

Clinical and Mycological Study of Onychomycosis**Rajesh Somkuwar¹, Ishita Dani², Priyanka Hemrajani³, Chetan Oberai⁴**¹MBBS, MD Dermatology, Venereology and Leprosy Consultant Dermatology, Al Salaam International Hospital, Kuwait²MBBS, Postgraduate Resident Department of Dermatology, Venereology and Leprosy, ESIC medical College & Hospital, Faridabad³MBBS, MD Dermatology, Venereology and Leprosy Consultant Dermatology, ESIC Hospital, Okhla⁴MBBS, MD Dermatology, Venereology and Leprosy Professor & Ex HOD, Department of Dermatology, Venereology and Leprosy, Grant Medical College & Sir JJ Group of Hospitals, Mumbai

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Conflict of interest: Nil

Abstract:**Introduction:** Onychomycosis is dermatophytic infection of the nails.**Aims:** To study the epidemiology, clinical presentations and to identify the various causative fungi causing onychomycosis.**Methods:** The study was a prospective study with 100 random patients with nail problems and 50 patients of clinically suspected untreated fungal infection.**Results:** Onychomycosis accounts for upto 50% of all nails problems. Risk factors for the disease include trauma, occupation, immunocompromised persons, diabetics and others. Distal and Lateral subungual onychomycosis is commonly found. Majority of dermatophytic infection is caused by *Trichophyton rubrum* while *Aspergillus* in non-dermatophytes.**Conclusions:** The purpose of this study is to document the incidence, prevalence, contributing factor, associated diseases, the common types and the causative agents of onychomycosis and also, to observe the psychosocial and occupational consequences of onychomycosis amongst the patients.**Keywords:** Onychomycosis, Dermatophytes, Nail.

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Introduction

Onychomycosis is dermatophytic infection of the nails.

Aims and Objectives

1. To study the prevalence and epidemiology of onychomycosis.
2. To study the clinical presentations of onychomycosis.
3. To identify the various causative fungi microbiologically.

Materials and methods

This study was carried out in the outpatient clinic of the Department of Dermatology and Venereology of a teaching hospital in collaboration with microbiology department, from November 2004 to May 2005. Out of 100 random patients with nail problems, 50 patients of clinically suspected untreated fungal infection were included in this study.

Patients were screened for nail symptoms for a period of three months and adults of both sexes were included in the study. Involvement of multiple

fingers and / or toenails, subungual hyperkeratosis, onycholysis and associated fungal infection like tinea pedis, tinea corporis and cruris, were the presenting complaints.

Inclusion Criteria:

- Patients between 20 to 60 years of age
- Clinically suspected onychomycosis (irrespective of the types)
- Not received any antifungal treatment previously

Exclusion Criteria:

- Patients less than 20 and more than 60 years of age
- Previously received any antifungal.
- Pregnant and lactating females
- Patients detected HIV Positive

History: A detailed clinical history was recorded of each patient with reference given to the occupation. Special emphasis on the type of occupation such as farming, gardening, manual labouring, was given. Following details were noted:

- History of trauma (physical, chemical, mechanical)
- History of drug intake or contact with chemicals, cosmetics.
- History of diabetes mellitus
- History of other associated illness

Examination and investigations:

1. In all these patients, complete general & cutaneous examination was carried out.
2. Detailed examination of the nail unit was performed, and the findings were noted in the tabulated form.
3. The clinical type of onychomycosis, number of finger / toenails involved and other associated nail changes such as nail discoloration, subungual hyperkeratosis, crumbling, pitting, thickening, dystrophy of nail plate were noted.
4. Sample collection was done by nail scraping and clipping depending upon the site of involvement after thorough cleaning of nail with spirit.
5. Direct microscopy of the KOH mount was done after overnight incubation of the nail specimen in 20% KOH.
6. Nail specimens were cultured on Sabourauds Dextrose Agar (SDA), with Chloramphenicol

and with or without Cycloheximide. Specific media for dermatophytes was also used i.e. Dermatophyte Test Medium (DTM).

