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Original Research Article

A preliminary clinico-mycological study of dermatophytes infection

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ABSTRACT

Background: Superficial fungal infections are the most common skin diseases, affecting millions of people throughout the world. Aim of the study was carried out to find, the effect of seasonal variation and socio-economic status on the prevalence of dermatophytes.
Methods: A total of fifty clinically suspected cases of dermatophytosis were subjected to mycological studies.
Results: Out of which 32 (64%) were culture positive Tinea corporis was the most common clinical type followed by Tinea cruris. *Tricophoton rubrum* 17/32 (53.12%) was the most common isolate followed by *T. mentagrophytes* 9/32(28.12%), *T. tonsurans* 3/32(9.37%), *T. verrrucosum* 2/32(6.25%) and *T. schoenleinii* 1/32(3.12%). Most of the patients belonged to the middle socio-economic group (28/50) followed by lower socio-economic group (19/50) maximum cases of dermatophytosis were reported from June to August revealing the fact that hot and humid weather during the monsoons has a great impact on the occurrence of dermatophytosis.
Conclusions: It may therefore be concluded that dermatophytosis is now a days a serious public health problem in view of its high occurrence in the world wide population.

Keywords: Dermatophytes, Mycology, Superficial fungus

INTRODUCTION

Superficial fungal infections are the most common skin diseases; affecting millions of people throughout the world.[1] Dermatophytosis is a colonization of the keratinized tissues that is the nails, the hair and the skin by a dermatophytic fungus which typically do not penetrate the mucus membranes of the body. It is caused by dermatophytic fungal species of *Trichophyton*, *Microsporum* and *Epidermophyton*.[2] Dermatophytes are assuming greater significance both in developed and developing countries particularly due to the advent of immunosuppressive drugs and diseases.[3] Dermatophytosis is common in tropical countries like India and may reach epidemic proportions in areas with high rate of humidity and over population and poor hygienic conditions.[4-5] Although dermatophytosis does not cause mortality, it does cause significant morbidity and poses major public health problem cosmetically. Many epidemiological studies have investigated the prevalence of fungi responsible for superficial mycosis in different region world over.[6]

Limited data regarding the prevalence of dermatophytosis from this part of country has prompted us to undertake the present study with the aim to isolate and identify the various aetiological agents of dermatophytosis reporting to a dermatology and venerology section of a tertiary care hospital.

METHODS

The study was carried out in the Postgraduate Department of Microbiology and Dermatology and Venerology, Chhatrapati Shivaji Subharti Hospital, Subharti Medical College, Meerut over a period of one year. A total of 50

patients with clinical suspicion of fungal infection were explained about the study and asked to participate. A verbal consent was taken from all the patients.

The affected area was cleansed with 70% ethyl alcohol swab to remove surface contaminants and topical medication that might be present and then was allowed to dry. As the site of localization of infection differs in the different type of dermatophytosis, the following samples are collected.

SKIN: Skin specimen was collected with the help of a sterile scalpel blade by scrapping the extending erythematous edge along with the normal skin (Figure 1).

NAIL: Fungus in the nail is deep seated particularly at the lateral margin and nail bed. Nail specimen was collected by taking clippings of the infected part (thickened, friable or discoloured areas) (Figure 2).

HAIR: Specimen from the scalp was obtained by scrapping with a blunt scalpel and sample included hair stubs and skin scales (Figure 3).

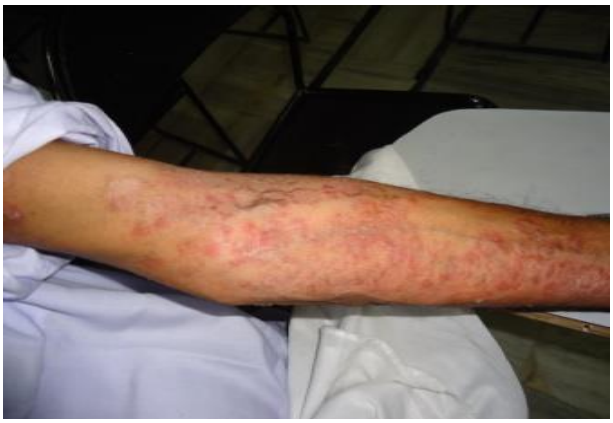

Figure 1: Skin specimen.

