



Original article

Clinico-microbiological study of dermatophytosis in a tertiary care institute in Northern India

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ABSTRACT

Introduction: Dermatophytoses is predominantly a tropical dermatosis but there is a current upsurge of complicated dermatophytosis in India. Various cross-sectional studies have been conducted on dermatophytic infections across India noted an increase incidence of dermatophytosis in the last decade. At present there is a dearth of clinical evidence regarding the trend of dermatophytosis in India. **Material and methods:** A retrospective analysis of data collected from the clinical records of 207 patients of clinically suspected dermatophytoses over a period of 12 months. Their clinico demographic profile, KOH and fungal culture details were obtained. **Statistical Analysis Used:** Statistical analysis was done using SPSS 17.0 software. **Results:** Out of total 207 patients, male predominance was noted with a male to female ratio of 2.1:1. Maximum number of cases were from the age group 16 to 30 years. 73.4 % had two or more site involvement, this was followed by *Tinea cruris* (11.6%), *Tinea corporis* (8.2%), *Tinea manuum* (1.9%), *Tinea pedis* (1.9%), *Tinea capitis* (1.5%), *Tinea faciei* (1.5%). 48.3% had a positive KOH mount and 25.1% had positive culture results. *T. mentagrophytes* was isolated in 17.9 %, *T. rubrum* in 5.8%, *Microsporum gypseum* in 0.9%, *Trichophyton verrucosum* 0.5%. **Conclusion:** This study highlights the change in clinical pattern of dermatophytosis and emergence of *T. Mentagrophyte* as a causative agent.

KEYWORDS: Dermatophytoses, clinicomicrobiological study, North India.

INTRODUCTION

Dermatophytes are one of the leading causes of acute and chronic illness with high morbidity. Unlike other pathogens, dermatophytes can cause infections in immune-competent individuals also. Direct contact with the infected patients can lead to rapid spread in community. Dermatophytosis is predominantly a tropical dermatosis but in past few years, there is a current upsurge of complicated dermatophytosis in India. It is more prevalent in tropical and subtropical countries where heat and moisture play an important role. Also, low personal hygiene and direct contact with infected persons can cause a rapid spread in the community [1].

Dermatophytosis is caused by a group of closely related keratinophilic mycelia fungi belonging to genera *Trichophyton* followed by *Microsporum*, and *Epidermophyton*. Dermatophytes have been recorded all

over the world but with variation in distribution, incidence, epidemiology, clinical spectrum and target hosts from one location to another. The foremost reason may be differences in climate (temperature, humidity, wind, etc.), overcrowding, health care, immigration, environmental hygiene, culture, and socioeconomic conditions [2]. Prevalence of dermatophytosis has increased over the past 4–5 years across the country. Numerous studies on dermatophytic infections from multiple regions have revealed an increasing trend of dermatophytosis [3-8].

At present there is a dearth of clinical evidence regarding the trend of dermatophytes in India. This study is being conducted to observe the prevalence along with clinical and demographic profile of dermatophytes in Garhwal region of Uttarakhand state as only few studies have been reported from this region till date.

Aims and objectives-

To study the demography, clinical spectrum and mycological species identification of dermatophytic infections.

MATERIALS AND METHODS

A retrospective analysis of data collected from the clinical records of 207 patients of clinically suspected dermatophytoses over a period of 12 months (March 2016 to Feb 2017) were collected in department of dermatology AIIMS ,Rishikesh after obtaining approval from the institutional ethical committee Data regarding clinico - demographic profile, KOH and fungal culture were obtained.

Collection and Processing of Samples:

After cleaning the affected area with 70 % alcohol, samples from skin,scalp,nails and skin scrapings were collected in a brown paper[2x 12 cm]. Samples were taken from advancing borders and edges of infection with blunt scalpel.

