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Brief Report

STUDY OF ONYCHOMYCOSIS: PREVAILING FUNGI AND PATTERN OF INFECTION

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Abstract

A mycological study of onychomycosis was undertaken in 88 patients. The nails were judged to be infected by their clinical appearance. Direct microscopy of the nail clips in 20% KOH solution was positive in 72 (81.8%) and culture was positive in 43 (48.8%) cases. Out of the samples cultured, dermatophytes were grown in 26 cases (29.5%), non dermatophyte moulds in 12 (13.6%) and *Candida* spp. in 5 (5.6%) while 45 (51.1%) samples yielded no growth. Amongst dermatophytes, *T. rubrum* was found to be commonest etiological agent (57.6%) followed by *T. mentagrophyte*. Amongst the non-dermatophyte mould (NDM), *Aspergillus* spp. was the most prevalent species followed by *Alternaria* spp, *Curvularia* spp. and *Fusarium* spp. Commonest age group affected was above 31 years. Males were predominantly affected (65%), male to female ratio being 1.8:1. Fingernails were affected more frequently than toe nails with the ratio of 3:1. Distal and lateral subungual onychomycosis (DLSO) was more common (50%) than other clinical pattern followed by proximal subungual onychomycosis (PSO) (20.4%), white superficial onychomycosis (SWO) (2%), total dystrophic onychomysosis (TDO) (14%) and paronychia (10.2%).

Key words: *Fungi, nails, onychomycosis*

Onychomycosis accounts for up to 50% of all nail infections.[1] In onychomycosis, infected nails serve as a chronic reservoir of infection which can give rise to repeated mycotic infections of the skin. It is of significance to suspect onychomycosis, perform mycological diagnosis and undertake treatment. This may help to prevent nail dystrophy and the spread of infection. Clinical and myocological features of onychomycosis show variation with time and place.[2]

This disease is more frequent among men than women and it increases with age.[2] Several factors have been implicated to the increase in disease such as reduced peripheral circulation, diabetes, nail trauma and difficulty to maintain proper nail hygiene.[2]

The aim of our study was to determine the incidence, contributing factors, associated diseases and occupational consequences related to onychomycosis, to isolate the causative pathogen, to determine the various clinical patterns and to identify opportunistic nail infections caused by fungi.

Materials and Methods

The study population comprised of 88 suspected cases of onychomycosis, attending Skin and VD, Outpatient Department of Government Medical College and Hospital, Aurangabad, during January 2005 to January 2006. Nail scrapings/clippings were obtained according to standard procedures.

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Detailed history of trauma, infection, occupation, diabetes, personal habits (smoking etc.) were taken. Different clinical patterns (DLSO - Distal and lateral subungual onychomycosis, PSO - Proximal subungual onychomycosis, SWO - White superficial onychomycosis, TDO - Total dystrophic onychomycosis) were recorded separately (Figs. 1-3). All specimens were subjected to direct microscopy in 20% KOH solution for the presence of fungal mycelia and spores (Figs. 4-5).

Nail scrapings and clippings were inoculated on antibiotic containing Sabourand dextrose agar with and without cycloheximide at 27°C and at 37°C. The fungal growth was identified by standard procedures. At least three samples from each patient were processed. Those who grew dermatophytes were classified as dermatophytosis patient.[3]

Those who grew a particular mould other than dermatophyte consistently on two or more successive occasions with consistent filaments by direct microscopy at least once and continued to grow the same mould consistently thereafter from the same nail and without growing a dermatophyte on any occasion were classified as opportunistic onychomycosis patient.[3]

Those who grew a dermatophyte on one or more occasions and also grew a mould with the same consistency, site specificity and direct microscopic variability as indicated for opportunistic onychomycosis, were classified as mixed infection patients. Because of difficulty in discerning pathogens from contaminants, the guidelines followed were: 1) If a dermatophyte was isolated on culture, it was a pathogen, 2) if a nondermatophyte mould (NDM) or yeast was

Figure 1: Showing distal subungual onycomycosis involving three fingers

Figure 2: Showing paronychia - Ring finger of right hand showing chicken drumstick appearance

Figure 3: Showing SWO - *Aspergillus* spp. was isolated from this lesion

cultured, it was significant only if direct microscopy was positive and 3) NDM required repeated isolation.[2]

Patients with filaments or spores by direct microscopy but no dermatophyte or consistent mould growth were also included in the study.

