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A Clinico-Mycological Study of Superficial Mycoses from a Tertiary Care Hospital of a North Indian Town

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Abstract

Introduction: Superficial mycoses refer to the diseases of skin and its appendages caused by fungi.

Aims & Objectives: The present study was undertaken to find out the prevalence of different clinical types of Dermatomycoses including Dermatophytes, *candida spp.* and dermatomycotic mold infections of skin and its appendages and their etiological agents in and around Aligarh region of Northern India.

Material and Methods: The study was conducted at the Department of Microbiology, JNMC,AMU, Aligarh, during the period of July 2011-July 2013. A total of 425 samples were collected including skin, nail and hair for a period of 5 years. Skin, nail scraping and clippings of infected hair from patients were collected. The samples were subjected to direct microscopy and culture.

Results: Out of 425 samples, Dermatophytoses was manifested clinically more in the males between the age of 11-30 years. In our study, KOH positivity rate was 61.2% and culture positivity rate was 58.8%. 18.8% of samples were culture positive alone; while, 21.2% of specimens were positive on direct microscopy alone. Dermatophytoses was the commonest superficial fungal infection in 123 cases 28 (9.5%), followed by Dermatomycotic molds in 32 (7.2%) and candidiasis in 15 (3.5%). *T.rubrum* was the predominant pathogen followed by *T. mentagrophytes*.

Conclusions: It is concluded that along with Dermatophytes, non-dermatophytic fungi are also emerging as an important cause of superficial mycoses.

Keywords: Superficial mycoses; Dermatophytes; Non-dermatophytic molds

Introduction

Superficial mycoses refer to the diseases of skin and its appendages caused by fungi. This group includes *dermatophytosis*, *pityriasisversicolor*, and candidiasis & dermatomycotic molds [1]. Dermatophytes infections are one of the earliest known fungal infections of mankind and are very common throughout the world [1]. Dermatophytes have the capability to produce keratinase, which allows them to metabolize and live on human keratin like skin, nail and hair [2]. Although dermatophytosis does not produce mortality, it does cause morbidity and poses a major public health problem, especially in tropical countries like India due to the hot and humid climate [1]. Over the last decade, an increasing number of non–dermatophyte filamentous fungi have been recognized as agents of skin and nail infections in humans, producing lesions clinically similar to those caused by dermatophytes [3].

India is a large subcontinent with remarkably varied topography situated within the tropical & sub-tropical belts of the world. Its climate is conducive to the acquisition and maintenance of mycotic infections [3]. Although dermatomycoses are worldwide in distribution, the endemic and most prevalent species of dermatophytes differ strikingly from one geographic locality to another [4]. Various studies have been done on the prevalence of dermatophytes in different parts of our country [1-3,5,6]. But this is first of its kind from Aligarh region of India. The present study was undertaken to find out the prevalence of different clinical types of dermatomycoses including dermatophytes, Candida species and dermatomycotic mold infections of skin and its appendages and their etiological agents in this part of our country.

Materials and Methods

425 clinically diagnosed cases of dermatomycosis attending the skin and VD out patients department of Microbiology, at J.N. Medical College, Aligarh during a period of July 2011-July 2013 were studied. Detailed history of patients regarding age, sex, duration of symptoms, socio economic status, living conditions, family history of the disease and history of keeping pets was noted. Twenty healthy people with no skin infection were taken as controls.

Skin scrapings/nail scrapings or clippings/infected hair from the patients were collected after cleaning the part with 70% alcohol. The specimens were send to Microbiology lab in sterilized envelops. The collected material was divided into two parts. One of which was put in a drop of 10% KOH solution on the slide and covered with a cover slip for direct microscopic examination. The skin scraping and hair were examined after keeping for one hour at room temperature. For nail scraping the microscopic examination was performed after 3-4 hours.

The KOH mount preparations were examined for presence of fungal elements.

The other portion of the sample was used for the culture on the following media

1-Sabourauds dextrose agar with chloramphenicol 6.05 mg/ml

2-Sabourauds dextrose agar with chloramphenicol and Actidione (0.5 mg/ml)

3-Dermatophyte Test Medium (DTM)

One set of the above media was incubated at 25°C and the other at 37°C. The DTM tubes were incubated at 25°C only. Tease mount, cellophane tape mount and slide cultures were undertaken for microscopic morphology. The microscopic examination of dermatophytes was characterized by duration of growth, surface morphology and pigment production. Hair perforation studies were carried out to distinguish between *T. rubrum*, *T. mentagrophytes*. Nature of mycelium and conidia formation helped to differentiate various genera and species. *Candida* species were classified as albicans and non-albicans groups by the production of chlamydospores on corn meal agar and germ tube formation [7].