All the samples were inoculated on to modified Sabouraud's Dextrose Agar [SDA] slants enriched with chloramphenicol [0.05 mg/ml] [Hi media] and incubated for 6 weeks. Cultures without any apparent fungal growth after 6 weeks were treated as culture negative and discarded.All samples

collected were kept in micro-centrifuge tubes containing 10 % KOH and 20 % KOH for skin, hair scrapings and nail respectively for 1-2 hour and were observed under low power and high power objectives.

Further identification was done by macroscopic and microscopic observation of culture isolates by examining the surface morphology, texture, and pigmentation on the obverse and reverse side of tube. Lactophenol cotton Blue (LCB) staining was done from each culture positive sample to observe mycelial type, conidial arrangement [macro and micro conidia] to differentiate between various species and genera among Dermatophytes.

The statistical analysis was done using SPSS 17.0 software.

RESULTS

Out of 207 cases, 140 (68 %) were males and 67 (32%) were females as shown in table1.Male to female ratio was 2.1:1. The prevalence of dermatophyte infections was higher in the age group 16 to 30 years with 105 cases (50.7%) and least was in below 15 years age group with 20 cases (9.7%).Majority of the patients had less than 5 skin lesions (38.6%), followed by patients with 5-10 lesions (32.9%) and least were with more than 10 skin lesions(28.5%) [Table 2].

Table 1: Gender and age-wise distribution of the involved cases (n=207)

Age in years	Male (n=119)	Female (n=86)	Total
< 15 years of age	12	8	20
16-30 years of age	71	34	105
31-45 years of age	45	12	57
>45 years of age	12	13	25
Total	140	86	207

Table 2: Distribution of cases according to number of lesions (n=207)

Number of cases	Number of lesions		
	< 5 lesions	5-10 lesions	>10 lesions
	80	68	59

Table 3: Distribution of Mixed clinical dermatophytoses (n=152)

Clinical types	Number of cases	Percentage
<i>T. Corporis</i> + <i>T.cruris</i>	92	44.5%
<i>T. Corporis</i> + <i>T. Faciei</i>	3	1.5%
<i>T. Corporis</i> + <i>T. Cruris</i> + <i>T. Faciei</i>	39	18.8%
<i>T. Cruris</i> + <i>T. Faciei</i>	4	1.9%
<i>T. Pedis</i> + <i>T. Ungum</i>	1	0.5%
<i>T. Corporis</i> + <i>T. Cruris</i> + <i>T. mannum</i>	5	2.4%
<i>T. corporis</i> + <i>T. Pedis</i>	1	0.5%
<i>T. Corporis</i> + <i>T.Cruris</i> + <i>T. Ungunum</i>	1	0.5%

<i>T.mannum</i> + <i>T.Pedis</i> + <i>Onychomycosis</i>	1	0.5%
<i>T. faciei</i> + <i>T. mannum</i>	1	0.5%
<i>T. Cruris</i> + <i>T. Mannum</i> + <i>T. pedis</i>	1	0.5%
<i>T. Pedis</i> + <i>Onychomycosis</i>	2	0.9%
<i>T.corporis</i> + <i>T.cruis</i> + <i>T. Mannum</i> + <i>Onychomycosis</i>	1	0.5%

Out of 207 cases, 73.4% (n=152) had mixed type infection with multiple sites involvement Whereas, only 26.6 % (n=55) cases had single site involvement [Table 3]

Among 55 cases, predominant was *Tineacruris* (n=24, 11.6%) followed by *Tineacorporis* (n=17,

8.2%), *Tineamannum* and *Tineapedis* (n=4, 2%), *Tineacapitis* (n=3, 1.5 %) and *Tineafaciei* (n=3, 1.5%) [Table 4]. There were no isolated cases of *Tineaunguium*.