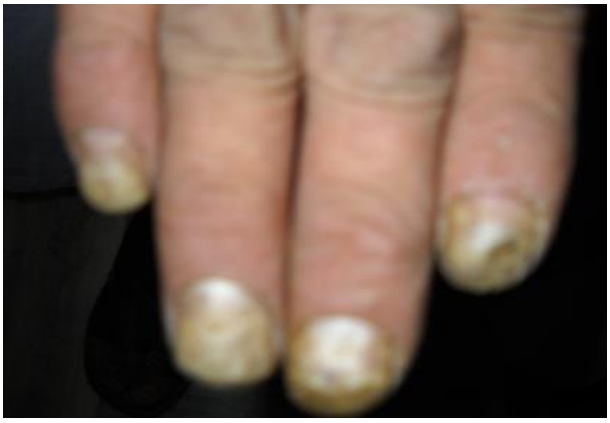

Figure 2: Nail specimen.

The specimens were collected in a piece of stiff black paper and transferred to the laboratory. The chemicals, reagents, stain and media employed in the present study was purchased from HiMedia Laboratories Pvt., Ltd., Mumbai, India.

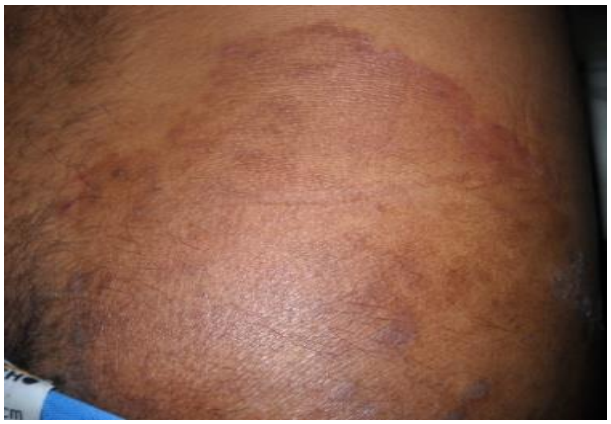

Figure 3: Hair specimen.

Direct microscopy: 20% KOH mount: A drop of 20% KOH was kept on a clean, grease free glass slide. The sample was put in the KOH drop and slide was passed through a burner flame just for warming. The sample was kept in KOH for duration of 1-2hours or till the material was cleared. In case of nails the slide was examined after overnight incubation in a wet chamber. The slide was screened, initially under low power (10X) and then under high power (40X) using simple bright field microscope with the condenser lowered down to enhance the contrast. Slide was scanned for the presence of septate hyphae with branching. Type and arrangement of spore was noticed to name it as ectothrix or endothrix type of infection in case of hair sample (Figure 4).

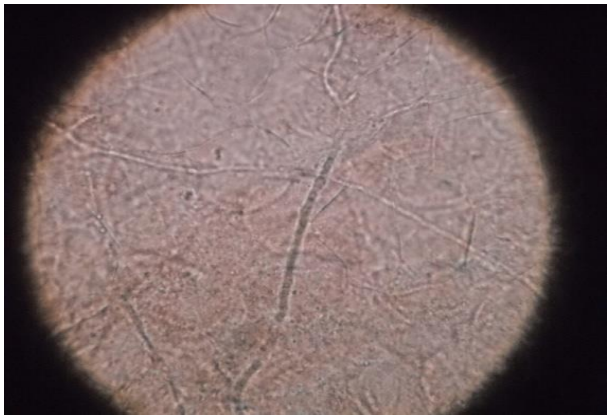

Figure 4: 20% KOH preparation shoeing septate hyphae.

Culture: After direct microscopic examination, irrespective of demonstration of fungal elements, the specimen was inoculated in duplicate into the following media for the isolation of dermatophytes:

- Sabouraud's Dextrose Agar Medium with antibiotics (SDA).
- Dermatophyte Test Medium (DTM).

Fungal isolate was identified by standard mycological technique that is on the basis of colony morphology on SDA, pigmentation, color change of dermatophyte test medium, morphology on Lactophenol Cotton Blue mount (LPCB, Figure 5), urease test and slide culture.

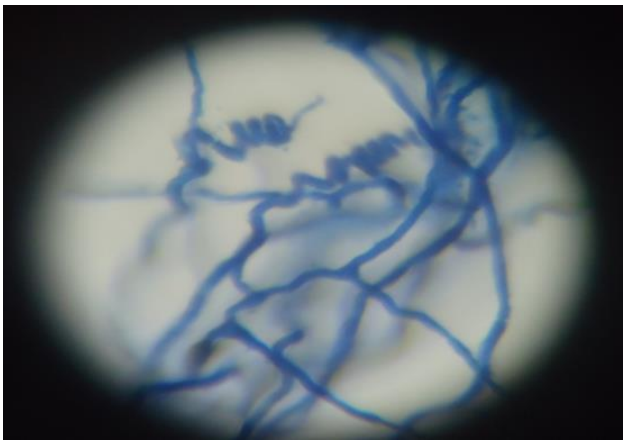

Figure 5: LCB preparation.

