

ORIGINAL RESEARCH

ASSESSMENT OF MICROBIOLOGICAL PROFILE OF
ONYCHOMYCOSIS

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ABSTRACT

Background: To assess microbiological profile of onychomycosis.

Methods: We selected nail samples from ninety- two patients, aged 18 to 60 years with nail infection of either gender. The sample was divided in two portions: one part for fungal culture and another part for microscopy. Testing for in vitro antifungal susceptibility against Candida species was done on Muller Hinton agar using the disc diffusion method.

Results: Age group 18-28 years had 15, 28-38 years had 23, 38-48 years had 41 and 48-60 years had 3 patients. The common site was finger in 31 and toe in 51 cases. Occupation found to be housewife in 9, farmer in 31, students in 20, business in 10 and others in 12 cases. The difference was significant ($P < 0.05$). There were 50 culture positive and 32 culture negative. Off 50, 34 were KOH positive and 16 were KOH negative and off 32, 30 were KOH positive and 2 were KOH negative. Fungal isolates were 33 yeasts such as candida albicans in 21, candida tropicalis in 6, candida parapsilosis in 4 and trichosporon spp. in 2 cases. Moulds were seen in 12 cases such as Aspergillus niger in 7, Aspergillus fumigatus in 3 and Penicillium spp. in 2 cases. Dermatophytes were Trichophyton rubrum in 5 cases. The difference was significant ($P < 0.05$). Candida Albican showed susceptibility in 21 cases against Amphotericin B, 17 cases against fluconazole and 15 cases against itraconazole.

Conclusion: A frequent fungal infection of the nails is onychomycosis. Yeast, molds, and dermatophytes were the causes. It was mostly seen among farmers. Candida albicans was the most often detected aetiological agent. Candida albicans showed maximum susceptibility against Amphotericin B.

Keywords: Amphotericin B, Candida albicans, Culture, onychomycosis

INTRODUCTION

Onychomycosis is a fungal infection of the nails, most commonly caused by dermatophyte fungi but can also be due to yeast or mold. It is a common condition that affects both toenails and fingernails, though toenails are more frequently involved. Onychomycosis can be challenging to treat and may persist if not managed appropriately.¹

Nearly half of all nail problems are caused by fungus. It could be brought on by dermatophytes, non- dermatophytic molds, or yeasts that affect the nail matrix, nail bed, or nail plate.² The most common fungal isolates are dermatophytes, of which T. rubrum is the principal species. The remaining fungal isolates are caused by molds, primarily Fusarium spp., and yeasts, primarily Candida albicans. The many variables that affect the prevalence rate of onychomycosis varies from place to location include age, climate, occupation, travel, and hygiene.^{3,4}

Distal Lateral Subungual Onychomycosis (DLSO), Superficial White Onychomycosis (SWO), Proximal Subungual Onychomycosis, Endothrix Onychomycosis, and Total Dystrophic Onychomycosis (TDO) are a few of the clinical spectrums of onychomycosis that can occur.⁵ Since the fungi that cause onychomycosis have varying susceptibilities to antifungal medications and the treatment entails long-term antifungal therapy, empirical treatment over a longer period of time may result in resistance. The etiology of the disease must be determined through laboratory testing, which includes speciation by culture and antifungal susceptibility, in order to determine the optimal course of treatment.⁶ We performed this study to assess microbiological profile of onychomycosis.

MATERIALS & METHOD

After considering the utility of the study and obtaining approval from the ethical review committee, we selected nail samples from ninety- two patients, aged 18 to 60 years with nail infection of either gender.

Data such as name, age, etc. was recorded. Nail material was taken from clinically abnormal nails or from the first right toenail if all nails appeared normal. Nails were cleaned with alcohol and nail clippings were collected on a sterile black filter paper or cardboard folder. The sample was divided in two portions: one part for fungal culture and another part for microscopy. The wet mount for microscopic examination was prepared using 20% KOH and examined after overnight incubation. In scanty sample, a drop of parker blue black ink was used to reduce false negative rates. Two Sabouraud's Dextrose Agar (SDA) tubes were used for the culture process; one contained actidione and the other did not, and both were kept in an incubator that measured biological oxygen demand (BOD) at 25°C. Yeasts grown in culture tubes were further tested for speciation using the germ tube test, culture on cornmeal agar, and culture on chromogenic (CHROM) agar. Testing for in vitro antifungal susceptibility against Candida species was done on Muller Hinton agar using the disc diffusion method. The results were compiled and subjected to statistical analysis using the Mann- Whitney U test. P value less than 0.05 was regarded as significant.

