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Research Article

Clinicomycological Profile of Dermatophytosis in a Tertiary Care Hospital in Western India

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Abstract: Dermatophytosis refers to superficial fungal infection of keratinized tissues, caused by dermatophytes. Although common, the precise size of the problem defies measurement. The present study was aimed to assess the clinicomycological profile of dermatophytosis, to identify the various infecting dermatophyte species and to compare clinical diagnosis with KOH microscopy and culture. A total of 300 clinically diagnosed cases of dermatophytosis were subjected to KOH microscopy and fungal culture. Most common clinical presentation observed was Tinea corporis (42%) followed by Tinea cruris (28%). Mixed clinical type was observed in 3.3% of the patients. Including mixed clinical types, a total of 310 clinical types were encountered. Out of 310 clinical types, 225 (72.6%) were positive on KOH microscopy and 208 (67%) were positive on culture. Young males in the age group of 21 to 30 years were most commonly affected. Trichophyton rubrum (59.6%) was the most common fungal isolate followed by T. mentagrophytes (26%) and E. floccosum (10.6%). Dermatophytosis is not uncommon in our setup. Early diagnosis is essential to prevent transmission of infection. Identification up to species level is necessary for epidemiological purpose and some dermatophytes are resistant to azole derivatives.
Keywords: Dermatophytosis, Tinea. Corporis, Trichophyton rubrum

INTRODUCTION:

Infectious diseases, particularly those involving the skin & mucosal surfaces, are a serious problem all over the world due to deficient sanitation & education. An important group of these skin pathogens are fungi [1]. Recently there has been an increase in the incidence of fungal infections. This increase may be a result of frequent usage of antibiotics, immunosuppressive drugs and various conditions like organ transplantations, lymphomas, leukaemia and human immunodeficiency virus (HIV) infections [2].

Dermatophytosis refers to superficial fungal infection of keratinized tissues, caused by dermatophytes. Although common, the precise size of the problem defies measurement [3]. The present study was undertaken to assess the clinico-mycological profile of dermatophytosis, to identify various species of dermatophytes by using different methods and to compare the clinical diagnosis with KOH smear & culture.

MATERIAL & METHODS:

Three hundred clinically diagnosed patients with dermatophytic infections attending the outpatient department of Dermatology & Venereology of the general hospital were studied clinico-mycologically in the present study. A detailed history was taken from all patients. It included age sex, socio-economic status, occupation, duration of disease, history of recurrence and habits. History of similar illness in family members and contact with animals or soil was also noted.

Skin scrapings, nail clippings and hair were the specimens collected. Lesions were thoroughly cleaned with 70% alcohol before collection of specimens. Skin scrapings were collected from the active border of the lesion. In tinea capitis, infected, brittle, lusterless hairs were collected. In tinea unguium, nail clippings, nail scrapings & the sub-ungual debris were collected.

Microscopic examination was done using 10% KOH for skin scrapings and hair and using 40% KOH for nail clippings and scrapings to demonstrate hyphal segments in skin scales & nail clippings , or either ectothrix or endothrix invasion of infected hairs. The specimens were inoculated on two slopes of Sabouraud's Dextrose Agar with chloramphenicol & cycloheximide & on Dermatophyte test medium. Slopes were examined regularly for growth for a period of three weeks. Slopes with no growth at three weeks were discarded.

Growth was observed and noted with respect to surface, texture, pigment (obverse as well as reverse). Identification was done by making lactophenol cotton blue mounts, slide culture, urease test, nutritional tests and hair perforation test.

RESULTS:

A total of 300 clinically diagnosed patients of dermatophytosis were subjected to mycological study. Of these, 68% of the patients (206) were male & 32% of patients (96) were female. The maximum cases were seen in the age group of 21-30 years (34%). Least number of cases were seen at the extremes of age, 3 % of cases falling in the 0-10 year age group and 2% of cases in the above 70 age group. Majority of the patients were from low socio-economic group. Distribution of dermatophytosis by clinical type is shown in table no.1.

Table-1: Distribution of Cases of dermatophytosis by clinical type

Clinical Type	Total No. of Cases	Percentage (%) n = 300
Tinea corporis	126	42
Tinea cruris	84	28
Tinea unguium	36	12
Tinea capitis	21	7
Tinea pedis	10	3.4
Tinea mannum	07	2.3
Tinea faciei	06	2
(Cases with Multiple Clinical Types = 3.3%)		
Tinea corporis + Tinea cruris	4	1.3
Tinea corporis + Tinea faciei	4	1.3
Tinea corporis + Tinea unguium	2	0.7
Total	300	100

Mixed clinical types were seen in 3.3% of patients. Hence the total number of clinical types is higher than the total number of patients. Table 2 shows distribution of clinical types.

