

## Clinico mycological study of Onychomycosis

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### Abstract

**Introduction:** Onychomycosis is a superficial fungal infection of the nail bed, matrix or plate, caused by dermatophytes, non-dermatophyte moulds and yeasts.

**Aims and Objectives:** To study the epidemiological aspects, various etiological agents, clinical types, clinico etiological correlation and the changing trends.

**Materials and Methods:** All new patients with onychomycosis were included for the study. 89 patients in all age groups were selected. KOH smear and fungal culture were performed from the nail clippings of those patients. The epidemiological factors and the clinico etiological correlation were also assessed.

**Results:** Onychomycosis was found most commonly in the 31-60 years age group with a female preponderance. Trauma and diabetes were the most common predisposing factors. Finger nail involvement was found more than the toe nail involvement. Distal and lateral subungual onychomycosis was the most common type. Non-dermatophyte moulds were commonly isolated than dermatophytes and yeasts. The clinico etiological correlation reveals that a single pathogen may produce the various clinical types.

**Keywords:** Onychomycosis, Morphological types, Aspergillus, Candida, Non-dermatophyte moulds.

**Key Message:** In any given location the dermatophyte species causing onychomycosis may change with time particularly, as new organisms are introduced by immigration. This study is done to demonstrate this changing scenario.

### Introduction

The term onychomycosis is derived from the greek word 'Onyx' which means nail and 'mykes' meaning fungus. Onychomycosis accounts for 50% of nail diseases and 30% of all mycotic skin infections.<sup>(1)</sup> Onychomycosis is regarded mainly as a cosmetic problem of minor importance to seek treatment.

Onychomycosis occurs at a prevalence rate of 2-18% worldwide. In India incidence varies from 0.5 to 5%.<sup>(2)</sup> The prevalence rate is determined by age, occupation, climate, living environment and frequency of travel. It is more common among men than women and increases with age, as males are more exposed to an environment conducive to the spread of organisms.<sup>(3)</sup>

Upto 90% of mycotic toe nail infections and 50% of finger nail infections are caused by dermatophytes.<sup>(11)</sup> Yeasts causes 5% of onychomycosis, majority of which is caused by *Candida albicans*.<sup>(12)</sup> 4% of cases of onychomycosis are caused by nondermatophyte moulds like *Scytalidium dimidiatum*, *S.hyalinum*, *Aspergillus*, *Fusarium*, *Onychocola Canadensis*, *Curvalaria*, *Scopulariopsis brevicaulis*, *Syncephalastrum* and *Aureobasidium paullulans*.<sup>(13,14)</sup>

We have done this study to know about the changing trends in the causative agents as well as the various host factors and the relationship of fungi with the clinical manifestations.

### Materials and Methods

This randomized single-blind longitudinal study was undertaken over a period of 2 years for all new patients with onychomycosis, who attended our

dermatology department. Informed consent was obtained from them.

The inclusion criteria were all patients with onychomycosis, any age group of both sexes. The exclusion criteria were patients who had taken topical antifungal treatment 2 weeks and systemic antifungal treatment 4 weeks prior to the study. Age, sex and duration of the disease were recorded. The detailed history with respect to socio economic status and similar lesions in siblings were taken. Dermatological examination and systemic examination were done.

Samples of nail scrapings and nail clippings were analyzed by KOH mount. KOH positive and negative specimens were cultured on Sabourauds dextrose agar with and without actidione. The rate of growth, colony morphology, pigment production and microscopic examination in lactophenol mount were used for the confirmation of the isolates. All the data was analyzed statistically with SPSS software.

### Results

A total of 89 clinically diagnosed cases of onychomycosis were included in the study. The most common affected age group was 31 to 60 years. Infection was less common in the age group below 10 years. Females were affected more than males, 52 females out of total 89 patients. The age and sex distribution is presented in Table 1.

**Table 1**

Age in years	No. of Males	No. of Females
0-10	-	1
11-20	5	4
21-30	8	7
31-40	7	12
41-50	9	8
51-60	4	17
>.60	4	3

Among those with occupational exposure, 37 patients were housewives and 12 were hotel staffs. Manual labourers and farmers were also affected. The family history of nail fungal infection was found in 15 cases. The duration of illness was < 6months in 41 patients,6 months to 1 year in 21 patients,1 to 2 years in

7 patients and >2 years in 20 patients. The history of trauma was seen in 12 patients. Association with other clinical types of fungal infections was observed in 21 patients. 36 patients were having finger nail involvement, 11 patients were having toe nail involvement and 42 were having both finger & toe nail involvement.

