



Original Research Article

A Clinicomycological Evaluation of Onychomycosis in a Tertiary Care Rural Hospital

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ABSTRACT

Background: Onychomycosis is a nail infection caused by dermatophytes, nondermatophyte moulds (NDM) and yeasts. There are racial and geographic variations in the prevalence of different types of fungal infections depending upon environmental, socio-economic and cultural factors.

Aim: This study was undertaken to identify the predisposing factors for onychomycosis and to evaluate clinicomycological pattern of onychomycosis in our tertiary care rural hospital.

Materials and methods: Nail clippings were obtained from 110 suspected cases of onychomycosis according to standard procedure. Direct microscopy with 20% KOH and culture on Sabouraud's dextrose agar with or without cycloheximide were done. Fungal growths were identified by standard methods.

Results: Out of total 110 suspected cases of onychomycosis, 53(48.1%) were males and 57 (51.8%) females. Commonest age group affected was above 31 years. Incidence of finger nail involvement 60(54.5%) was more than toe nail 38(34.5%). Distal and lateral subungual onychomycosis (DLSO) was commonest clinical pattern (40.3%). Out of 110 samples, 62(56.7%) were positive by direct microscopy, 52 specimens (47.2%) were culture positive while 58 specimens (52.7%) yielded no growth. Dermatophytes were isolated in 23 (44.2%) specimens, Candida species in 16 (30.7%) and NDM in 13 (25%) specimens.

Conclusion: Dermatophytes remain the most common cause, but the role of non dermatophyte moulds as a causative agent of onychomycosis cannot be proven in this study.

Key words: Onychomycosis, Dermatophytes, Non dermatophyte moulds.

INTRODUCTION

Onychomycosis is a common fungal infection of nails and accounts for 20% of all nail infections.^[1] Predominant pathogens for onychomycosis are dermatophytes, however nondermatophyte molds (NDM) and yeasts (particularly candida albicans) are also implicated especially in previously traumatized or diseased nails.^[1-4] Factors

contributing to onychomycosis may be related to the increasing age, occupation, lifestyle, underlying physiology or immunosuppression, prior trauma, warm climate and occlusive footwear etc.^[1,5, 6] There are racial and geographic variations in the prevalence of different types of fungal infections depending upon environmental, socio-economic and cultural factors.^[1,4]

Onychomycosis has significant clinical consequences such as chronicity, therapeutic difficulties, secondary bacterial infections, disfigurement and it serves as reservoir of infection.^[7] Other skin conditions such as psoriasis, lichen planus, nail trauma can mimic onychomycosis. Therefore accurate diagnosis and laboratory investigations are essential for identification of causative microorganism and for starting antifungal agents with appropriate spectrum of activity as the clinical outcome of antifungal agents vary according to etiological pathogen.^[8,9] Hence this study was undertaken to identify the predisposing factors for onychomycosis and to evaluate clinicomycological pattern of onychomycosis in our tertiary care rural hospital.

MATERIALS AND METHODS:

110 suspected cases of onychomycosis in the age group of 11- 60

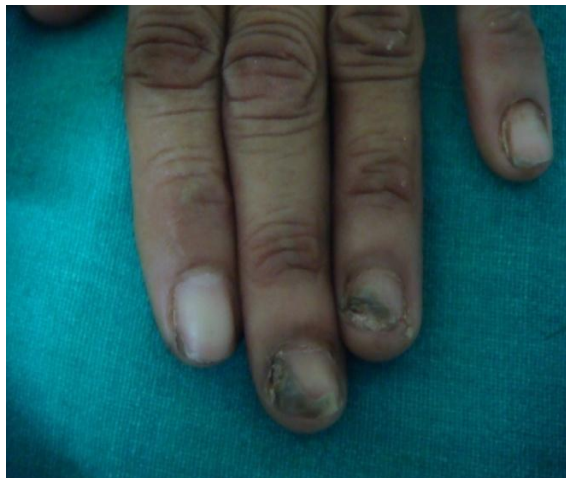


Photo 1: Distal and lateral type of onychomycosis.

Total dystrophic onychomycosis (TDO) is the end result of four main subtypes.^[10] Nail scrapings/clippings were obtained according to standard procedure.^[1,4] Before collecting nail clippings, the affected site was disinfected with 70% alcohol. All the specimens were subjected to direct

years were included in this cross-sectional study. Patients concurrently having nail lesions of psoriasis, lichen planus or other nail diseases were excluded from the study. The project was approved by Institutional Ethics Committee.