Table-2: Distribution of Clinical Type

Clinical Type	Total No. of Types	Percentage (%) n = 310
Tinea corporis	136	43.9
Tinea cruris	88	28.4
Tinea unguium	38	12.3
Tinea capitis	21	6.8
Tinea pedis	10	3.2
Tinea faciei	10	3.2
Tinea mannum	07	2.2
Total	310	100

Thus, we have collected 251 specimens from skin, 21 from hair and 38 from nail. Therefore, from 300 cases of dermatophytosis, we have collected 310 specimens from various Clinical Types.

Table-3: Correlation of results between KOH and Culture Examination

	KOH positive	KOH negative	Total
Culture positive	194	14	208 (67%)
Culture negative	31	71	102 (32.9%)
Total	225 (72.6%)	85 (27.4%)	310 (100%)

Overall KOH positivity was 72.6% & culture positivity was 67%. Out of 310 specimens, 14 were negative by KOH but yielded growth on culture, while 31 though showed fungal element on KOH but did not grow on culture.

Table- 4: Clinico-mycological Correlation in Cases of Dermatophytosis

Clinical Type	Total no. of specimens	KOH Positive	Culture Positive	KOH +ve Culture +ve	KOH +ve Culture–ve	KOH –ve Culture +ve	KOH –ve Culture – ve
Tinea corporis	136	103	99	90	13	09	24
Tinea cruris	88	62	59	54	08	05	21
Tinea unguium	38	26	22	22	04	-	12
Tinea capitis	21	15	11	11	04	-	06
Tinea pedis	10	08	08	08	-	-	02
Tinea faciei	10	05	03	03	02	-	05
Tinea mannum	07	06	06	06	-	-	01
Total	**310**	**225**	**208**	**194**	**31**	**14**	**71**

194 out of 310 total clinical types were diagnosed by both microscopies as well as culture technique. KOH microscopy alone could confirm 31 extra types and culture alone 14 extra types. All the specimens of tinea pedis & tinea faciei, positive by KOH were also positive by culture showing 100 % correlation in microscopy & culture. Using both KOH and culture techniques for diagnosis, tinea corporis, tinea cruris and tinea unguium could not be diagnosed mycologically in 24 out of 136, 21 out of 88 and 12 out of 38 clinical types respectively. Thus 71 out of total 310 types could not be detected mycologically by both the techniques.

Table-5: Clinical Specimen wise Distribution of Dermatophyte Species

Site of Infection	No. of Specimens (n)	KOH positive	Culture positive	T. rubrum	T. mentagro -phytes	T. violac eum	M. canis	M. gypseu m	E. floccosu m
Skin	251	184 (73.3%)	175 (69.7%)	102	43	03	03	02	22
Hair	21	15 (71.4%)	11 (52.4%)	05	06	**-**	**-**	**-**	**-**
Nail	38	26 (68.4%)	22 (57.9%)	17	05	**-**	**-**	**-**	**-**
Total	**310**	**225 (72.6%)**	**208 (67%)**	**124**	**54**	**03**	**03**	**02**	**22**

KOH technique held almost good for all the three specimens i.e. skin, hair and nail. Culture positivity was more for skin (69.7%) compared to hair (52.4%) and nail specimens (57.9%). Hair and nail infection were caused mainly by Trichophyton rubrum and Trichophyton mentagrophytes. Whereas, all the three dermatophyte species were isolated from skin specimens.

Table-6: Clinical Type wise Distribution of Strains of Dermatophytes

Clinical Type	No. of Specimens (n)	Culture Positive	T. rubrum	T. mentagr o-phytes	T. violace um	M. canis	M. gypseum	E. floccosu m
Tinea corporis	136	99	76	15	02	01	01	04
Tinea cruris	88	59	23	20	01	02	01	12
Tinea unguium	38	22	17	05	-	-	-	-
Tinea capitis	21	11	05	06	**-**	**-**	**-**	**-**
Tinea pedis	10	08		04	-	-	-	04
Tinea faciei	10	03	03		-	-	-	-
Tinea mannum	07	06		04	-	-	-	02
Total	**310**	**208**	**124 (59.6%)**	**54 (26%)**	**03 (1.4%)**	**03 (1.4%)**	**02 (1%)**	**22 (10.6%)**

Most commonly isolated dermatophyte species were T.rubrum, T. mentagrophytes followed by E. floccosum. T.rubrum and T. mentagrophytes species were mainly isolated from almost all the clinical types. E. floccosum was mainly isolated from Tinea corporis, Tinea cruris, Tinea pedis and Tinea mannum clinical

types. Tinea unguium and Tinea capitis were caused by T.rubrum and T. mentagrophytes.