Table 4: Gender wise distribution with respect to clinical types (n=207)

Clinical type	Male (%)	Female (%)	Total
<i>Tineacorporis</i>	10 (4.8%)	7 (3.4%)	17
<i>Tineacruris</i>	19 (9.2%)	5 (2.4%)	24
<i>Tineafaciei</i>	2 (0.9%)	1 (0.5%)	3
<i>Tineamannum</i>	3 (1.5%)	1 (0.5%)	4
<i>Tineapedis</i>	3 (1.5%)	1 (0.5%)	4
<i>Tineacapitis</i>	0	3 (1.5%)	3
<i>Tineacorporis</i> + <i>tineacruris</i>	61 (29.5%)	31 (14.9%)	92
Mixed	42 (20.2%)	18 (8.7%)	60
Total	140	67	207

Table 5: KOH and culture findings

KOH and culture findings	Number of cases (n=207)	Percentage
KOH and Culture positive	36	17.5%
KOH positive and Culture negative	64	30.9%
KOH negative and Culture positive	16	7.7%
KOH and Culture negative	91	43.9%
Total KOH and/ or culture Positive	116	56.1%

Total KOH and/ or culture positivity was seen in 116 cases (56.1%) out of which 100 patients (48.3%) had a positive KOH mount and 52 patients (25.1%) had positive culture results. 36 cases (17.5%) were both KOH and culture positive, 64 cases (30.9%) were KOH positive but culture negative, 16 (7.7%) cases were culture positive but KOH negative and 91 cases (43.9%) were both KOH and culture negative [Table 5]

Out of the 207 specimens inoculated into modified Sabouraud's Dextrose Agar [SDA] slants enriched with chloramphenicol [0.05 mg/ml] [Hi media] and incubated for 6 weeks, 25.1% positive cultures were obtained. Among which *Trichophyton mentagrophytes* was most common with 17.9% yield. *Trichophyton rubrum* was isolated in 12%, *Microsporum gypseum* in 0.9% and least common isolate was *Trichophyton verrucosum* (0.5%). No species of *Epidermophyton* were isolated [Table 6 & 7].

Table 6: Species wise distribution of culture positive cases (n=52)

Species isolated	Number of cases	percentage
<i>Trichophyton mentagrophyte</i>	37	17.9%
<i>Trichophyton rubrum</i>	12	5.8%
<i>Microsporum gypseum</i>	2	0.9%
<i>Trichophyton verrucosum</i>	1	0.5%
Total culture positive	52	25.1%

Table 7: Species wise distribution of Dermatophytes with their clinical presentation

	Number of cases (%)	Culture positive isolate (%)	<i>T. mentagrophyte</i>	<i>T. rubrum</i>	<i>M. gypseum</i>	<i>T. verrucosum</i>
<i>T. corporis</i>	17(8.2%)	5 (2.4%)	4 (1.9%)	1(0.5%)	0	0
<i>T. cruris</i>	24(11.6%)	5(2.4%)	3 (1.5%)	1(0.5%)	1(0.5%)	0
<i>T. faciei</i>	3(1.5%)	0	0	0	0	0
<i>T. mannum</i>	4 (1.9%)	1 (0.5%)	1 (0.5%)	0	0	0
<i>T. pedis</i>	4 (1.9%)	0	0	0	0	0
<i>T. capitis</i>	3 (1.5%)	0	0	0	0	0
<i>T. corporis</i> + <i>cruris</i>	92(44.5%)	28(13.5%)	21(10.1%)	7 (3.4%)	0	0
Mixed	60(28.9%)	13(6.3%)	8(3.9%)	3(1.5%)	1(0.5%)	1(0.5%)
Total	207	52	37	12	2	1

DISCUSSION

Epidemiology and clinical spectrum of dermatophyte infections changes with time and differ from region to region especially in large countries like India, so studies are needed to define the magnitude of problem and changing clinico- microbiological trends prevailing in the particular geographical area.

