Clinico-mycological evaluation of onychomycosis at Bangalore and Jorhat

Sanjiv Grover
Department of Dermatology, Air Force Hospital, Agram PO, Bangalore - 560007. India.

Address for correspondence: Wg Cdr (Dr) Sanjiv Grover, Department of Dermatology, Command Hospital (Air Force), Agram PO, Bangalore - 560007. India. E-mail: sanjivgrover@rediffmail.com

ABSTRACT

Introduction: Clinical and mycological features of onychomycosis show variation with time and place. **Material and Methods:** A study to analyze the morphological variants and mycological isolates of onychomycosis was carried out in 50 patients attending the dermatology out-patient departments at the Air Force Hospitals at Bangalore and at Jorhat. Nail clippings were subjected to direct microscopy and cultured on Sabouraud's Dextrose Agar. **Results:** The commonest age group affected (56%) was the 20-40 year age group. The fingernails alone were involved in 24 (48%) patients, the toenails alone in 15 (30%) patients, and both in 11 (22%) patients. Distal and lateral subungual onychomycosis was encountered in 41 (82%) patients, proximal superficial onychomycosis and total dystrophic onychomycosis in 3 each (6%), paronychia in 2 (4%) and superficial white onychomycosis in 1. Of the 59 samples cultured, dermatophytes were grown in 14 (23.7%), non-dermatophyte moulds (NDM) in 13 (22.0%), candida in 10 (16.8%) and no growth in 22 (37.2%) samples. **Conclusion:** Among the dermatophytes, *Trichophyton rubrum*, and among the NDM, *Aspergillus* spp., were the commonest isolates.

Key Words: Onychomycosis, Mycology, Dermatophytes, Non-dermatophyte moulds

INTRODUCTION

Onychomycosis refers to fungal infection of the nail with various etiological agents, viz. dermatophytes, yeasts and non-dermatophyte moulds (NDM). Dermatophytes, especially *Trichophyton rubrum,* are most frequently implicated as its causative agents, but yeasts and NDM are increasingly recognized as etiological agents in causing primary invasion of the nail.[1-3] We undertook this study to identify the clinical pattern of this disease in our centers, isolate the most common fungal pathogens responsible and assess the role of yeast and NDM in causing onychomycosis.

MATERIAL AND METHODS

Successive out-patients diagnosed clinically as having onychomycosis were included in the study conducted at the Air Force Hospitals at Bangalore and at Jorhat. A detailed history, including that of trauma, infections, occupation and personal habits, was taken. Patients with any significant medical history were excluded from the study. Nail clippings from the infected nails were collected in small black paper envelopes for easy visualization of specimens. A portion was immersed in 10% KOH overnight and examined the next morning by light microscopy. The rest was preserved in the same envelopes in order to absorb moisture and reduce or eliminate bacterial contamination. One week later, after the specimens were adequately dried of the moisture in the envelopes, they were inoculated in pairs in plain Sabouraud's Dextrose Agar (SDA) and SDA with chloramphenicol and incubated at room temperature. All cultures were examined bi-weekly for growth and incubated for four weeks before declaring them negative. Germ tube tests were performed on all

growths identified as yeasts. The growths were noted for colony characteristics in the form of texture, surface color, color on the reverse, and diffusible pigment. Tease mounts, cellophane tape mounts and slide cultures were undertaken for microscopic morphology. The cultures were reported on the basis of the macroscopic and microscopic examination and germ tube tests.[4,5]

RESULTS

There were a total of 50 cases consisting of 31 males and 19 females (male to female ratio = 1.63:1). The commonest age group was the 20-40 year age group, followed by the 51-60 year age group and both 41-50 and 61-70 year age groups (Table 1). The fingernails alone were most frequently involved (48%), followed by the toenails alone (30%) and both (22%) (Table 2). Distal and lateral subungual onychomycosis (DLSO) was the commonest clinical pattern (82%), followed by proximal superficial onychomycosis (PSO) and total dystrophic onychomycosis (TDO) (6% each), paronychia (4%) and superficial white onychomycosis (SWO) (2%) (Table 3).