RESULTS

Table I Assessment of parameters

Parameters	Variables	Number	P value
Age group (years)	18-28	15	0.05
	28-38	23	
	38-48	41	
	48-60	3	
Site	Finger	31	0.03
	Toe	51	
Occupation	Housewife	9	0.85
	Farmer	31	
	Student	20	
	Business	10	
	Other	12	

Age group 18-28 years had 15, 28-38 years had 23, 38-48 years had 41 and 48-60 years had 3 patients. The common site was finger in 31 and toe in 51 cases. Occupation found to be housewife

in 9, farmer in 31, students in 20, business in 10 and others in 12 cases. The difference was significant ($P < 0.05$) (Table I).

Table II Comparison of microscopy with culture

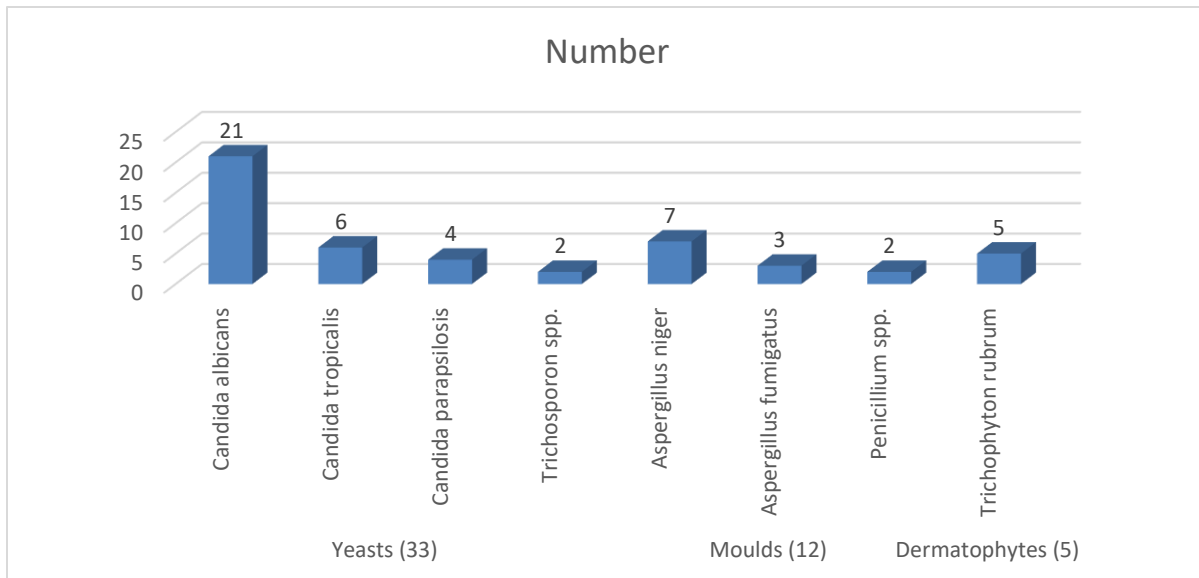
KOH mount	Culture positive	Culture negative	Total
KOH Positive	34	30	64
KOH Negative	16	2	18
Total	50	32	82

There were 50 culture positive and 32 culture negative. Off 50, 34 were KOH positive and 16 were KOH negative and off 32, 30 were KOH positive and 2 were KOH negative (Table II).

Table III Spectrum of fungi isolated

Fungal isolates	Causative agents	Number	P value
Yeasts (33)	Candida albicans	21	0.01
	Candida tropicalis	6	
	Candida parapsilosis	4	
	Trichosporon spp.	2	
Moulds (12)	Aspergillus niger	7	0.04
	Aspergillus fumigatus	3	
	Penicillium spp.	2	
Dermatophytes (5)	Trichophyton rubrum	5	-

Fungal isolates were 33 yeasts such as candida albicans in 21, candida tropicalis in 6, candida parapsilosis in 4 and trichosporon spp. in 2 cases. Moulds were seen in 12 cases such as Aspergillus niger in 7, Aspergillus fumigatus in 3 and Penicillium spp. in 2 cases. Dermatophytes were Trichophyton rubrum in 5 cases. The difference was significant ($P < 0.05$) (Table III, Graph I).



Graph I

Table IV Antifungal susceptibility of candida species

Antifungal	Susceptible	Resistant
Amphotericin B	21	0
Fluconazole	17	4
Itraconazole	15	6

Candida Albicans showed susceptibility in 21 cases against Amphotericin B, 17 cases against fluconazole and 15 cases against itraconazole (Table IV)

DISCUSSION

A nail infection commonly referred to as onychomycosis is typically brought on by three types of fungi: dermatophytes, non-dermatophytes, mold, and yeast.^{7,8} Between 8 and 10% of the general population are estimated to be affected by onychomycosis, which also accounts for about 30% of all superficial fungal infections, 50% of nail disorders, and more. In senior people, it is much more crucial.^{9,10} We performed this study to assess microbiological profile of onychomycosis.

