

Original Article

Non dermatophytic fungal infections amongst the dermatophytosis - A hospital based study

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Abstract:

Background: Dermatophytosis is a major public health problem in tropical and subtropical countries.

Methods: 100 clinically suspected cases of dermatophytosis were subjected to mycological examination with microscopy and culture using 10% KOH and Sabouraud's dextrose Agar (SDA) and Dermatophyte test medium (DTM).

Results: Direct microscopy revealed fungal elements in 49% cases and 55% were positive on culture and included all cases positive by KOH. Commonest age group affected was between 21-40 years and males outnumbered females 2.2:1. Among 55% positive cases; 65.5% were non dermatophytic molds (NDMs) or fungi and 34.5% were dermatophytes. Among the NDMs the isolated species were *Aspergillus niger* (14.5%), *Aspergillus flavus* (18.2%), *Candida albicans* (12.7%), *Candida tropicalis* (5.5%), *Fusarium* spp (7.3%), *Mucor* spp. (5.5%) and *Acremonium* spp. (1.8%).

Conclusion: The isolated NDMs are to be evaluated as primary pathogen causing dermatophytosis in absence of any underlying predisposing factor and need to be considered important for treatment as to reduce the morbidity and psychological stress among such patients

Key Word: Dermatophytosis, NDMs, *Fusarium* spp.

Introduction:

Cutaneous fungal infections caused by dermatophytes are commonly known as ringworm infection (Tinea infection). Being chronic in nature they are one of the major public health problems in tropical and subtropical regions. These infections are commonly referred to by the region of the body they inhabit (e.g. Tinea pedis involving the foot, Tinea capitis involving the scalp and so forth.) The dermatophytes have the capacity to invade keratinized tissue (skin, hair & nails) of humans & animals. The etiological agents of the dermatophytic infections include the three genera of dermatophytes- Trichophyton, Microsporum & Epidermophyton^{1,2,3}.

Probably because of wide spread use of broad spectrum antifungal drugs and corticosteroid locally, not only above but some non dermatophytic fungi primarily *Scytalidium Hyalinum*, *Pityrosporum ovale*, *Candida albicans*, *Malassezia furfur*, *Malassezia globosa*, *Aspergillus* spp.

etc. seen causing cutaneous infections^{4,5}. Non dermatophytic molds (NDMs) are filamentous fungi that are commonly found in nature as soil saprophytes and plant pathogen. It is not clearly known whether infection with NDMs can occur as a primary infection on healthy cutaneous tissue like nail, skin or exist only as secondary invaders living saprophytically in keratinized plates already damaged by trauma, ischemia or other disease especially dermatophyte infection⁶. Hot & humid climate in the tropical and subtropical countries like India makes dermatophytosis or ringworm a very common superficial fungal skin infection. Infection might spread as a result of common use of certain facilities such as baths, combs, brushes & articles of clothing^{7,8}. Hence the present study was carried out with a view to estimate the prevalence of NDMs in patients presenting clinically with abnormal nails, skin and other keratinized tissue in patients suspected of having dermatophytic infections attending OPD of this tertiary care center.

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No study has been done about incidence of NDMs in cutaneous infections from this part of North India. This may also help better to evaluate the significance of these fungi and their possible contribution to the clinical problems of nail, skin and hair disfigurement.

Material and Method:

The study population included 100 patients among which 62 males and 38 females were diagnosed clinically as having dermatophytosis who attended the outpatient department of skin of L.L.R. Hospital and G.S.V.M. Medical College, Kanpur, U.P. from 1st June 2011 – 1st Oct 2011. This part of the year was chosen for the study because it was the best climate for growth of dermatophytic infection. Patient's personal history including age, sex, socioeconomic status, occupation and other demographic profile was noted. Clinical history like site, type and duration of lesions along with other factors were noted.

The skin scrapings were collected from the active edge of the lesion. In Tinea capitis, infected and lusterless hair were collected along with skin scrapings. In Tinea unguis nail scrapings, clippings and subungual debris were collected. Inclusion criteria for nail abnormalities included; subungual hyperkeratosis, nail thickening, longitudinal and transverse grooves, pitting, brittle nails, cracks changes in colour of nail plates such as black, yellow and white discoloration & onycholysis. For such nail clippings and subungual scrapings were taken, in cases of hair, plucked hair along with follicles were taken as a sample⁹.