Statistical analysis was performed by using SPSS-10 and sigma plot.

Results

Of the 425 patients who were enrolled in the study, 262 (61.6%) were males and 163 (38.3%) females. None of them had any systemic disease. The commonest age group involved was 11-20 years in 149(35.1%), followed by 21-30 years in 93 (21.8%) and 31-40 years in 73 (17.7%) cases and >61 years in 37 (8.70%) cases (Table 1).

Age (Years)	Male	Female	Total
1-10	14	10	24 (5.64%)
11-20	98	51	149 (35.1%)
21-30	65	28	93 (21.8%)
31-40	39	34	73 (17.1%)
41-50	11	8	19 (4.47%)
51-60	12	18	30 (7.05%)
>61	23	14	37 (8.7%)

Table 1: Age and Sex distribution of Dermatomycosis Patients

Commonest clinical presentation in this study was skin infection 257 (60.4%) followed by nail infection 161 (37.8%) and hair infection 7 (1.61%) (Table 2). Out of 425 samples sent for culture, 250 (58.8%) were culture positive. A total of 260 samples (61.1%) were KOH positive. 90 (21.2%) KOH positive samples were culture negative and 80 (18.8%) KOH negative samples were culture positive. The strength of association of positivity (O.R) in skin samples from KOH positive compared with other sites of infection (Hair,Nail) were 1.46 times higher and the probability of skin samples from KOH positive (R.R.) were 1.13 times higher but this association was statistically insignificant (P=0.20).

The strength of association of positivity in hair samples were 2.89 times higher and the probability were 1.27 times higher but this association was statistically insignificant (P=0.43) and the strength of association of positivity in nail samples were 0.60 times lesser and the probability were 0.84 times lesser but this association was statistically insignificant (P=0.08) (Table 2A and 2B).

	KOH-	KOH+	O.R.	R.R.	P-value
Skin	47	115	1.46 (0.84-2.54)	1.13 (0.93-1.37)	0.20
Hair	1	6	2.89 (0.3424.41)	1.27 (0.92-1.73)	0.43
Nail	32	49	0.60 (0.34-1.06)	0.84 (0.64-1.03)	0.08

Table 2A: Positivity pattern for Fungi by Direct Microscopy and culture from dermatomycosis samples

	KOH-	KOH +	O.R.	R.R.	P-Value
Skin	43	52	1.33 (0.73 - 2.42)	1.15 (0.85-1.54)	0.36
Hair	0	0	-	-	-
Nail	42	38	0.74 (0.41-1.35)	0.86 (0.64-1.16)	0.36

Table 2B: Positivity pattern for Fungi by Direct Microscopy and culture from dermatomycosis samples. *O.R.=Odd ratio, *R.R.=Risk ratio

Dermatophytosis was the commonest superficial fungal infection with 123 cases 28 (9.5%), followed by Dermatomycotic molds in 32 (7.2%) and candidiasis in 15 (3.5%), (P<0.001) (Table 3). The commonest type of dermatophytosis was *T.corporis* in 52 (42.25%) followed by *T. crurisin* 27 (21.9%), *T. unguium* 19 (15.4%), *T. manuam* 9 (15.4%), *T pedis* 7 (5.6%), *T capitis* 7 (5.6%) and mixed infection in 2 (1.6%) cases.

Types	No.	Controls (n=20)	P-value
Dermatophytosis	123 (72%)	0 (0%)	<0.05
Candidosis	15 (8.8%)	1 (5%)	<0.05
Dermatomycotic molds	32 (18.8%)	0 (0%)	<0.01
Total	170 (100)		

Table 3: Mycological isolates from cases of Dermatomycosis

The commonest dermatophyte isolated was *T. rubrum* in 72 (58.5%) cases. *T. mentagrophytes* in 26 (21.1%), *E. floccusum* in 10 (8.1%), *T. tonsurans* in 7 (5.6%), *M. gypseum* in 5 (4.1%) cases (Table 4).

Candidiasis was found in 15 (3.5%) cases. Majority (40%) had groin infection followed by that of nails 33.3% and feet 26.6%. The *candida albicans* was the commonest species isolated.