Table-7: Distribution of Dermatophyte Species

Dermatophyte	No. of Isolates	Percentage
Trichophyton	Total 181 Isolates	87 %
• T. rubrum	124	59.6%
• T. mentagro-phytes	54	26%
• T. violaceum	03	1.4%
Epidermophyton	Total 22 Isolates	10.6 %
• E. floccosum	22	
Microsporum	Total 5 Isolates	2.4 %
• M. gypseum	03	1.4%
• M. canis	02	1%
Total Isolates	208	100%

Of the total 208 dermatophyte isolates, 87% were Trichopyton species, 10.6% were Epidermophyton floccosum and 2.4% were Microsporum species. Overall, T. rubrum was the major isolate (59.6%) followed by T. mentagrophytes (26%), E. floccosum (22%), T. violaceum (1.4%), M. gypseum (1.4%) and M. canis (1%) in decreasing order of frequency of isolation.

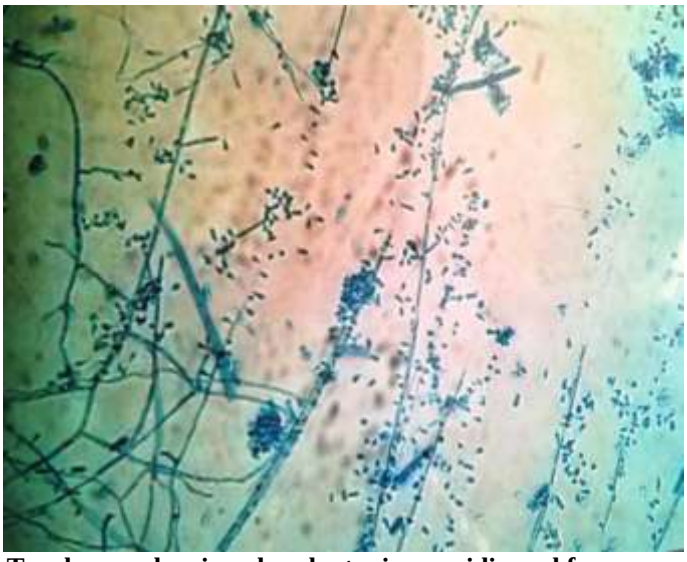

Fig 1: LPCB mount of T. rubrum: showing abundant microconidia and few macroconidia (100X, LPCB-Lactophenol Cotton blue) (original)

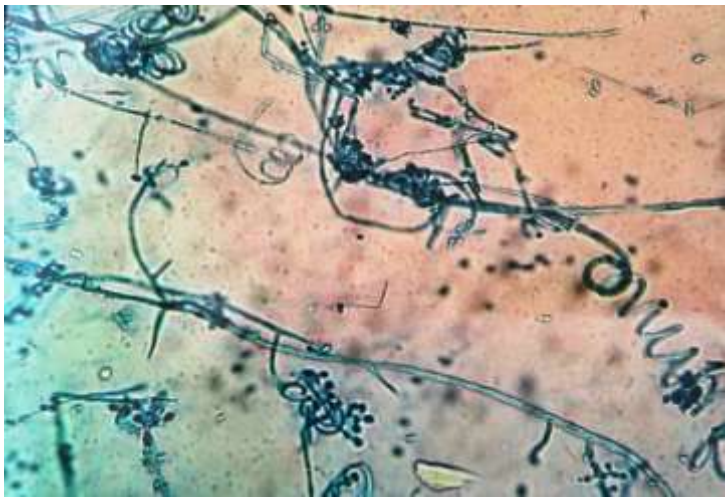

Fig 2: LPCB mount of T. mentagrophyte showing spiral hyphae (100x) (original)

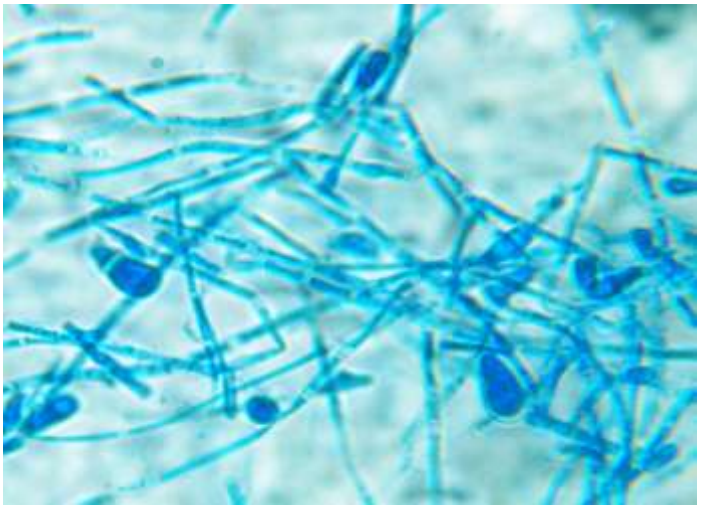

Fig 3: LPCB mount of E. floccosum showing club shaped macroconidia and absence of microconidia (100 xs) (original)