Figure 6: A) SDA-Khaki green powdery colonies. B) DTM-depicting colour change. C) Urease test.

Macroscopic examination of culture: The growth on Sabouraud's dextrose agar was examined to study the colony morphology based on following characteristics:

Colony characters: The colour (e.g. white, pearl, ivory, black), consistency (e.g. cottony, fluffy, suede like, wiry) and topography (e.g. flat, folded, plicate, rugose) were noted (Figure 6A).

Colony characters on the reverse: Presence or absence of pigment, whether diffusing or not. Dermatophyte test medium was also examined periodically for color change from yellow to red (Figure 6B).

Microscopic examination of culture: Urease test: This test is to differentiate between *T. mentagrophytes* and *T. rubrum*. Christensen's urea agar slant was inoculated with the test fungus. *T. mentagrophytes* demonstrated the urease activity usually within seven days, changing the colour of the medium to pink. *T. rubrum* isolates were negative for urease test (Figure 6C).

RESULTS

The study enrolled 50 patients of all age groups and out of which 29 patients were found to be positive for dermatophytosis. Distribution of various clinical cases of dermatophytosis was distributed according to the various clinical types as shown in (Table 1). In the present study *Tinea corporis* (19/50) was the most common clinical type followed by *Tinea cruris* (13/50).

Table 1: Distribution of various clinical cases of dermatophytosis (n=50).

Clinical type	Total no of cases
Tinea corporis	19
Tinea cruris	13
Tinea unguium	5
Tinea incognito	1
Tinea capitis	1
Tinea mannum	1
Tinea pedis	7
Tinea faciei	3
Total	50

Correlation of results of direct microscopy and culture is shown in Table 2. Out of 50 clinical cases of dermatophytosis 29/50 (58%) samples were positive by both direct microscopy and culture. However, 8/50(16%) samples, though showed fungal elements on direct microscopy but did not grow on culture.

Table 2: Profile of direct microscopy and culture n=50).

	KOH +VE	KOH –VE	Total
Culture +VE	29	3	32 (64%)
Culture –VE	8	10	18 (36%)
Total	37 (74%)	13 (26%)	50 (100%)

On Clinico-mycological correlation of the cases, it was observed that *T. corporis* gave the maximum culture positivity rat 12/32(37.5%) and *Trichophyton rubrum* was the commonest isolate found 8/12(66.6%) from cases of *Tinea corporis* (Table 3).

Age-wise distribution of laboratory confirmed cases of dermatophytosis is shown in Table 4, Maximum numbers of isolates were in the age-group of 21-30 years (40.62%), followed by 31-40 years (25%).

Gender-wise distribution of laboratory confirmed cases of dermatophytosis is shown in (Table 5). Out of 32 positive cultures, 68.75% were of male patients and 31.25% were of female patients. The male:female ratio was 2.2:1.

Table 3: Clinico-mycological correlation of dermatophytosis.

Clinical type	Tinea corporis	Tinea cruris	Tinea unguium	Tinea incognito	Tinea capitis	tinea mannum	Tinea pedis	Tinea faciei	Total
Clinical suspected cases	19	13	5	1	1	1	7	3	50
Laboratory confirmed	12	8	3	-	1	-	6	2	32
Species isolated									
T. rubrum	8	3	2	-	-	-	4	-	17
T. tonsurans	1	2	-	-	-	-	-	-	3
T. mentagrophytes	2	3	-	-		-	2	2	9
T. schoenlenii	-	-	-	-	1	-		-	1
T. verrucosum	1	-	-	-	-	-	-	-	1
Microsporum gypseum	-	-	-	-	-	-	-	-	-
E. floccosum	-	-	1	-	-	-	-	-	1

Table 4: Age-wise distribution of laboratory confirmed cases of dermatophytosis (n=32).

Age group (yrs)	T. rubrum	T. tonsurans	T. mentag-rophytes	T. schoenlenii	T. verrucosum	E. floccosum	Total
11-20	1	0	0	0	0	0	1
21-30	7	2	3	1	0	0	13
31-40	3	0	4	0	1	0	8
41-50	2	1	1	0	0	1	5
51-60	2	0	0	0	0	0	2
61-70	1	0	1	0	0	0	2
>70	1	0	0	0	0	0	1
Total	17	3	9	1	1	1	32

Table 5: Gender-wise distribution of laboratory confirmed cases of dermatophytosis (n=32).