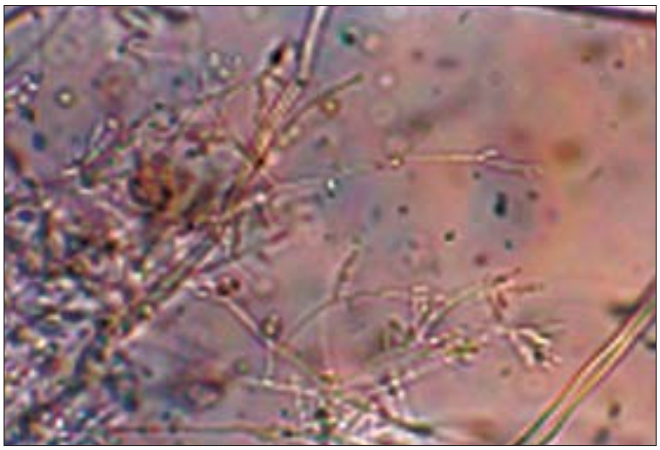

Figure 4: Showing KOH mount with plenty of septate hyphae and spores (x40)

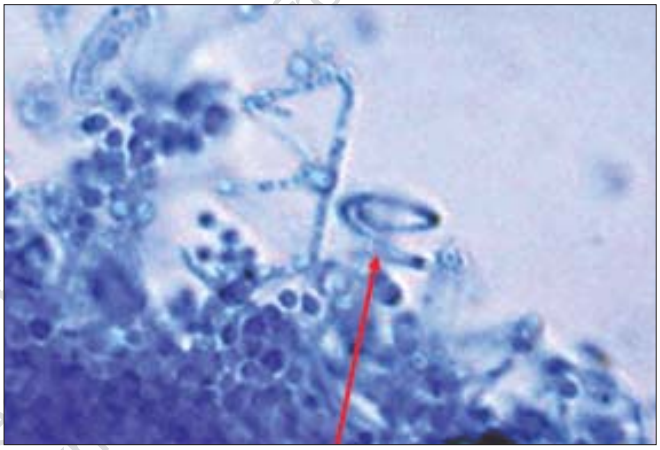

Figure 5: Showing LCB with spiral hyphae clusters of microconidia and macroconidia (x40)

Results

There were a total of 88 suspected cases of onychomycosis. Of these 88 cases, 72 (81.8%) were positive by direct microscopy and 43 (48.86%) were culture positive (Table 1).

Of these 88 cases, 58 (65%) were male and 30 (35%) were female, male to female ratio being 1.8:1. The commonest age group was 31 to 40 years followed by 41 to 50. Infections were less common in the age group below 30 years.

The fingernails were more frequently involved i.e., 56 (63%) cases followed by toenails 19 (21%) and both in 13 (14%) cases. Ratio of fingernail to toenail infection was 3:1 (Table 2).

Distal and lateral subungual onychomycosis (DLSO) was the commonest clinical pattern (50%) followed by proximal subungual onychomycosis (20.4%) and then total dystrophic onychomycosis (14%), paronychia (10.2%) and SWO (2%) (Table 3).

The most common fungal isolates were dermatophytes

Table 1: Microscopy and culture positivity of the clinical samples (n=88)

	Sample	Percentage
Total KOH +ve	72	81.8
KOH +ve culture –ve	34	38.6
Culture +ve, KOH –ve	05	05.6
Total culture +ve	43	48.8
Both +ve	38	48.1
Both –ve	11	12.5

Table 2: Age and sex distribution in relation to site of involvement (n=88)

Age (years)	Male	Female	Finger nails	Toe nails	Both
< 10	01	—	—	01	—
11-20	02	01	01	—	02
21-30	05	02	04	03	—
31-40	21	12	19	06	04
41-50	17	08	18	05	06
> 50	12	07	14	04	01
Total	**58 (65)**	**30 (35)**	**56 (63)**	**19 (21)**	**13 (14)**

Figures in parenthesis are percentages

(29.54%) of which 15 (57.64%) were *T. rubrum*, 11 (42.3%) were *T. mentagrophyte*. NDM constituted 13.63% of the fungal isolates of which 50% were *Aspergillus* spp, followed by *Scopulariopsis* spp. (16.66%), *Alternaria* spp. (16.66), *Fusarium* spp. and *Curvularia* spp. (8.3%) each. Out of the total fungal isolates 5 (5.6%) were *Candida* infections and 45 (51.13%) of the samples showed no growth (Table 4).