7. Two culture slants were made; one maintained at room temperature and the other was incubated at 37°C.
8. The cultures are observed at least twice a week for the total period of four weeks. Cultures were discarded, if there was no growth at the end of 4 weeks.
9. Culture tubes were examined for color of the colony surface and reverse, topography, texture, and rate of growth.
10. In presence of growth, a loopful of growth was taken and examined using a Lacto Phenol Cotton Blue (LPCB) mount. Slide culture was also done if required and was examined for characteristic morphology.
11. Both clinical photographs with KOH and culture microscopic photographs were taken.
12. The results were noted, and a detailed analysis was done.

Observations and Results: The following results were noted and conclusions were drawn.

Age Distribution:

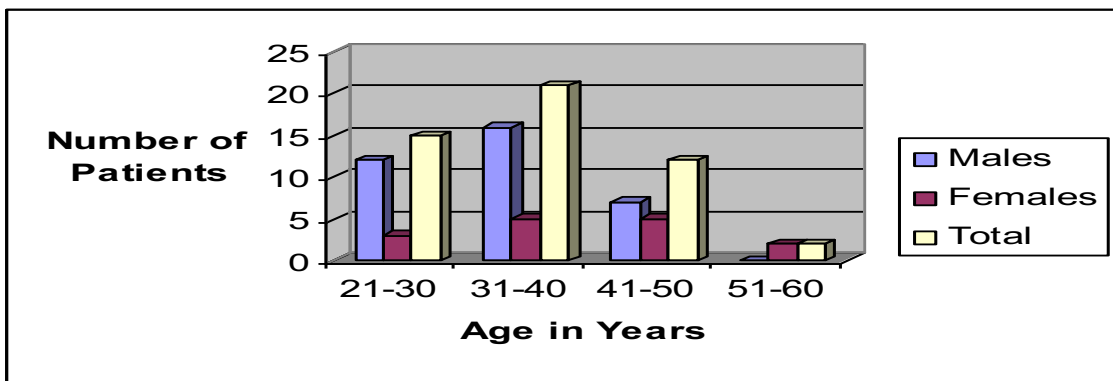


Figure 1: Age Distribution

Nail involvement:

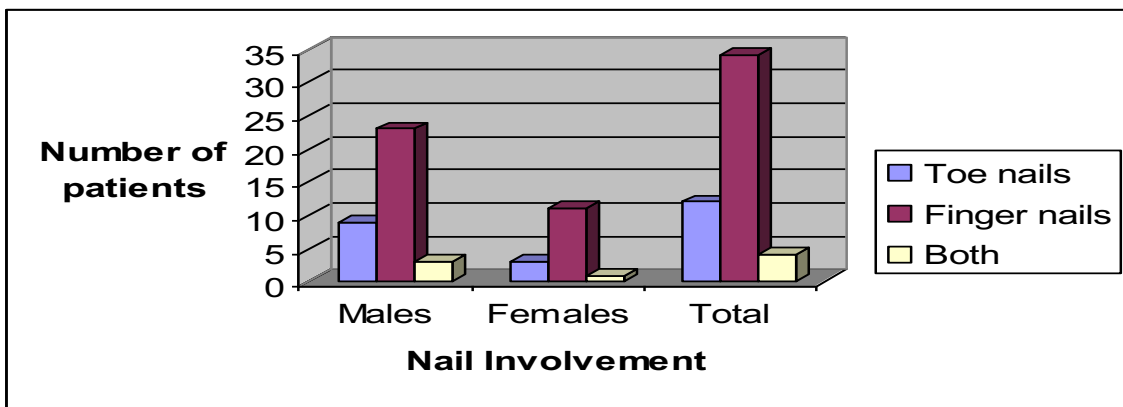


Figure 2: Nail involvement

Predisposing factors:

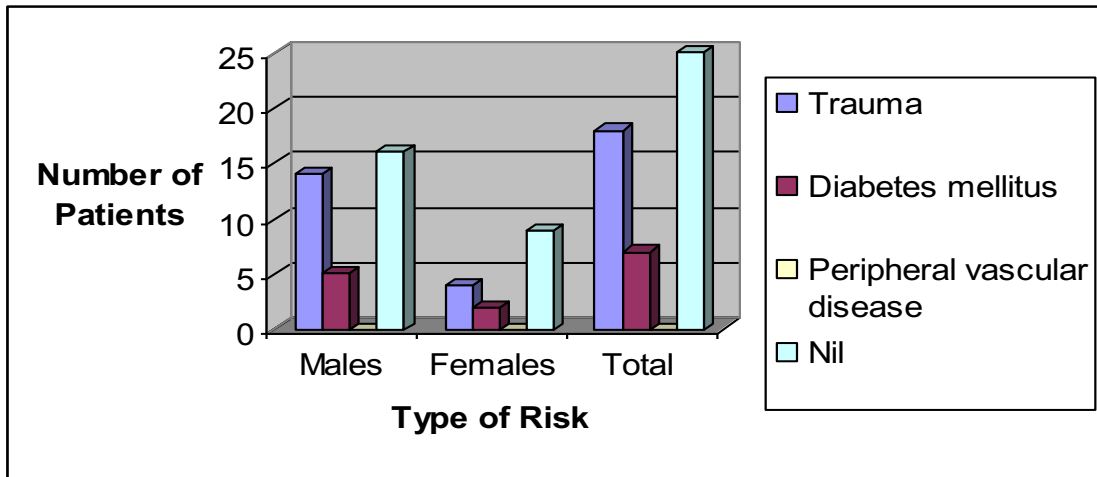


Figure 3: Predisposing factors

Associated dermatophytosis:

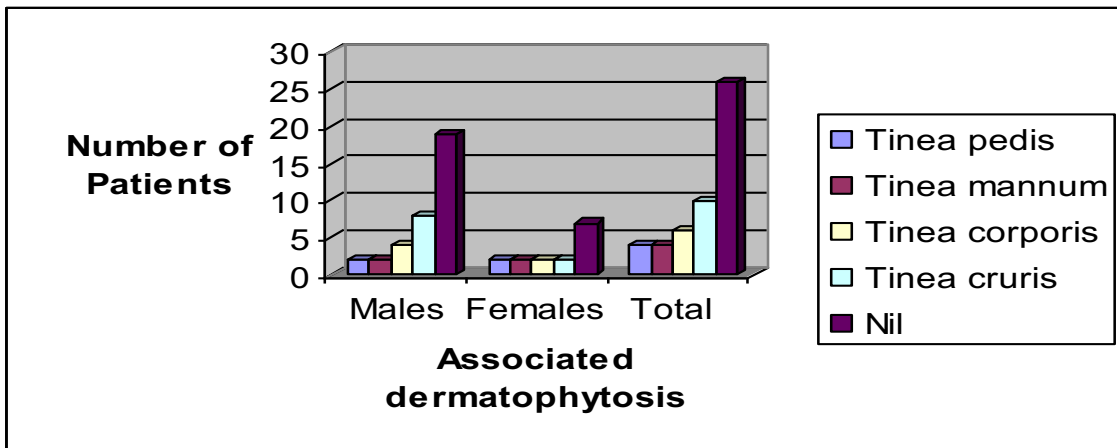


Figure 4: Associated dermatophytosis

Clinical types of onychomycosis: The following shows the various types of onychomycosis included in the study:

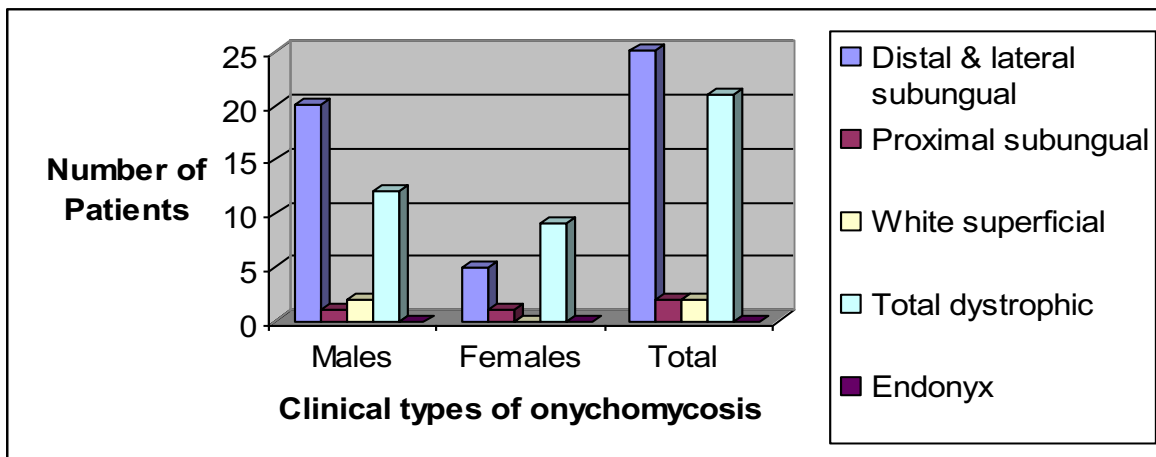


Figure 5: Clinical types of onychomycosis

Microscopy (KOH mount) for fungal elements:
Fungal elements were demonstrated in 39 patients

(78 %) and in remaining 11 patients no fungal elements were seen.

