*.. Out of the 20 cases of tinea unguis, culture positivity rate seen was 45%. Only 1 out of 7 cases of tinea capitis was positive on culture and fungus isolated was *Trichophyton rubrum*, however KOH positivity rate was 42.9%. Tinea corporis et cruris and Tinea corporis et faciei

cases showed 100% KOH and culture positivity. The epidemiology of dermatophytoses may change with time and studies like this provide information on the current status of the disease in a particular area. This study has given us insight regarding the mycological pattern of dermatophytoses in this region of North India

CONCLUSION

The study highlighted tinea corporis as the most common clinical pattern of dermatophytosis followed by tinea unguium. Predominant causative fungal species isolated was *Trichophyton rubrum* followed by *Trichophyton mentagrophytes*. The overall findings of our study match with many studies done across India. Good personal hygiene and sanitary conditions can prevent further spread of infection.

REFERENCES

1. Sumathi S, Mariraj J, Shafiyabi S, Ramesh R, Krishna S. Clinicomycological study of dermatophytes. *Int J Pharm Biomed Res.* 2013;4:132-4.
2. Hay RJ, Ashbee HR. Mycology. In: Burns T, Breathnach S, Cox N, Griffiths C, editors. *Rook's textbook of Dermatology*. Vol. 2, 8th ed. Wiley: Blackwell; 2010. p. 36.1-93
3. Sharma M, Sharma R. Profile of dermatophytic and other fungal infections in jaipur. *Indian J Med Microbiol.* 2012;52:270-4.
4. Fisher F, Cook NB. Reagents, stains, Media, and Methods. In: *Fundamentals of Diagnostic Mycology*. Philadelphia: WB Saunders; p.330.
5. Agarwal US, Saran J, Agarwal P. Clinicomycological study of dermatophytes in a tertiary

care centre in Northwest India. *Indian J Dermatol Venereol Leprol.* 2014;80:194.

6. Vyas A, Pathan N, Sharma R, Vyas L. A Clinicomycological Study of Cutaneous Mycoses in Sawai Man Singh Hospital of Jaipur, North India. *Ann Med Health Sci Res.* 2013;3:593-7
7. Gupta CM, Tripathi K, Tiwari S, Rathore Y, Nema S, Dhanvijay AG. Current trends of clinicomycological profile of dermatophytosis in central India. *IOSR-JDMS.* 2014;13:23-6.
8. Bhagra S, Ganju SA, Kanga A, Sharma NL, Guleria RC. Mycological Pattern of Dermatophytosis in and Around Shimla Hills. *Indian J Dermatol.* 2014;59:268-70.
9. Sen SS, Rasul ES. Dermatophytosis in Assam. *Ind J Med Microbiol.* 2006;24:77-8.
10. Ranganathan S, Menon T, Selvi SG, Kamalam A. Effect of socio-economic status on the prevalence of dermatophytosis in Madras. *Indian J Dermatol Venereol Leprol.* 1995;61:16-8.
11. Prasad PV, Priya K, Kaviarasan PK, Aanandhi C, Sarayu L. A study of chronic dermatophyte infection in a rural hospital. *Indian J Dermatol Venereol and Leprol.* 2005;71:129-30.
12. Kalla G, Begra B, Solanki A, Goyal A, Batra A. Clinicomycological study of tinea capitis in desert district of Rajasthan. *Indian J Dermatol Venereol Leprol.* 1995;61:342-5.
13. Bindu V, Pavithran K. Clinico-mycological study of dermatophytosis in Calicut. *Indian J Dermatol Venereol Leprol.* 2002;68:259-61.
14. Lakshmanan A, Ganeshkumar P, Mohan SR, Hemamalini M, Madhavan R. Epidemiological and clinical pattern of dermatomycoses in rural India. *Indian J Med Microbiol.* 2015;33:S134-6.

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