
ORIGINAL ARTICLE

Clinico-Mycological Study of onychomycosis

Shreya Moozhiyil, Shreya Srinivasan, C.Geo Danny, Vignesh NR, K. Manoharan
Department of dermatology, Venereology and Leprosy, Sree balaji medical college & hospital,
Chennai.

ABSTRACT

Onychomycosis is a progressive, recurring fungal infection that begins in the nail bed and progresses to the nail plate. Although superficial, fungal nail infections should be taken seriously because they can cause significant health problems: a reservoir of fungal microorganisms is created that can be transmitted through shoes and direct contact. Consequently, infection can spread from the feet (in toenail onychomycosis) to other areas of the body within an individual patient. Infection can also be transmitted between susceptible individuals. Therefore this study was done to analyze the etiological spectrum and the clinical correlation in patients with onychomycosis, attending dermatology department at Sree Balaji Medical College and hospital and to also know the epidemiological profiles (i.e.) sex, age and occupational distribution of the patients.

Keywords: Dermatophyte infection, Tinea unguium, onychomycosis

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INTRODUCTION

The term onychomycosis is derived from the Greek word "onyx" meaning nail and "mykes" meaning fungus. Traditionally it refers to the non-dermatophyte infection of the nail and Tinea unguium describes the dermatophyte infection. But now, it is used as a general term for all fungal infections involving the nail. Onychomycosis constitutes 30% of mycotic cutaneous infections and 20-40% of all onychopathies and affects 5% of worldwide population. In India, it varies between 0.5 to 5%. The prevalence of onychomycosis in HIV patients is 25%. Even with improvement in personal hygiene and living environment, onychomycosis continues to persist and spread, the major reason being that it gets regarded as more of a cosmetic problem which requires no treatment. Recent studies show that onychomycosis can have significant negative effects on the patient's emotional, social, and occupational functioning. Affected patients may experience embarrassment in social and work situations, where they feel blighted or unclean, unwilling to allow their hands or feet to be seen. Dermatophytes, moulds and yeasts are known to cause onychomycosis. The various types are 1) distal lateral subungual onychomycosis (DLSO) 2) Proximal Subungual onychomycosis (PSO) 3) Superficial White onychomycosis (SWO) 4) Total nail dystrophy 5) Endonyx. Nowadays, the diagnosis is based on Potassium Hydroxide (KOH) wet mount preparation and fungal culture. But histopathology of the nail is the single most sensitive tool for diagnosis. Treatment of onychomycosis includes- oral, topical, mechanical and chemical therapies or a combination of these. Therefore this study was done to analyze the etiological spectrum and the clinical correlation in patients with onychomycosis.

MATERIAL AND METHODS

Study Design: Cross sectional study

Study area: Dermatology Outpatient department, Sree Balaji Medical College and Hospital

Study population: All patients attending dermatology OPD were clinically diagnosed with onychomycosis

Study sample: 40

INCLUSION CRITERIA

- All clinical types of onychomycosis irrespective of age, sex and comorbidities
- Patients consenting for the study

EXCLUSION CRITERIA

- Patients not consenting for the study
 - Patients who have taken treatment in the past 4 weeks
 - Other nail disorders like psoriasis, lichen planus and other nail dystrophies
 - The recruited patients were subjected to the following
 - Full history was taken
 - Through general and dermatological examination
 - Specimens were collected which were subjected to
1. Direct microscopy using 40% KOH
 2. Culture in Sabouraud's Dextrose agar containing chloramphenicol (50mg/L) and cyclohexidine (500mg/L).

This study was undertaken after obtaining clearance from the ethical committee of Sree Balaji Medical College and Hospital. The consent form, proforma and the master chart are enclosed in annexure.

Statistical Analysis:

A cross sectional study was carried out in 40 patients to establish a relationship between the clinical features and isolation of fungus in each. The distribution of qualitative variables such as gender, age, occupation, aggravating factors, and type of onychomycosis, associated conditions and KOH positivity was expressed in terms of frequency with percentage. The association of type of onychomycosis, nails involved and clinical presentation with culture was carried out by using chi square test. All analysis was carried out at 5% level of significance and a p value of less than 0.05 was considered significant. The analysis was performed using SPSS and graph were created in MS excel.

RESULTS AND DISCUSSION

The clinical changes looked for in these patients were – onycholysis, discolouration, paronychia, and nail dystrophy. The most common change noted was discolouration, which was seen in 36 patients followed by onycholysis in 35 patients. Among the 40 patients studied, 35 of them showed onycholysis with most of them showing onycholysis of only 1 finger nail – 32.5% (Table 1). The finding was noted with discolouration of the nail, where again 1 nail involvement was the most common-32.5% (Table 2). Paronychia was noted in 21 patients and it was limited to either one nail fold (47.5%) or two (5%). Subungual hyperkeratosis was seen in 20 patients and again it was limited to one nail (35%) or two nails (15%). The next change studied was dystrophy, which was seen in 23 patients and was mostly restricted to one nail (47.5%).