Age group 18-28 years had 15, 28-38 years had 23, 38-48 years had 41 and 48-60 years had 3 patients. The common site was finger in 31 and toe in 51 cases. Occupation found to be housewife in 9, farmer in 31, students in 20, business in 10 and others in 12 cases. Kabi et al¹¹ found that although it can affect people of any age, onychomycosis is more common in those between the ages of 31 and 40 in both men and women. The majority of instances of fingernail infection were found in females. Molds (24%) and dermatophytes (10%) were the main causes, with Candida species accounting for 66% of the cases. C. albicans was the most common Candida species. Even while every strain of Candida was amphotericin B responsive, some of them nevertheless demonstrated resistance to conventional antifungals like fluconazole and itraconazole.

There were 50 culture positive and 32 culture negative. Off 50, 34 were KOH positive and 16 were KOH negative and off 32, 30 were KOH positive and 2 were KOH negative. Sylla et al¹² enrolled 469 patients. The mean age of the study population was 33.2 ± 15.2 years, and the sex ratio was 0.52. The prevalence of onychomycosis was 48.4% (227/469). The main clinical presentations were disto-lateral subungual onychomycosis (37.9%) and onyxia (46.5%). Identified fungal species were Candida albicans (42.7%), Candida spp. (39.5%), Trichophyton soudanense (10.1%), Fusarium spp. (5.3%), and Candida tropicalis (2.6%). Candida albicans was more frequent in subjects over 15 years of age (43.6%) and women (45%). However, Trichophyton soudanense was higher in patients under 15 years old (17.4%) as well as in male subjects (18.8%).

In our study, fungal isolates were 33 yeasts such as candida albicans in 21, candida tropicalis in 6, candida parapsilosis in 4 and trichosporon spp. in 2 cases. Moulds were seen in 12 cases such as Aspergillus niger in 7, Aspergillus fumigatus in 3 and Penicillium spp. in 2 cases. Dermatophytes were Trichophyton rubrum in 5 cases. Sen et al¹³ examined the clinical characteristics, etiological agent pattern, and severity evaluation of OM. Study participants included sixty-eight clinically suspected patients with positive fungal and potassium hydroxide cultures. Male to female infection rates were higher (1.61:1). The age range that was most frequently impacted was 21–40. Compared to toe nails, finger nails were more commonly impacted. The most prevalent clinical pattern (48 cases, 70.59%) was distal and lateral subungual OM. The majority of patients (66.18%) had severe nail involvement. Subungual hyperkeratosis (51 cases, 75%) was the most prevalent alteration, followed by discoloration (67 cases, 98.53%). Dermatophytes (55 cases, 80.88%) were the main cause of the injury, with Trichophyton rubrum being the most prevalent (35 instances, 51.47%). Of the 9 (13.23%) patients, 6 had Candida albicans.

We observed that *Candida Albicans* showed susceptibility in 21 cases against Amphotericin B, 17 cases against fluconazole and 15 cases against itraconazole. Garg et al¹⁴ identified the different onychomycosis clinical patterns in central India. Ninety onychomycosis patients made up the study population. The mean age was 29.40 +/- 13.61 years, and the male to female ratio was 3:1. Of the ninety patients, sixty percent had fingernails affected, twenty-six percent had toenails involved, and thirteen percent had both. The clinical forms that were observed were superficial white onychomycosis (1.11%), proximal subungual onychomycosis with paronychia (12.2%), distolateral subungual onychomycosis (64.44%), and complete dystrophic onychomycosis (17.78%). In 24 patients (26.36%), dermatophytes were the most frequently isolated pathogens [*Tricophyton rubrum* (23.07%), *Tricophyton verrucosum* (2.22%), and *Epidermophyton floccosum* (1.11%)]. These were followed by *Candida albicans*, which was found in 22 patients (24.27%). Thirty-six (39.58%) nondermatophyte molds were isolated from 29 patients. Of these 29 cases, six were associated with *Tricophyton rubrum*, which was considered the primary pathogen.

CONCLUSION

A frequent fungal infection of the nails is onychomycosis. Yeast, molds, and dermatophytes were the causes. It was mostly seen among farmers. *Candida albicans* was the most often detected aetiological agent. *Candida albicans* showed maximum susceptibility against Amphotericin B.

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