DISCUSSION:

Dermatophytosis is a common disease in tropical countries due to factors like heat and humidity. India is large subcontinent with remarkably varied topography, situated within the tropical and subtropical belts of the world. Its climate is conductive to the acquisition and maintenance of mycotic infections [4]. The present study carried out in Western India, comprised of 300 clinically diagnosed cases of dermatophytosis. Male to female ratio in this study was 2.1:1. The similar ratio was reported by Sahai et al. [5] A study from North India reported a ratio of 1.5:1[6]. Male preponderance was reported by many workers.[3,5,6,7] The maximum cases (34%) were seen in the age group of 21-30 years. The higher incidence in young males could be due to greater physical activity and increased sweating. [3, 7].

The reason for less infection in higher ages can be justified as cellular immunity system perfection and the skin fatty acid augmentation [8]. Majority of the patients in the present study were from low socio-economic group. Similar finding was reported by other workers [4,9]. The reason behind this may be living condition, large family size and close contact, either directly or by sharing facilities including combs and towels is common between family members in low socio-economic group.[4] In this study, history of contact with infected family members was observed in 4.2% of the patients. Such history was present in 3.09% of patients in one study reported by Kamothi et al [4] where as Bindu et al reported 16.6% in their study[3].

In this study, Tinea corporis was the common clinical type in 42% patients followed by Tinea cruris (28%). (Table 1) Similar findings were reported by many other workers. [3, 4,7,10,11,12] Less aeration due to tight clothing, maceration and high rate of sweating in groin area and waist region make this site more vulnerable to dermatophytosis.[4] Tinea capitis was seen predominantly in children in the present study. This is in agreement with the other workers.[3,4,7,11,13] Children have frequent shaving of scalp and sharing of caps.[3] They have immature immune system and enhanced exposure to subclinical infection carriers in the school and at home. They are unable to maintain hygiene, hence prone to repeated and frequent trauma and till puberty the lack of effective fungisitic activity of sebum. [13].

In the present study, Tinea unguium was mainly seen in female patients. Other clinical types noted were Tinea pedis, Tinea faciei and Tinea mannum. Mixed clinical type was observed in 3.3% of the patients. (Table 1). In this study, results of KOH microscopy and culture were almost comparable. (KOH positivity of 72.6% Vs Culture positivity of 67%). (Table 3 and 4)This indicates the correlation and importance of both the techniques in the mycological diagnosis of dermatophytosis. A study from Jaipur reported the KOH positivity rate of 72.5% and culture positive rate of 58.3%.[7] Highest KOH microscopy positive rate of 84.6% and of 89.6% and highest isolation rate of 80% and of 83% were reported by Agarwal et al [12] and Sahai et al [5] respectively.

In the present study, 27.4% types could not be detected by KOH microscopy. (Table 3 and 4)This could be due to minimal scaling in the lesion. [14] 32.9% clinical types were negative on culture. This might be due to bacterial contamination or delay in processing the specimen in the laboratory.

In the present study, although the isolation rate was maximum for skin specimens (69.7%) compared to hair and nail, a quite considerable i.e. 57.9% isolation rate was recorded from nail specimen (Table 5). This could be because of combination of three methods of nail clipping, shaving and collection of sub-ungual debris to increase the isolation of fungus from nail as advocated by Hull and co-workers [15]. In this study, Trichophytonn rubrum was the most common fungal

isolate accounting for 59.6% of total isolates followed by T. mentagrophyte (26%). (Table 6, 7) Similar findings were recorded by other co-workers [3, 4, 7, 10, 11, 14]. George has suggested that both the predominantly chronic nature of infection and adaptation of dermatophyte to the human skin can explain the higher predominance of T. rubrum in India.[16] In contrary, Microsporum audouinii and T. mentagrophyte as a predominant dermatophyte were reported from North India and Nortwest India respectively[6,12]. In the present study, isolation rate of E. floccosum was 10.6%. A study from Rajkot reported E. floccosum isolation in 8.2% patients [4] and other study reported 9.4% isolation [8].

CONCLUSION:

To conclude, there is evidence that predominance of species of dermatophytes not only differs from region to region but may change with the passage of time. Because of contagious nature of dermatophytosis, an early diagnosis is needed. Some of the species of dermatophytes show slower response to azole derivatives. So it is important to perform the speciation.

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