Fungal species isolated in culture.

Fungus was grown in 32 cultures out of 50 while no fungus was grown in 18 cultures.

Species isolated in cultures.

Out of 50 cultures, dermatophytes were isolated in 10 (20 %), nondermatophytes in 22 (44 %) and no growth were seen in 18 cultures (36 %).

Specific species isolated in cultures.

10 positive dermatophyte cultures and 22 non-dermatophytic cultures were isolated with the following species distribution:

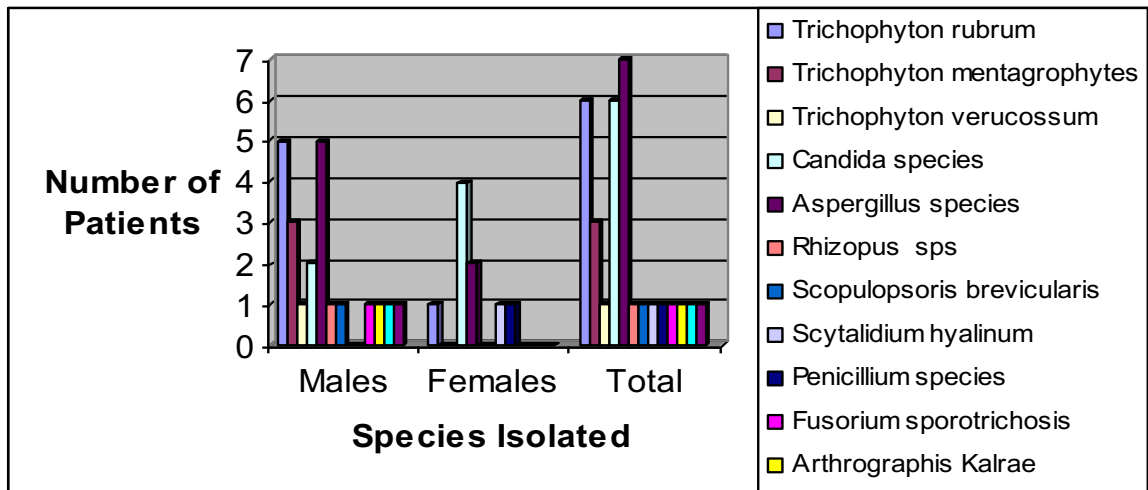


Figure 6: Specific species isolated in cultures

Discussion

Onychomycosis accounts for upto 50% of all nails problems. At least 15% to 20% of persons between 40-60 years of age may have this disease. In addition, immunocompromised persons, diabetics, and athletes are also considered to be at risk.

Prevalence: The prevalence of onychomycosis in our study was 50% (50/100).

The most common age group affected in our study was between 31-40 years population, which corresponds to the findings in Grover S (mean age 20-40 years) and Vijaya D studies (mean age 32 years). This could be due to increased exposure to occupational trauma, and to fungal pathogens with age.

In our study, out of 50 patients 35 were male and 15 were females with sex ratio of 2.4:1 consistent with Grover S (sex ratio 1.42). Out of 35 males, 21 were labourers while 13 were servicemen. In females, majority of them were housewives.

This it explain the role of occupation in the pathogenesis of onychomycosis. Occupations, which are more prone for nail trauma like manual labouring, farming favour the growth of fungus, and thereby causing onychomycosis. In housewives frequent contact with water and detergent damage the cuticle, which then favour the invasion of fungus.

Trauma was the major predisposing factor in our study (36 %), which was followed by diabetes

mellitus (14 %). Also, males comprised the larger group of patients who gave a history of trauma.

Both mechanical and chemical trauma was involved. A mechanically damaged nail provides the ideal medium for fungal organisms to invade easily and thrive. Similarly, contact with chemicals like detergents damage the cuticle, which in turn favours the invasion by fungus.