GENDER WISE DISTRIBUTION OF ONYCHOMYCOSIS:

(Table 1)- Of the 40 patients studied, females outnumbered the males (62.5% females and 37.5% males). This was mainly due to the higher cosmetic concern, and indulgence of women in more domestic activities like washing, cooking and gardening. In a study by Madhuri *et al* [1], females were more affected-57.96%. In contrast, Neupane *et al* [2] and Garg *et al* [3] reported that males outnumbered the females.

AGE DISTRIBUTION :

(TABLE 2) In this study, the highest incidence was seen between the age groups of 41-60 years (42.5%). This is in accordance with a study by Mohammed and Sayed [4], which showed that most of them were in the age group of 40 -49. The highest incidence in this age is possibly due to occupation related trauma, increased exposure to wet work and household responsibilities.

OCCUPATION WISE DISTRIBUTION:

(TABLE 3) Of the 40 patients studied, the highest incidence was noted among housewives-16(40%) followed by school going students 5 (12.5%) followed by engineers, construction site workers and vendors, each with 3 cases (7.5%). This can be associated to the high domestic activity done by females. In school children, engineers and construction site workers, it must be high due to their occlusive footwear. Vendors are more prone for trauma; hence the cases were more among them as well. In a study by Neupane *et al* [2], it was observed that the highest cases were seen among housewives, agriculturist, labourers, industrial workers and students.

DISTRIBUTION ACCORDING TO DURATION:

In 25% of the patients, the duration was 3 months, followed by 6 months. On an average most of the cases reported had duration less than 1 yr. This finding was in agreement with the study conducted by

Neupane *et al* [2], which showed that maximum patients (66%) had the disease for less than 1yr. (TABLE 4).

DISTRIBUTION OF AGGRAVATING FACTORS:

(Table 5) Most of the patients didn't have any aggravating factors (45%), 14 out of the 40 patients showed that moisture was the aggravating factor(35%) followed by 4 patients having tight footwear(35%). In a study by Kaur *et al* [20], occlusion, moisture and warmth provided by occlusive footwear was the predisposing factor.

FINGER AND TOE NAIL DISTRIBUTION

(Table 5, Table 6, Table 7 and Table 8) In this study, finger nail involvement was more than toe nail involvement. The right hand nails (22 patients) were more involved than left (13 patients). Among toe nails, right nail involvement was more common (21 patients) than left toe nails (17 patients). These results were similar to the study done by Grover [9] which showed that finger nails were more commonly involved.

DISTRIBUTION OF CLINICAL TYPE:

(Table 9) In this study, the most common type was Distal lateral subungual onychomycosis (52.5%) followed by total dystrophic type (25%) and then proximal onychomycosis (22.5%). This finding was in accordance with reports by Grover [9], Bokhari *et al* [7] and Garg *et al* [3].

CO-EXISTING SUPERFICIAL FUNGAL INFECTION:

(Table 16) out of the 30 patients, 7 of them showed co-existing fungal infection. Tinea cruris was the commonest (12.5%) followed by *Tinea corporis* (5%). In a study by Neupane *et al* [2], it was found that 58.2% of onychomycosis coexisted with other superficial fungal infection.

COEXISTING SYSTEMIC DISEASES:

(Table 17) Out of the 40 patients with onychomycosis, 15% were found to have diabetes mellitus and 10% had hypertension. Garg *et al* [3] reported that onychomycosis was associated with diabetes mellitus in 4.4%

KOH AND CULTURE :

Out of the 40 patients, 95% of the patients were KOH positive and showed fungal elements. (Table 10, Table 11 and Table 12).

The culture positivity rate in our study was 25%. The most common organisms isolated were, *Trichophyton rubrum* and candida species followed by *Trichophyton mentagrophytes*, *Aspergillus* species.

CLINICO-ETIOLOGICAL CORRELATION:

It was found that there was no significant association between the clinical features and isolation of the fungus by culture. Finger and toe nail involvement also did not show any significant association with the isolation of fungi by culture. The most common pathogen to cause DLSO was candida and TDO by *Trichophyton rubrum*, *Trichophyton mentagrophytes* and *Aspergillus* species. Kaur *et al* [5] in his study reported that trichophyton rubrum was the most common cause for DLSO and TDO. (Table 13, Table 14, Table 15, Table 16, Table 17, Table 18).