A detailed history including age, sex, occupation, socioeconomic status, predisposing factors (duration of wearing footwears in a day, contact time with water in a day, trauma etc.) associated diseases, duration of disease were taken.

Clinically there are four types of onychomycosis:

- Distal & lateral subungual onychomycosis (DLSO) (photo 1)
- Proximal subungual onychomycosis (PSO)
- White superficial onychomycosis (WSO)
- Candidal onychomycosis (CO)

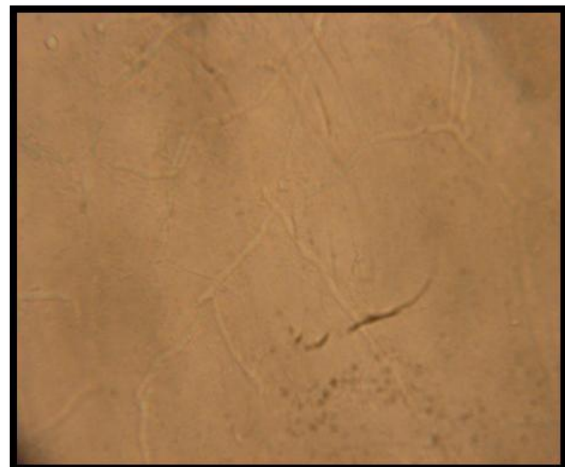


Photo 2: Direct microscopy(KOH mount) showing septate hyphae.

microscopy after keeping the specimens in 20% KOH for 24 hours for presence of fungal elements (hyphae, spores).(photo 2) Each sample was inoculated on Sabouraud's dextrose agar (SDA) with and without cycloheximide and incubated at 37°C and 25°C for four weeks. The SDA tubes were

observed biweekly for growth. The tubes were discarded only after 4 weeks in



Photo3: SDA slants showing growth of *T. rubrum*, *T. mentagrophytes* and *T. tonsurans*.

Fungal species were identified by the standard procedures i.e. gross colony morphology (photo 3) and microscopic appearance in lacto phenol cotton blue tease mount. [1,4] (photo 4,5) Slide culture was done on SDA in cases where tease mount of LPCB was inconclusive.

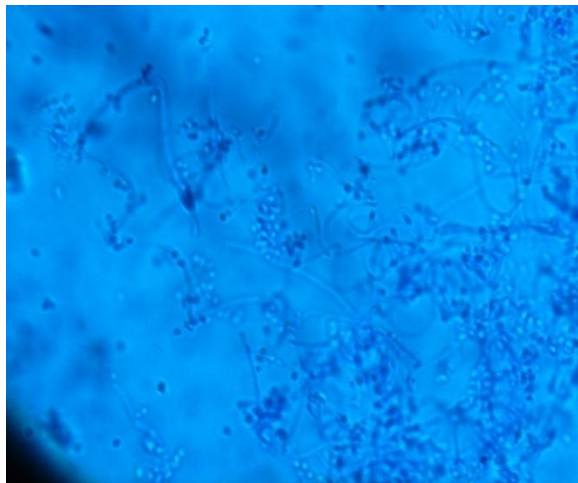


Photo 5: Trichophyton mentagrophyte showing spherical microconidia and spiral hyphae in LPCB tease mount.

Candida species were identified by Gram staining, germ tube test and

absence of growth.



Photo 4: *T. rubrum* showing macroconidia and teardrop shaped microconidia in LPCB tease mount.

production of chlamydospores on cornmeal agar. [1,4]

Diagnosis of nondermatophyte moulds from patient's sample as a pathogenic agent was based on following criteria: [11,12]

1. Hyphae or fungal element present in direct microscopy (KOH preparation) at least once.
2. Growth of more than 5 colonies of the same mould in three consecutive samples from the same patient.
3. Failure to isolate dermatophyte in culture.

RESULTS

Out of total 110 suspected cases of onychomycosis, 53(48.1%) were males and 57 (51.8%) were females. The maximum number of patients i.e.32 (29%) were found in the age group of 31-40 years followed by 24 patients (21.8%) in 41-50 years age group and 22 patients in 51-60 years age group. (Fig.1)

The majority of the patients (89%) in this study belonged to lower economic class and were engaged in occupations related to

agriculture and were unskilled labourers. (Fig 2) Duration of disease ranges from 0-1 year in 64 (58.7%) cases, 1-5 years in 34(30.9%) cases and >5 years in 12(10.9%) cases. Regarding predisposing factors, there was history of prolonged contact with water in 38(34.5%) cases, history of wearing occlusive footwear in 10 (9.1%) cases and history of nail trauma in 7 (6.7%) cases. Out of total 110 suspected cases of onychomycosis, associated fungal infections

were seen in total 22 cases(20%) which includes tinea corporis in 6 cases, tinea pedis in 4 cases, tinea manum 3 cases and combination in 3 cases (tinea corporis and pedis in 1case and tinea corporis and tinea manum in 2 cases) and paronychia in 6 cases. Associated immunocompromised conditions were seen in total 8 (7.2%) cases which include diabetes mellitus 5 cases (4.5%), patient on systemic steroids in 2 cases and 1 patient with HIV.