In the present study, dermatophytosis was more common in the age group of 16–30 years (50.7%) with males (67.6%) were more commonly affected than females (32.4%). Male to female ratio was 2.1:1. Studies conducted by U.S. Agarwal [9] *et al.*, Hanumanthappa [10] *et al.*, Gupta [11] *et al.*, Poria [12] *et al.*, Verenkaret *al* and Sumana [13] *et al* also showed a higher prevalence in the same sex and age group. The higher incidence of dermatophyte in young males maybe due to increased physical and outdoor activity leading to more opportunity for exposure.

In the present study, 73.4% of patients had mixed infections with multiple sites involvement. Among those *Tineacorporis* with *Tineacruris* was the commonest type with 92 cases (44.5%), followed by *Tineacorporis* with *Tineacruris* with *Tineafaciei* with 39 cases (18.8%). Our results were in contrast with the studies conducted by Poria *et al.*, Siddappa [14] *et al.*, Bhavsar Hitendra K [15] *et al* and Mathur [16] *et al* where *Tineacorporis* was reported as the most common clinical type while in our study *Tineacorporis* was seen in 8.2% of patients only. The reason behind increased number of mixed cases might be due to low socioeconomic status, poor hygiene, self- treatment for short duration and delay in seeking treatment.

Tineacruris was the second most common clinical type in the present study, seen in 11.6% of patients. Poria *et al.*, Verenkar *et al* and Siddappa *et al* also reported high incidence of *tineacruris*. The reason for this may be because of heat and humidity in our region.

In the present study, *Tineapedis* was seen in 1.9% of cases, which is comparable with studies by Karmakar [17] *et al.* (2%) and Bindu [18] *et al.* (3.3%) and incidence of *Tineamannum* was 1.9% similar to the study conducted by Siddappa [14] *et al* (1.53%).

In the present study, *Tineacapitis* was seen in 1.5% of cases which was in contrast with the studies conducted by Karmakar [17] *et al.* (16.8%), Siddappa [14] *et al* (6.93%). Reason for such a low incidence, as less number of children were recruited in the study. In our study, out of 207 cases, 48.3% had a positive KOH mount and 25.1% had positive culture results. Whereas, 17.5% were both KOH and culture positive, 30.9% were KOH positive but culture negative, 7.7% cases were culture positive but KOH negative. Studies conducted by Siddappa [14] *et al* reported 100% positivity by KOH and 49% positivity by culture. Karmakar [17] *et al* reported 86% positivity by KOH and 41.6% positivity by culture. Huda [19] *et al* reported 57.14 % positive both by KOH and culture and 8 % negative by both methods.

In the present study, the most common culture isolate was *T. mentagrophytes* (17.9%), followed by *T. rubrum* (5.8%), *Microsporium gypseum* (0.9%), *Trichophyton verrucosum* (0.5%). This is in contrast to other studies by Siddappa *et al.*, Bindu *et al.*, Gupta *et al.*, Verenkaret *al.* where *T. rubrum* was the most common culture isolate. In contrast, a study conducted by Agarwal *et al.* reported *T. mentagrophytes* as the most common isolate. The commonest dermatophyte isolated from *tineacorporis*, *tineacruris*, *tineamannum* and mixed infections was also *T. Mentagrophytes*.

In present study *Trichophyton mentagrophytes* has emerged as the predominant pathogen with an increased prevalence in comparison to what was seen in the past. The higher isolation rate of *T. mentagrophytes* observed in this study may be due to changing trends in the prevalence of dermatophyte species in our region.

CONCLUSION

In our study, direct microscopy (KOH examination) shows 48.3% positivity and fungal culture shows 25.1% positivity thus both plays an important role in definitive diagnosis. This study highlighted that mixed dermatophytic infections the commonest clinical presentation of dermatophytes in our region. Among *Trichophyton* species, *T. mentagrophytes* were the most common aetiological agents. Thus our study highlights the changing clinical patterns and mycological species in dermatophytic infections in our region. Therefore, to obtain a true representation of the overall disease pattern of the country more such types of studies should be conducted.

Competing interest: The authors declare that they have no competing interests.

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