Each specimen was subjected to direct microscopy (in 10% KOH) and culture in duplicates were done on Sabouraud's dextrose agar slopes with chloramphenicol without cycloheximide and also on Dermatophyte test media (HIMEDIA). Cultures were incubated at 25 degree C to 30 degree C for 4 weeks. Cultures were checked twice a week for any growth. In absence of growth even after 4 weeks, the culture was declared negative. Identification of dermatophytes was done on the basis of colony characteristics as well as microscopic morphology in Lactophenol cotton blue mount, special test like urease test and hair perforation test and chrom agar culture were done when necessary¹⁰.

Result:

Out of 100 patients, the maximum cases were seen in the age group 20-40 years, 33(60%) (Table I). Table II shows the sex ratio among the 100 suspected cases of dermatophytic infections, 62% were male and 38% were female. Majority of the patients belonged to low

income group. Patients were having mainly three symptoms as major presenting symptoms (Table III) which were itching (52%), burning (20%) & pain (40%) and the site of infection included skin (69%), nails (21%) and hair (10%) (Table IV)

Table I: Age distribution among the cases

Age Group	Total No. of Patient in given Age Group(N=100)	Age group and % in Positive cases (n=55)
0 – 20 Year	10(10%)	7 (12.72%)
21 – 40 Year	60(60%)	33 (60%)
41 – >60 Year	30(30%)	15 (27.27%)

Table II: Sex distribution of cases

No of cases	Male	Female	Positive male (n=55)	Positive female (n=55)
100	62(62%)	28(28%)	34(54%)	21(46%)

Table III: Presenting Symptoms

Symptoms(n=100)	Positive	Negative
Pain	40	60
Itching	52	48
Burning/Non specific discomfort	20	80

Table IV: Site Of Positive Culture

Site of infection	% of positive patient
Skin	38 (69.09%)
Hair	03(5.45%)
Nail	14 (25.45%)

The KOH mount was positive for fungal element in only 49% of samples collected and culture positivity was 55% i.e. 45% of clinically suspected dermatophytosis were culture negative (Table V). The results of positive culture on SDA/DTM have been shown in Table VI.

Table V: Results of KOH preparation and culture

Number of case	Positive by KOH preparation	Positive by culture
100	49(49%)	55(55%)

Table VI: Results of positive culture on SDA/Dtm

Fungus(n=55)	Positive
Dermatophytes	19(34.5%)
Non dermatophytic fungus	36(65.5%)

On observation of KOH/LPCB mount & colonial morphology the fungi isolated included 19 (34.54%) dermatophytes & 36 (65.46%) non dermatophyte fungi. The sample sites among culture positive included skin 38 (69.09%), hair 03(5.45%) & nail 14 (25.45%) as shown in Table IV.

The non dermatophyte fungi among the culture positive included *Aspergillus flavus* 10 (18.18%), *Aspergillus niger* 08(14.54%), *Candida albicans* 07 (12.72%), *Candida tropicalis* 03 (5.45%), *Fusarium* spp. 04 (7.27%), *Mucor* spp. 03(5.45%) & *Acremonium* spp. 01(1.81%) (Table VII).

No significant epidemiological factors were found which predisposed to colonization of clinically abnormal NDMs causing cutaneous infection as regards age, sex, residence and occupation.

Table VII: Non dermatophytic fungus isolated from positive culture

Fungus	Number (n'=36)	%
<i>Aspergillus flavus</i>	10	18.2
<i>Aspergillus niger</i>	08	14.5
<i>Candida albicans</i>	07	12.7
<i>Candida tropicalis</i>	03	5.5
<i>Fusarium</i> spp	04	7.3
<i>Mucor</i> spp.	03	5.5
<i>Acremonium</i> spp.	01	1.8

LEGENDS FOR ILLUSTRATION (FIGURES)



FIGURE-1(CANDIDA SPP)



FIGURE-2(CANDIDA CULTURE ON CHROM AGAR)



FIGURE-3(MUCOR SPP)