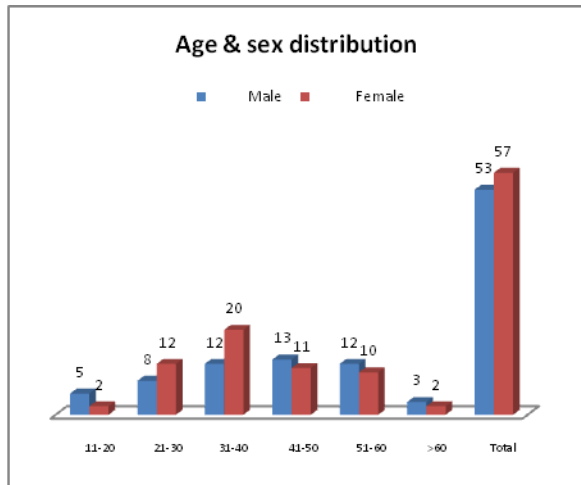


Figure 1: Bar diagram showing age and sex distribution of 110 suspected cases of onychomycosis.

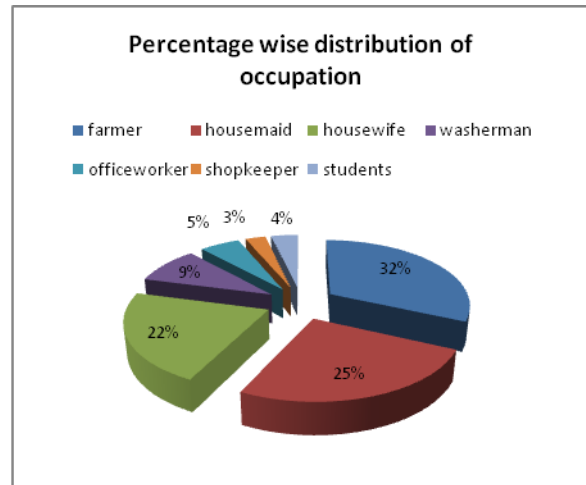


Figure 2: Pie diagram showing percentage wise distribution of occupation of 110 suspected cases of onychomycosis.

Incidence of finger nail involvement 60(54.5%) was more than toe nail 38(34.5%). Both finger and toenail were involved in 12(10.9%) cases.

Co-relation of findings of direct microscopy (KOH preparation) and culture for fungi was studied. Out of 110 specimens, 62(56.7%) specimens were positive by direct microscopy, 52 (47.2%) specimens were culture positive while 58 (52.7%) specimens yielded no growth.

Table 1: Correlation of the results of direct microscopy (KOH preparation) and culture.

Total specimens	KOH +	KOH -	KOH+& culture+	KOH-& culture+	Total culture +	Total culture(-)
110	62(56.7%)	48(43.6%)	38(34.5%)	14(12.7%)	52(47.2%)	58(52.7%)

Out of 52 culture positive specimens, DLSO was the commonest clinical presentation (40.3%) followed by TDO (30.7%), Candidial onychomycosis (CO) (21.1%), WSO(5.7%) and PSO(1.9%).

Out of 52 culture positive specimens, dermatophytes were isolated in 23 (44.2%) specimens, Candida species in 16 (30.7%) and NDM in 13(25%) specimens. (Table 2)

Most common isolated species was Trichophyton rubrum 12 (23%) followed by Trichophyton mentagrophytes 7 (13.4%), Trichophyton tonsurans 2(3.8%) and Microsporum gypseum 2(3.8%). So out of 52 culture positive specimens, anthropophilic dermatophytes were isolated in 21 (40.45) specimens and geophilic dermatophytes in 2 (3.8%) specimens.

Table2- Isolation of various species of fungi with clinical types of onychomycosis.