Gender	T. rubum	T. tonsurans	T. mentagro Phytes	T. schoen Lenii	T. verru Cosum	E. floc Cosum	Total
Male	11	2	7	1	0	1	22
Female	6	1	2	0	1	0	10
Total	17	3	9	1	1	1	32

Table 6: Effect of seasonal variation on the distribution of cases of dermatophytosis.

Month	Clinically suspected	Laboratory confirmed
May	2	2
June	10	7
July	15	11
August	13	8
September	6	3
October	4	1
Total	50	32

The present study shows that hot and humid climate has maximum number of laboratory confirmed cases were reported from June to August (Table 6).

DISCUSSION

In the present study *Tinea corporis* (38%) was the commonest clinical type followed by *Tinea cruris* (26%), *Tinea unguium* (10%) and *Tinea incognito* (2%) as shown in Table 1. This is similar with reports from other parts of India. Singh et al reported *Tinea corporis* in 58.84% of cases, Patel et al from South Gujarat in 64% of cases, Venkatesan et al from Chennai in 64.8% of cases, Sen et al from Assam in 48% of cases.[6-8,1]

However, few other Indian studies have reported *Tinea cruris* as the commonest clinical variety. Complete numeration due to tight clothing, maceration and high rate of sweating in groin and waist regions makes these sites more vulnerable to dermatophytosis.[9] Constant sweating keeps the temperature in these regions at 27^0C. The detection rate of fungal element was more by direct microscopy using KOH preparation (37%) as compared to culture (32%) as shown in Table 2. This finding is comparable to that reported by other workers from India in the past.[6] however some workers have reported higher culture positivity rate as compared to KOH. In the present study 16 % of specimens were positive by direct microscopy alone and 6% by culture alone, highlighting the importance of performing both direct microscopy and culture for a definitive diagnosis of fungal infection (Table 2). *Trichophyton* species was the more prevalent dermatophyte isolated from our cases as compared to *Epidermophyton* species and *Microsporum* spp. (Table 3). We could isolate *Trichophyton* spp. from 96.87% cases. Peerapur et al from Bijapur, Kalra et al from Delhi, Poria et al from Jamnagar and have reported the isolation rate as 85%, 32%, 79.7% respectively.[9,1,11]

Out of the Trichophyton species isolated, *T. rubrum* was the most common dermatophyte isolated from various lesions. The overall isolation rate for *T. rubrum* was 53.12% followed by *T. mentagrophyte* (28.12%), *T. tonsurans* (9.37%), *T. schoelenii* (3.12%), *T. verrucosum* (3.12%), *E. floccosum* (3.12%). Similar findings have been observed by Singh et al from Baroda (73.27%), Venkatesan et al from Chennai (73.3%), Sen et al from Assam (68.63%) where the predominant isolate was *T. rubrum.*[6,9,8]

Though persons of all ages are susceptible to dermatophyte infection it appears to be more common in adults. In the present study dermatophytosis was more common in the age group of 21-30 years (40.62%) followed by 31-40 years (Table 4). This is consistent with other studies done by Srinivasan Baiakumar et al from Tamilnadu.[12]

A higher incidence of dermatophytosis in males than in females has been reported both in India and abroad. Male preponderance (2.2:1) was observed in our study (Table 5). Similar finding has been reported by various workers from different regions in India.[3,6]

The higher incidence in young males could be co-related to greater physical activity leading to increased sweating and the frequent interaction of males with different people of the society. The lower incidence in females may be due to non reporting to the hospitals because of prevailing social stigma in rural population in India. These observations were supported by some of the earlier reports by Suman S et al from Baroda.[6]

The location of dermatophytosis is partially dependent on climatic conditions of the area and the resident population. Dermatophytosis is a common disease in tropical countries like India, due to factors such as heat and humidity which provides a fertile ground for the abundant growth of dermatophytes.[7]

In the present study maximum cases of dermatophytosis were reported from June to August revealing the fact that hot and humid weather during the monsoons has a great impact on the occurrence of dermatophytosis (Table 6). Various other workers have also found maximum number of cases between March to July.

It may therefore be concluded that dermatophytosis is now a days a serious public health problem. The present study has given us a clear insight into the clinico mycological aspect of dermatophytosis in and around Meerut city.

Present preliminary study thus provides a valuable baseline which may be useful in the design of a larger epidemiological study in more number of patients and for longer time duration for preventive and educational strategies for the future.

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Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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