Impaired blood supply and associated neuropathy in diabetes favor fungal growth.

In our study associated dermatophytosis was noted in 34 out of the 50 patients enrolled. Tinea cruris was the most common finding, present in 10 patients (20%).

Existing dermatophytic infection may favours the invasion of nail by the same fungus or it could be just an incidental finding as the species isolated were not causing dermatophytic infection of the skin.

In our study, finger nail involvement was seen in 34 patients out of 50 cases studied while 12 had toe nail involvement and 4 had both toe as well as finger nail involvement because of more susceptibility of the fingernail to trauma with subsequent invasion by the fungus.

Clinical types: Distal and Lateral subungual onychomycosis is commonly found in most of the patients due to repeated trauma over distal areas of nail which gives entry for pathogenic fungi.

Total dystrophic onychomycosis is not commonly seen in normal individuals. Its presence in patients may be due to the occupation which leads to repeated trauma and also the constant contact with water leading to paronychia, which enables the fungus to invade the entire nail and cause dystrophy.

Fungal organism isolated:

Trichophyton rubrum constituted the majority of dermatophytic infection while *Aspergillus* was majority in non dermatophytes.

Also nondermatophytes were isolated in majority as compared to dermatophytes, which is consistent with Jesudanam and Grover et al studies.

This could be because of –

1. Increased susceptibility to non-dermatophytes patients
2. Environmental factors that favor the growth of non-dermatophytes.

Summary and Conclusions

Increased participation in physical activity, increased exposure to wet work, shoe wearing habit among this age group and early marriage leading to new household responsibilities could be some of the contributing factors for the increased prevalence in the 21-40 years age group. *Tinea unguium* is more than a cosmetic problem, although persons with this infection are often embarrassed about their nail disfigurement. Because it can sometimes limit mobility, onychomycosis may indirectly decrease peripheral circulation, thereby worsening conditions such as venous stasis and diabetic foot ulcers. [4]

The following conclusions were drawn from our study.

1. The prevalence of onychomycosis in our study was found out to be 50%.
2. The pre-dominant age group affected was between 31-40 years (42 %).
3. Males were predominantly involved.
4. In males most of the patients were laborers by occupation while majority of females were housewives.
5. Previous history of trauma was the major predisposing factor (44.66%), along with diabetes mellitus (14 %).
6. *Tinea cruris* was the most frequent associated dermatophytosis (20 %).
7. Fingernail involvement was more frequent than toenail involvement (68 %).
8. The predominant clinical type of nail involvement was found to be Distal and lateral subungual onychomycosis (50 %).
9. Out of 50 patients, fungal elements were demonstrated in 39 on microscopy.

10. On culture, fungal growth was seen in 32 patients; out of which 10 had dermatophytic and remaining 22 patients had non-dermatophytic growth. Amongst dermatophytes, *Trichophyton rubrum* was the most common species isolated (5 out of 10). Amongst non-dermatophytes, *Aspergillus* species constituted the majority (7 out of 22). Other yeasts and molds species, which were isolated, included *Candida* (4), *Scytalidium hyalinum* (1), *Chrysosporium* (1), *Penicillium* (1), *Rhizopus* (1), *Scopulosporiosis brevicularis* (1), *Exofiala* (1), *Cheatomium globosus* (1), *Fusarium* (1), *Arthrographis Kalrae* (1).

Our study was consistent with earlier studies is the clinical type of onychomycosis. Distal and lateral subungual onychomycosis was observed in most of our patients. The more vigorous nature of the Indian lifestyle could be the probable cause of this discrepancy. Also, since total dystrophic onychomycosis is the end result of evolution of any of the other clinical forms, our study even show this variety to be the second most common type.

Although microscopy revealed the presence of fungus in only 39 patients, it is still an important weapon in the diagnostic armamentarium of the dermatologist.

Culture was positive in 32 patients. When done in conjunction, these procedures can ensure that more patients can be diagnosed and appropriately treated.

There was one strong difference in our results was the species of fungus isolated. Dermatophytes were isolated in only 10 patients in our study. This is consistent with the findings in earlier studies, wherein nondermatophytes constituted the majority (Jesudanam et al and Vijaya D et al¹ studies). The ubiquity of a large and varied species of fungi in our environment, as well as the active nature of our lifestyles, which increases the vulnerability to trauma, may be probable causes.

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