TABLE 1: Gender distribution

	Frequency	Percent
Females	25	62.5
Males	15	37.5
Total	40	100.0

TABLE 2: Age distribution

Age distribution	Frequency	Percentage
0-20	3	7.5
21-40	15	37.5
41-60	17	42.5
61-80	5	12.5

TABLE 3: Occupation frequency

	Frequency	Percent
Business	1	2.5
Construction	3	7.5
Electrician	1	2.5
Engineer	4	10
Housewife	16	40.0
Labourer	1	2.5
Unemployed	1	2.5
Office work	2	5.0
Shop owner	1	2.5
Student	5	12.5
Teacher	2	5.0
Vendor	3	7.5
Total	40	100.0

TABLE 4: frequency of duration

	Frequency	Percent
Six months	9	22.5
One Year	4	10.0
Nine Months	5	12.5
Seven Months	3	7.5
Two Years	3	7.5
Three Months	10	25.0
Five Months	1	2.5
Ten Months	1	2.5
One Year Six Months	3	7.5
Eight months	1	2.5
Total	40	100.0

TABLE 5: Aggravating factors

	Frequency	Percentage
Unknown	17	42.5
Moisture	14	35
Footwear	9	22.5

Table 6: Onycholysis

	Frequency	Percent
No Onycholysis	5	12.5
One Nail	13	32.5
Two Nails	11	27.5
Three Nails	7	17.5
Four Nails	2	5.0
Five Nails	1	2.5
Six Nails	1	2.5
Total	40	100.0

TABLE 7: Discolouration

	Frequency	Percent
No Discolouration	4	10.0
One Nail	13	32.5
Two Nails	8	20.0
Three Nails	6	15.0
Four Nails	6	15.0
Five Nails	2	5.0
Six Nails	1	2.5
Total	40	100.0

TABLE 8: Paronychia

	Frequency	Percent
No Paronychia	19	47.5
One Nail	19	47.5
Two Nails	2	5.0
Total	40	100.0

TABLE 9: Dystrophy

	Frequency	Percent
No Dystrophy	17	42.5
One Nail	19	47.5
Two Nails	4	10.0
Total	40	100.0

TABLE 10: Finger Nail- Right

	Frequency	Percent
No Nail	18	45.0
One Nail	10	25.0
Two Nails	10	25.0
Three Nails	1	2.5
Four Nails	1	2.5
Five Nails	40	100.0

TABLE 11: Finger Nail Left

	Frequency	Percent
No Nail	27	67.5
One Nail	8	20.0
Two Nails	4	10.0
Three Nails	1	2.5
Total	40	100.0

TABLE 12: Toe Nail Right

	Frequency	Percent
No Nail	19	47.5
One Nail	15	37.5
Two Nails	3	7.5
Three Nails	2	5.0
Four Nails	1	2.5
Total	40	100.0

TABLE13: Toe Nails - Left

	Frequency	Percent
No Nail	23	57.5
One Nail	8	20.0
Two Nails	8	20.0
Three Nails	1	2.5
Total	40	100.0

TABLE 14: Clinical Type

	Frequency	Percent
Distal Lateral Subungual Onychomycosis	21	52.5
Total Dystrophic Onychomycosis	10	25.0
Proximal Subungual Onychomycosis	9	22.5
Total	40	100.0

TABLE 15: Associated Cutaneous

	Frequency	Percent
No Association	33	82.5
Tinea corporis	2	5.0
Tinea cruris	5	12.5
Total	40	100.0

TABLE 16: Associated Systemic Conditions

	Frequency	Percent
No Associations	30	75.0
Type 2 Diabetes Mellitus	6	15.0
Hypertension	4	10.0
Total	40	100.0

TABLE 17: Potassium Hydroxide Mount

	Frequency	Percent
Yes	38	95.0
No	2	5.0
Total	40	100.0

TABLE 18: Culture Study

	Frequency	Percent
No growth	30	75.0
Trichophyton rubrum	3	7.5
Aspergillus	1	2.5
Candida	3	7.5
Trichophyton mentagrophytes	2	5.0
Epidermophyton floccosum	1	2.5
Total	40	100.0



Figure 1: Fingernails showing discoloration



Figure 2: Toe nails showing discolouration and onycholysis



Figure 3: Right thumb showing nail dystrophy



Figure 4: Finger nails with DLSO



Figure 5: TDO type in toe nails

CONCLUSION

The females outnumbered the males. Most of them were married. Although a wide range was affected, the commonest age group to be involved was between 41-60. Highest number was noted in housewives and the main reason must be their constant exposure to moisture. This was followed by school children, and here the reason must be the shoes and constant trauma due to playing. Most of the cases here had an average duration of less than a year. Moisture was noted to be the most common aggravating factor followed by occlusive footwear. Among the clinical changes seen, discolouration was the most common and was seen in most of the patients followed by onycholysis. Fingernails were more commonly involved than toenails. Fingernails were more involved in females and toe nail involvement was common among men. Among the 5 types of onychomycosis, distal lateral subungual onychomycosis was found to be the most common followed by total dystrophic type and proximal type. White superficial and endonyx were not encountered. Around 15.5% of the affected people showed coexisting superficial fungal infections and the most common among them was *Tinea cruris* followed by *Tinea corporis*. 15% of the cases had diabetes mellitus along with onychomycosis. KOH was found to be positive in 95% of the cases showing that it's a sensitive test. The fungal culture positivity rate was found to be 25%. The most common isolates were *Trichophyton rubrum* and *Candida* species. It was found that *Candida* species were the most common causative organism for DLSO type. In our study, we couldn't establish any significant correlation between the clinical features and the fungal culture.

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