As some of the cases had involvement of multiple sites, 59 samples were collected and cultured. Of these, dermatophytes were grown in 14 (23.7%), non-dermatophyte moulds (NDM) in 13 (22.1%), candida in 10 (16.9%) and no growth was observed in 22 (37.3%) samples. Among dermatophytes, *Trichophyton rubrum* was the commonest isolate (42.9%), followed by *Epidermophyton floccosum* (35.7%), *Trichophyton tonsurans* (14.3%) and *Trichophyton schoenleinii* (7.1%). Among the NDM, *Aspergillus niger* was the commonest isolate (84.6%), followed by Penicillium and Cladosporium (7.7% each). Of the 59 samples cultured, 55.9% were KOH-positive and 62.7% were culture-positive (Table 3).

Table 1: Age-wise distribution of onychomycosis

Age group (years)	Number	Percentage
20-40	28	56
41-50	7	14
51-60	8	16
61-70	7	14
Total	**50**	**100**

Table 2: Morphological patterns of onychomycosis

Morphological pattern	Fingernails only	Toenails only	Both fingernails and toenails	Total
DLSO*	19	12	10	41
PSO†	2	1	–	3
SWO‡	1	–	–	1
TDO§	–	2	1	3
Paronychia	2	–	–	2
Total	**24**	**15**	**11**	**50**

*DLSO= Distal and lateral subungual onychomycosis, †PSO = Proximal subungual onychomycosis, ‡SWO = Superficial white onychomycosis, §TDO = Total dystrophic onychomycosis

DISCUSSION

All the men in our study were soldiers. We found a high incidence of onychomycosis in a younger age group which could be the result of occupation related subclinical trauma or perhaps because younger people are cosmetically more conscious than older ones. The male predominance in our study may be due to predisposing factors like occupation related subclinical trauma and use of occlusive footwear.

We found dermatophytes, especially *Trichophyton rubrum*, to be the most frequent etiological agents in onychomycosis, and DLSO to be the commonest morphological pattern, which has been reported earlier.[3] Though NDM are often 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. NDM have been isolated in 2%-22% cases and yeasts in 17%-66% cases of onychomycosis in some studies.[1,2] Our high rate (22.1%) of isolation of NDM can be explained by our climate, since a higher

Table 3: KOH and culture characteristics of mycological isolates

Culture growth	KOH-positive	KOH-negative	Total
Dermatophytes			
Trichophyton rubrum	6	–	6
Epidermophyton floccosum	5	–	5
Trichophyton tonsurans	–	2	2
Trichophyton schoenleinii	–	1	1
Non-dermatophyte moulds			
Aspergillus niger	8	3	11
Penicillium spp.	–	1	1
Cladosporium spp.	–	1	1
Candida	2	8	10
No growth	12	10	22
Total	**33**	**26**	**59**

prevalence of NDM in onychomycosis is reported in hot and humid tropical and sub-tropical climates.[1] Some stringent criteria have been described to define NDM as a primary pathogen: (a) isolation of NDM in pure culture, (b) absence of dermatophytes, and (c) demonstration of KOH-positive filaments.[6] Using these criteria, 8 of the 13 NDM in our study (all of which are *Aspergillus niger*) would qualify as primary pathogens.

The KOH positivity rate varied from 35.6%-88.6% in various studies and the culture positivity rate from 36%-53.6%.[7] Our KOH positivity rate (55.9%) fell within the reported range, but we had a comparatively high culture positivity rate (62.7%). This can be attributed to the 'drying procedure' of Milne that we followed, which reduces the rate of contamination and produces pure cultures in the isolates.[4]

To conclude, our study revealed a male preponderance, DLSO as the commonest morphological pattern, and dermatophytes as the commonest mycological isolate. It also stresses the increasing role of NDM in causing onychomycosis in recent times.

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