Distal and lateral subungual onychomycosis (DLSO) was the most frequent clinical pattern observed in 40 patients, followed by Total dystrophic Onychomycosis type (TDO) in 26 patients. DLSO and TDO both types in 10 patients and proximal subungual Onychomycosis type (PSO) in 7 patients. The least common type noted was superficial white onychomycosis (SWO) in only one patient. The clinical pictures noted as in Fig. 1 and 2.



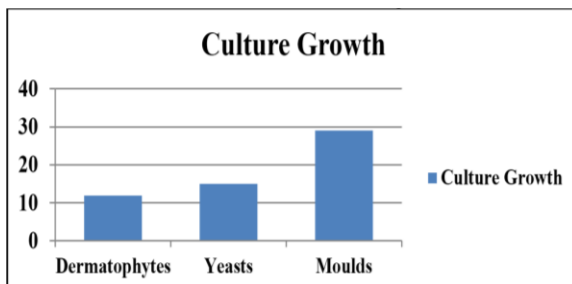
**Proximal subungual onychomycosis      Total dystrophic subungual onychomycosis**  
**Fig. 1: (PSO &TDO)**



**Distal and lateral subungual onychomycosis      Superficial white onychomycosis**  
**Fig. 2: (DLSO & SWO)**

The fungal pathogens identified by culture as shown in the Fig. 3.

Yeasts and dermatophytes were isolated in 15 and 12 specimens respectively while nondermatophyte moulds were isolated in 29 samples.



**Fig. 3**

In cultures with yeast growth, *Nonalbicans candida* was isolated in 8 cases, followed by *candida albicans* in 7 cases. From the nondermatophyte moulds growth, *aspergillus niger* was isolated in 15 cases followed by *rhizopus* in 5, *syncephalastrum* in 4, *curvalaria* in 2, *aureobasidium pullulans* in 2 and *scopulariopsis* in 1.

In cultures with dermatophyte growth, *T.rubrum* was isolated in 5 cases followed by *T.verrucosum* in 2, *T.schoenlenii* in 2, *T.mentagrophytes* in 2 and *T.violaceum* in 1 sample. The fungal pathogens identified as shown in Fig. 4 and 5.



**Fig. 4: Candida growth**



**Fig. 5: T.rubrum growth**

### Discussion

In our study, the common age group affected was 31 to 60 years. Females were affected more due to higher number of female respondents in our study. The sex ratio was 1:1.4. The history of trauma and diabetes were present in most of the patients. Dogra S et al reported that diabetics were 2.5 times more likely to be affected because of impaired circulation and peripheral neuropathy.<sup>(4)</sup>

Most of the patients in this study group (70.4%) belonged to low socioeconomic status. Studies by Singh et al showed that around 68% of patients were from low socioeconomic status.<sup>(5)</sup>

The patients with other skin diseases were too low to draw any conclusion on the prevalence of onychomycosis, in conjunction with other skin diseases. In this study fingernails were involved more often than toe nails. This has also been reported by the other authors like Veer et al and Patwardhan NS.<sup>(6)</sup> A higher incidence of finger nail involvement may be the result of trauma.

Distal and lateral subungual onychomycosis was the most common clinical pattern observed in our study which is similar to the study by Garg A, Singh et al in 2004.<sup>(7)</sup>

In our study, direct microscopic examination was positive in 25.8% samples, culture growth was positive in 15.7% and both positive in 58.4%. The non-dermatophyte moulds were isolated in 51.8% followed by yeasts in 26.8% and dermatophytes in 21.4%. Until recently, yeasts were regarded as the contaminants but increasingly they are emerging as pathogens.<sup>(8)</sup>

The role of aspergillus species as pathogens has been a topic of controversy as they are commonly considered as contaminants. But various recent studies have confirmed its pathogenic role. Grover and Veer et al have reported aspergillus species as the major causative organism in their studies.<sup>(9)</sup> Ramani et al reported curvularia as the causative pathogen in their study.<sup>(10)</sup>

### Conclusion

Onychomycosis is difficult to treat and exerts a significant negative impact on the quality of life. In any location, the species may change with time, particularly as new organisms are introduced, which explains the predominance of aspergillus species in our study. The recognition of the changing prevalence of etiological agents will aid in therapeutic approach and the potential implementation of the control measures.

**Conflict of interest:** Nil

**Ethical approval:** Done

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