Onychomysosis was found to be commonest in agricultural workers (19.31%), followed by labourers and housewives. Occlusive footwear was the commonest predisposing factor (2%), followed by diabetes.

Discussion

Onychomycosis is a common infection of nails in adults and accounts for prevalence rate of 2 to 50% worldwide and the incidence increases with age.[4]

In the present study, onychomycosis was found to be commonest in the age group 31-40 years in accordance with most of the studies.[1,4-6] Our study reveals that incidence of onychomycosis is increasing with advancing age. Antecedant disease such as diabetes (six cases), peripheral vascular disease (fivecases), personal habits such as chronic smoking (seven cases), trauma to the aged nails (four cases) have greater predilection for onychomycosis.

Higher incidence was noted amongst males (65%) than females, the ratio being 1.8:1, which compares well with most of the studies.[4,5] Higher incidence in males may be because

Table 3: Clinical pattern of onychomycosis

Clinical patterns	Finger nails	Toe nails	Both	Total (%)
DLSO	24	10	10	44 (50.0)
PSO	08	06	04	18 (20.4)
SWO	-	02	-	02 (02.0)
TDO	03	08	02	13 (14.0)
Paronychia	07	02	-	09 (10.2)

(DLSO - Distal and lateral subungual onychomycosis, PSO - Proximal subungual onychomycosis, SWO - White superficial onychomycosis, TDO - Total dystrophic onychomycosis)

Table 4: Fungal isolate obtained from the clinical samples

Fungus	Isolate	Percentage
Dermatophytes	26	29.54
- *T. rubrum*	15	57.6
- *T. mentagrophyte*	11	42.3
Non-dermatophytic moulds	12	13.6
Aspergillus spp.	06	50.0
Fusarium spp.	01	08.3
Scopulariopsis spp.	02	16.6
Alternaria spp.	02	16.6
Curvularia spp.	01	08.3
Candida albicans	05	05.6
No growth	45	51.1

they are more exposed to outdoors with greater physical activity and are more prone to trauma.

Various authors have reported high incidence of onychomycosis of the toenail. In the present study we have come across more cases of fingernail onychomycosis, than toenails[1,4,6] with a ratio of 3:1, which compares well with other studies. Incidence of increased finger nail onychomycosis may be because of the increased chances of occupation related trauma, also fingernail infection is more likely than the toenail infection to arouse the patients concern, driving them to seek medical attention.

In various studies,[2,4] right thumb was the commonest fingernail involved. We observed that, ring finger and index finger were commonly involved. Greater toenail onychomycosis has been reported frequently, this is in agreement with other studies,[2,4] because of its bigger size predisposing to increased trauma.

The high incidence of DLSO pattern has been reported by various studies. Incidence in and around Aurangabad is about 50% comparable with Garg *et al*[6] 64.4%.

In the present study anthropophilic dermatophytes have been isolated from 29.6% of culture positive cases which is comparable with various studies.[1,5,6] *T. rubrum* was the common isolate i.e., 57.6% in accordance with other studies.[1,5] NDM were 13.6%, especially *Aspergillus niger* comparable

with Grover.[5]

Candida albicans is reported as the commonest cause of paronychial onychomycosis.[7] This is reflected in our study where all the paronychial cases grew *Candida albicans* on culture. Previously regarded as contaminant, yeast is now increasingly recognized as pathogen in fingernail infections.[4]

To conclude, DLSO was the commonest clinical presentation in this study, however TDO and PSO were not uncommon. *T. rubrum* and *Candida* were major pathogens. This study also stresses the role of NDM associated onychomycosis.

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