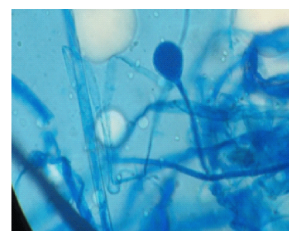


FIGURE-4(LPCB MOUNT SHOWING MUCOR SPP)



FIGURE- 5(FUSARIUM SPP)

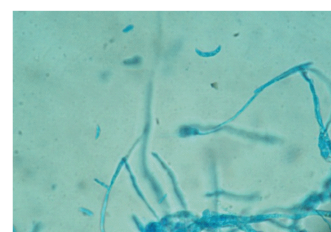


FIGURE-6(LPCB MOUNT SHOWING FUSARIUM SPP)

Discussion:

Dermatophyte infections are common disorders worldwide, and dermatophytes represent the prevailing type of fungi that cause infection of the skin, hairs and nails. These infections lead to a variety of clinical manifestations, including tinea capitis, tinea pedis, tinea corporis, tinea cruris, and Majocchi's granuloma. Three types of dermatophytes account for the majority of infections: Epidermophyton, Trichophyton, and Microsporum. Dermatophytoses have varied presentations, named by location, and have similar treatments. These fungal infections are more prevalent in tropical & subtropical area¹¹.

India is a developing country & geographically lies in tropical climatic situation. Kanpur area lies in Western U.P. & passes through all seasons including rainy season with hot & humid climate. Diagnosis of dermatophytic infections lie in proper collection, proper media & accurate identification of fungus through various microbiological techniques. Clinically these infections caused by dermatophytes are known as ring worm lesions. These may be associated with slight Erythema, with few patchy areas of scaling with dull gray hair stumps to a highly inflammatory reaction with folliculitis, kerion formation & alopecia, sometimes accompanied by fever, malaise and regional lymphadenopathy^{12,13,14}. In our busy testing case center about more than 100 cases attending skin OPD which include dermatophytic infections. The time chosen was rainy season, as due to hot & humid climate. During this part of year infection becomes more flourishing. We studied 100 cases suspected of Dermatophytic infection out of which 55 were positive for fungus i.e. 55% & the prevalence about 100 cases in 1500 cases attending skin OPD i.e. 6.66%. All patients were OPD patients, so it shows that being a chronic infection, it is not fatal but results in morbid condition leading to loss of money & physiological stress.

In the present study out of 100 cases 62 were male & 38 female. This may be due to gender attending OPD may be more. Maximum cases belonged to 20-40 years age group i.e. 60%. The site most commonly involved was skin (69.09%) followed by nail (25.45%), & hair (5.40%). Pain, itching & burning were seen in 40%, 52% & 20% cases respectively. The isolated species were mainly non dermatophytic and isolated fungi were *Aspergillus flavus* (18.2%), *A. niger* (14.5%), *Candida albicans* (12.7%), *Candida tropicalis* (5.5%), *Mucor* spp (5.45%), *Fusarium* spp (7.3%) and *Acremonium*

spp (1.8%) i.e. Overall 65.45%. The prevalence of NDMs in nails in our study was 25.45% which is different with the study done in 1548 cases in which it ranged from 1.45% to 17.6%¹⁵ and 50% in 207 cases a study done in Egypt⁶. This variation seems to reflect the geographic distribution and differences in mold distribution along with different climate situation. *Aspergillus* spp was most common species detected which is akin to study done by Khagby et al and Ramani et al in India^{16, 17}.

Dermatophytic spp. are *Trichophyton* spp., *Microsporum* spp. & *Epidermophyton* spp. i.e. 7.27%, 14.54%, 12.72% respectively. So only 34.55% of the positive culture was dermatophytes.

It is difficult to actually determine the role of non dermatophytic fungi in causing cutaneous infection. Extensive multicentric studies are required to see the prevalence of NDMs in different regions and studies are also required to evaluate these fungi for their ability to invade the healthy tissue. In our study no significant risk factors were found to predispose to NDMs colonization except in two cases that were having damaged nails.

So we conclude that NDMs detected and isolated in patients with cutaneous infection must be considered carefully for treatment after proper evaluation of any underlying predisposing factor as dystrophic nails, immunosuppression, peripheral vascular disease or in diabetic.

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