Etiologic Agent	T. corporis	T. cruris	T. capitis	T. pedis	T. manuas	T. unguium	Mixed infection	Total
T. rubrum	31	21	-	2	4	14	-	72 (58.5%)
T.mentagrophytes	12	2	2	2	2	4	2	26 (21.1%)
T. violaceum	2	-	1	-	-	-	-	3 (2.4%)
T. tonsurans	2	-	3	2	-	-	-	7 (5.6%)
M. gypseum	2	-	1	-	2	-	-	5 (4.06%)
E. floccosum	3	4	-	1	1	1	-	10 (8.1%)
Total	52	27	7	7	9	19	2	123

Table 4: Clinical types of dermatophytosis in relation to etiological agent in Culture

Dermatomcoytic molds were isolated from 32 (7.25%) cases. The commonest isolate was *Helminthosporium* spp.in 11 (34%) followed by *A. fumigatus* in 5 (15.6%), *A.niger*, *Fusarium spp, Phailophora spp.* each in 4 (12.5%) cases and *Penicilliun spp and Alternaria spp.* each in 2 (6.25%) patients (Table 5).

Types	No.
Helminthosporium spp	11 (34.3%)
Asp. Fumigatus	5 (15.6%)
Asp. Niger	4 (12.5%)
Fusarium	4 (12.5%)
Philophora spp	4 (12.5%)
Penicillium spp	2 (6.25%)
Alternaria	2 (6.25%)
Total	32

Table 5: Non-dermatophytes molds isolated from cases of dermatomycosis

Discussion

A part from the clinical symptoms superficial fungal infections can cause debilitating effects on a person's quality of life. Although rarely life threatening they may in some circumstances spread to other individuals or become invasive [1]. Most superficial fungal infections are easily diagnosed and readily amenable to treatment [3]. A high prevalence (61%) of dermatomycoses among males was found in this study (61%). Higher incidence of dermatophytes in males than in females has been reported both in India and other countries as well [4]. This may be due to greater physical activity and increased sweating.

Persons of all ages were susceptible but maximum cases of fungal infection occurred between the age group of 11-20 years (35%) followed by 21-30 years (21.8%) and 31-40 years (17%). Higher frequency in age group of 11-40 years was predominantly found with physically active males.

Earlier in various studies, KOH positivity rate varied from 35.6% to 88.6% and rate of culture positivity varied from 36% to 53.6% [1,3,5,8,9]. In our study KOH positivity rate was 61.2% and culture positivity rate was 58.8%. 18.8% of samples were culture positive alone while, 21.2% of specimens were positive on direct microscopy alone. Since no association was found (P=0.20) between KOH and culture positivity it highlights the importance of both direct microscopy and culture in making definite diagnosis of superficial fungal infections.

Of the total number of 260 KOH positive specimens, 170(65.3%) isolates were obtained on culture. Among all the isolates dermatophytes were the commonest (72%). The isolation rate in our study is higher as compared to various other studies where it ranged from 45.3%-52.2% [6,10,11]. However, a study from Madras [7] has shown similar isolation rate of dermatophytes. *T. rubrum* was the most common isolate from skin lesions [58.85%], and also the commonest isolate from glabrous skin of the body, groin and feet [8,12,13]. In this study *T. mentagrophytes* was the second most common isolate (21.1%) as has been observed in other studies also [7,14]. *E. floccosum* was the third common isolate (8.1%) among dermatophytes similar to other studies [7,15].

T.rubrum was the main isolate from the cases of *Tenia corporis* and was not isolated from the *Tenia capitis* cases. This is well correlated with a study carried out at Amritsar [16]. In our study *T.tonsurans* was the commonest isolate from the scalp/scalp hair. *Tenia corporis* was the most common (42%) clinical presentation among cases of dermatophytosis followed by *Tenia cruris* (21.9%) and *Tenia unguim* (15.4%). The findings are endorsed by earlier reports [3,5]. *Candida spp.* was isolated from 8.8% cases which are comparable to that of other studies [1,17].

A striking finding in our study was the isolation in pure cultures of dermatomycotic molds in 32% cases even in repeat cultures (Table 5). Though commonly considered as contaminants, they have been reported to colonize damaged tissues and cause secondary tissue destruction. Their role in causing cutaneous infections is not proven and a primary pathogenic role of NDM is controversial [18]. But these species are increasingly implicated in causing primary invasion of the nail in onychomycosis [19,20]. 15 out of the 32 NDM (46.8%) in our study were isolated from infected nails. It is suggested that this subgroup may have a direct causative role as it fulfills the criteria of a pathogen (proposed initially for nails) viz isolation in pure culture, KOH positivity and non-isolation of dermatophytes in the culture [21]. The commonest NDM we isolated was *Helminthosporium spp.* This mold has also been isolated by Kannen *et al.* in cases of onychomychoses from India [7].

Conclusions

It is concluded that along with dermatophytes, dermatomycotic fungi are also emerging as an important cause of superficial mycoses. Both direct microscopy and culture are important tools of diagnosis for the superficial fungal infections. Good hygiene, sanitation and use of fungicidal sprays & washes are effective methods for prevention of such infections.

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