Clinical types	Dermatophytes				Candida species		NDM						
	T.rubrum	T.m	T.tonsuran	Misp.	albicans	tropicalis	A.n	A.fu	A.fl	Fus.	Cur	S	M
DLSO(21)	7	4	1	1	4	-	1	1	-	1	1	-	-
PSO (1)	-	-	-	-	-	-	-	-	1	-	-	-	-
WSO(3)	1	1	-	-	1	-	-	-	-	-	-	-	-
Co (11)	-	-	-	-	10	1	-	-	-	-	-	-	-
TDO(16)	4	2	1	1	-	-	2	1	-	1	1	2	1
Total (52)	12	7	2	2	15	1	3	2	1	2	2	2	1

T.m- Trichophyton mentagrophytes, Misp- Microsporium species, A.n.-Aspergillus niger, A.fu- Aspergillus fumigates, A.fl. –Aspergillus flavus, Fus.-Fusarium, Cur.-Curvularia, S-Scopulariopsis, M-Mucor

Candida albicans was isolated in 15(28.8%) specimens and Candida tropicalis in 1 specimen (1.9%). Aspergillus niger was isolated in 3 specimens(5.7%), Scopulariopsis species, Fusarium, Curvularia and Aspergillus fumigatus in 2(3.8%) specimens each and Aspergillus flavus , Mucor in one(1.9%) specimen each. In all these specimens, isolation of same NDM from same patients in 3 consecutive samples was not observed.

DISCUSSION

In the present study, onychomycosis was found to be commonest in the age group 31-40years which is in accordance with other studies.^[13-16] Female preponderance (51.8%) was observed in our study. In study by Kaur et.al,^[10] the infection was more prevalent in females (72.3%) than in males (27.7%). Predisposing factors such as increasing age, gender, occupation ,trauma along with associated diseases such as fungal infection (22cases), diabetes (5cases), systemic steroids(2 cases) and HIV (1 case) infection are the general risk factors for onychomycosis in this study.^[5]

In the present study finger nail involvement was more common than toenails which compares well with other studies.^[13,14,16,17] Finger nails are more prone to occupation related factors such as injuries, prolonged contact with water etc.

DLSO was the commonest presentation in this study. Other studies also reported high incidence of DLSO.^[16-18]

Out of 110 specimens, 62(56.7%) specimens were positive by direct microscopy and 52 specimens (47.2%) were culture positive. In study by Veer et al¹⁷ 81.8% samples were positive by direct microscopy and 48.8% were culture positive.

In the present study, out of 52 culture positive specimens, dermatophytes were isolated in 23 (44.2%) specimens, Candida species in 16 (30.7%)specimens and NDM in 13(25%) specimens which is comparable to study by Kaur etal^[10] in which dermatophytes were isolated in 40.5% specimens, yeast in 48% specimens and NDM in11.5% specimens.

Anthrphophilic dermatophytes were isolated from 40.4% of culture positive cases which is comparable with various studies.^[13-17] T. rubrum was the common isolate in this study which is in accordance with other studies.^[13,15,17] The identification of species of dermatophytes is of immense value for therapeutic purposes as the anthropophilic group causes chronic infection and may be difficult to cure. The zoophilic and geophilic dermatophytes cause inflammatory lesions, which easily respond to therapy and occasionally heal spontaneously.^[1,4] The clinical importance of identifying the species of dermatophytes is to find out the probable source of

infection and also for epidemiological reason.

In finger nail infections, yeast is recognised as pathogen [14] and *Candida albicans* is the commonest cause of paronychia onychomycosis. [1] In this study *Candida albicans* was isolated in 28.8% specimens and all six paronychia cases grew *Candida albicans*. In the present study NDM were isolated in 25% specimens and *Aspergillus niger* was the commonest followed by other NDM which is comparable to other studies. [10,15,17]

In all these cases, isolation of same NDM from same patients in 3 consecutive samples was not observed. Hence the pathogenicity of isolates could not be explained. Isolation of NDM may be attributed to frequent exposure to soil saprophytes in our patients. NDM may be recovered as contaminant from glabrous skin, hair and nails. Definite diagnosis of NDM onychomycosis is not easy. Stringent guidelines must be followed before accepting NDM as a causative agent of onychomycosis.

CONCLUSION

Onychomycosis generally regarded as cosmetic problem have significant clinical consequences. The identification of causative agent is of immense value for therapeutic purposes, epidemiological reason and to find out probable source of infection. DLSO was the commonest clinical presentation in this study. Dermatophytes especially *T. rubrum* and yeast i.e. *Candida albicans* were the predominant pathogens but the role of NDM as a causative agent of onychomycosis cannot be proven in this study.

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