Onycomycoses; mycology and epidemiology in a tertiary care hospital in North India

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Abstract

Introduction: "Onychomycosis" is fungal infection of the nail which may be caused by dermatophytes, non-dermatophytes and *Candida*.(1) It affects toe nails more than finger nail. It may involve any part of the nail including nail bed or nail plate. The incidence of the disease varies from 3 to 5% and it may reach upto 20% in certain subgroups, e.g. miners, sportsmen.

Materials and Method: A total of 100 patients attending out patient clinic of Department of Dermatology and Venererology at Medical College in North India were enrolled in study. Nail scrapings and nail clippings were collected by proper aseptic techniques.

KOH wet mount was prepared from nail specimens. Culture was done on SDA media in duplicate. Lacto phenol cotton Blue mount was prepared from growth on SDA. Species identification was done by Micro slide culture technique.

Results: In this study M:F ratio was 1.7:1. Labourers (49)were most commonly involved among males and housewives(21) were among females. Out of all isolates maximum were Dermatophytes(79),Non dermatophytes(38) and Candida(12).

Keywords: Onycomycosis, Dermatophyte, Slide culture

Introduction

"Onychomycosis" is fungal infection of the nail which may be caused by Dermatophytes, non-dermatophytes and *Candida*.(1) It affects toe nails more than finger nail. It may involve any part of the nail including nail bed or nail plate. Onycomycoses is responsible for approximately 50% fungal infections.(2) It is caused by three main groups of fungi: dermatophytes, yeasts and non-dermatophyte molds. The incidence of the disease varies from 3 to 5% and it may reach upto 20% in certain subgroups, e.g. miners, sportsmen.(3) Dermatophytes are the most common causes of onychomycosis worldwide. Out of these two major agents cause of all cases are *Trichophyton rubrum*, *Trichophyton mentagrophytes*, *Trichophyton tonsurans*, *Epidermophyton floccosum* etc. Yeast and non-dermatophyte molds are the other causes of onychomycosis cases.

Along with superficial mycoses this is another fungal infection affecting population of India. So, this study was conducted to find etiology and epidemiology of Onycomycoses among population.

Materials and Method

A total of 100 patients seeking advice for nail deformity, attending out patient clinic of Department of Dermatology and Venererology at Medical College in North India were enrolled in study for 1 year after obtaining informed written consent with them. A detailed history of complaints, present and past were taken. Nail examination was done and all findings were recorded in prescribed format. Occupation history, family history, H/O any antifungal treatment, allergy, diabetes, jaundice were recorded. Affected nail was cleaned by 70% alcohol. Nail scrapings, scraping for nail bed undesired and nail clippings were collected by proper aseptic techniques. Skin scrapings and hair samples were also collected in case of associated lesions 20%. KOH +DMSO wet mount was prepared from nail, skin and hair samples. Culture was done on SDA media in duplicate. Lacto phenol cotton Blue mount was prepared from growth. Species identification was done by Micro slide culture technique. For Candida sps. Dalmau culture plate was done. All findings were noted and results were analysed.

Result

Table 1: (Relationship of Age group and Sex- Male: Female ratio)

Age (years)	Male	Female
1-10	3	1
11-20	7	3
21-30	9	7
31-40	17	13
41-50	12	10
51-60	4	3
61-70	5	4
>> 70	2	---
Total 100	59	41

Table 1 shows M:F ratio is 1.7:1. Maximum numbers involved is 17 in31-40 yrs age group in males followed by 41 to 50 yrs.(12) In females also most common age group involved was 31-40yrs.(13)

Table 2: (Relationship of Occupation & Sex(M:F) Ratio)

Occupation	Male	Female
Labourer	29	9
Students	17	4
Housewives	-----	20
Professionals	13	7
Total	59	41

Labourers (29) were most commonly involved among males and housewives(21) were among females

Table 3: KOH Positivity & culture Co-relation

	Culture +	Culture -
KOH +	67	7
KOH -	16	10
Total	83	17

According to Table 3 total culture positive cases were 83 and culture negative cases were 17.

Table 4: Fungal Isolates from nail specimens

Dermatophyte	**57**
Tricophyton rubrum	20
Tricophyton mentagrophytes	15
Tricophyton verrucosum	9
Tricophyton schonlenii	6
Tricophyton tonsurans	4
Tricophyton violaceum	2
Epidermophyton floccosum	1
Non-Dermatophyte	**13**
Aspergillus sps	7
Alternaria	2
Bipolaris	1
Curvularia	1
Fusarium	2
Unidentified	**3**
Candida	**10**

Out of all isolates maximum were Dermatophytes(57), Non dermatophytes(13) and Candida(10)

Discussion

Onychomycosis is a fungal infection of nails caused by dermatophytes, yeasts or non-dermatophyte. Dermatophytes are the most common causative agents in onychomycosis.[4]

Onychomycosis is a fungal infection of the fingernails or toenails that causes discoloration, thickening, and separation from the nail bed. Onychomycosis affects toenails more often than fingernails because of their slower growth, reduced blood supply, and frequent confinement in dark, moist environments. It may occur in patients with distorted nails, a history of nail trauma, genetic predisposition, hyperhidrosis, concurrent fungal infections, and psoriasis. It is also more common in smokers and in those who use occlusive footwear and shared bathing facilities.[5]

Risk factors include diabetes and conditions contributing to poor peripheral circulation. In fact, onychomycosis may represent an important predictor for the development of diabetic foot syndrome and foot ulcers Patients who are immunosuppressed, such as those with HIV infection and those undergoing cancer therapy, are also predisposed to fungal nail infection. Toenail onychomycosis is not prevalent in tropical climates, presumably because people in those areas are not in the habit of wearing occlusive footwear that create a warm, moist environment for the proliferation of fungi. Further, the spread of foot infections, including tinea pedis (athlete's foot), may occur in places such as shower stalls, bathrooms, or locker rooms where floor surfaces often are wet and people are barefoot. Nail trauma will also increase the risk of fungal infection of the affected nail, especially in the geriatric population.[6]

The dermatophytes are keratinophilic fungi causing dermatophytosis because of their ability to degrade keratin, colonizing and invading skin and it's appendages.[7] Tinea unguium is dermatophytic infections of nail whereas Onychomycosis is a generalized term used for fungal infections of nail. Fungal infection is often an age related infection. In this study, out of 100 clinically suspected cases of fungal infection (maximum) patients belonged to 31-40 years age group followed by 41-50 years age group.

Dalal *et al* (1985) found maximum incidences in the first four decades.[8] Monzon *et al* (2001) found that among 491 patients from Spain the average age of the patients for the risk of dermatophytosis was 38.7 years.[9] Bokhari *et al* (1999)[10] from Lahore reported onychomycosis in 72 women aged 32.0±14.8 years and 28 men aged 40.6±15.8 years. So the present study well matches with the findings of Dalal *et al*, Monzon *et al* and Bokhari *et al*.

In our study of 100 patients 59 cases were males and 41 cases were females The male: female ratio was 1.7:1. This finding is similar to the findings of Maheshwari Amma *et al*[11] (and Dalal *et al* (1985) who have reported male: female ratio approximately 2:1. Monzon *et al* (2001) found 55.6% patients were men out of total 491 cases of dermatophytosis. In the study of 6798 cases of dermatophytosis Svejgaard *et al*[12] found tinea pedis (50%) as the most common clinical variant.

Koussidore (2002)[13] observed that in toenail infections, dermatophytes were most often isolated (72.3%) followed by molds (9.6%) and yeast (2%), 16.1% of the infections were mixed. In the fingernail infections mostly yeasts were isolated (72%), followed by dermatophytes (10%) and molds (5.6%), 12.4% of the infection were mixed.

In our study, of the 83 positive culture cases among patients with suspected onychomycosis (n=100), 20

isolates of *Trichophyton rubrum* 15 isolates of *Trichophyton mentagrophytes* 4 isolates of *Trichophyton tonsurans*, *Trichophyton violaceum(4)*.. (9) isolates each of *Trichophyton verrucosum* and *Trichophyton schoenleini(6) I* was isolated. Hence in 57 cases dermatophytes were isolated and *Trichophyton rubrum* was the commonest dermatophyte isolated. Similarly Bokhari *et al* (1999) in 100 cultures positive cases of onychomycosis isolated dermatophytes in 43% cases i.e. *Trichophyton rubrum* (31%), *Trichophyton violaceum* (5%), *T. mentagrophyte* (4%), *T. tonsurans* (2%), and *Epidermophyton floccosum* (1%). In the present study of the 83 culture positive samples, 13 isolates of non-dermatophytic molds grew as single growth. *Fusarium spp* (2) were the common nondermatophytic filamentous fungi isolated followed by *Alternaria spp.* (2), *Aspergillus sps(*7) *Curvularia spp* (1), *Fusarium(2), Bipolaris(2)* Bokhari *et al*, isolated non-dermatophyte molds in 11% of cases, *Fusarium spp.* (4%), *Scopulariopsis brevicaulis* (2%), *Aspergillus spp.* (2%), *Acremonium spp.* (1%), *Scytalidium dimidiatum* (1%) and *Alternaria spp.* (1%) were the common molds isolated by them.also reported *Trichophyton rubrum* as the commonest dermatophyte isolated (49.3%).

Conclusion

Onychomycosis is a fungal infection of nails caused by dermatophytes, yeasts or non-dermatophyte. M:F ratio is 1.7:1. Maximum numbers involved is 17 in31-40 yrs age group in males followed by 41 to 50 yrs.[12] In females also most common age group involved was 31-40yrs.[13] Labourers (29) were most commonly involved among males and housewives[21] were among females. Total culture positive cases were 83 and culture negative cases were.[17] out of all isolates maximum were Dermatophytes,[57] Non dermatophytes[13] and Candida.[10]

Summary

Onycomycoses can be caused by Dermatophytes and non-dermatophytes. In our study Male out-numbered females among all onycomycoses cases. Labourers were mostly involved in male patients and Housewives among female patients. Maximum isolates were Dermatophytes which reflects prevalence and etiology of Onycomycoses cases.

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