Original Article

Clinico-Microbiological Profile Of Onychomycosis Of Patients Attending A Tertiary Care Centre

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Abstract

Background: A frequent fungal infection of the nails that is considered a serious public health concern is onychomycosis. Nearly half of all nail disorders are caused by fungi, and these infections can be caused by dermatophytes, non-dermatophytic moulds, or yeasts that affect the nail bed, nail plate, or nail matrix (onychomycosis). Furthermore, treating fungal nail infections typically takes a long time and has a high chance of recurrence.
Aim: To study the clinico-microbiological profile of onychomycosis of patients attending a Tertiary care centre
Material & Methods: This was a cross-sectional study carried out in the Department of Microbiology for a period of 1 year period i.e February 2023 to February 2024. In clinically suspected cases of onychomycosis, a thorough clinical evaluation was performed, followed by microscopically examining the infected nail specimen under 40% potassium hydroxide, which was succeeded by cultivating the organisms on fungal culture media and identifying the pathogen both by closely studying colony morphology in culture and also microscopically utilizing lacto phenol cotton blue staining.

Results: In the present study the ratio of Females (60%) were more commonly affected than males (40%). The most common age group affected was 30-40 years (30%). Females showed more finger nail involvement (60%) and males toe nail involvement (40%). Onychomycosis was most commonly seen in house wives (50%), followed by farmers (30%). Out of the 100 patients in our study, 10 demonstrated onychomycosis positive fungal growth on culture. Non dermatophyte moulds (NDM) (80%) were the most common fungal isolates followed by Candida species (10%) and dermatophytes (10%).
Conclusion: In contrast to other research, our patients' primary pathogen was NDM. Males and females of all ages might contract onychomycosis; however, fingernail involvement was primarily observed in females, particularly in housewives who perform a greater amount of home work. Even though the rate of fungal isolation is low, it is crucial to understand the primary fungal aetiology and drug resistance pattern in the area using fungal culture and antifungal susceptibility testing in order to properly manage cases of onychomycosis.

Key Words: Dermatophytes, non dermatophyte, fungal culture media, moulds, onychomycosis

Introduction

Onychomycosis (OM) is one of the most common problems affecting the nails and has shown to have an extreme variability in clinical presentation, risk factors and etiology. Onychomycosis is a common fungal infection of nail. Fungal nail infection accounts for almost 50% of all nail diseases [1]. It may be caused by dermatophytes, non-dermatophytic moulds or yeasts involving nail bed nail plate or matrix of nail. Dermatophytes are the predominant fungal isolates, of which *T.rubrum* is the main species and the rest are due to moulds (mainly Fusarium spp.) and yeasts (Candida albicans predominant one). Age, climate, occupation, travel and hygiene are the various factors contributing for the variation of prevalence rate of onychomycosis from region to region [2]. It is a superficial nail infection caused by dermatophytes, non-dermatophyte molds and yeasts. Onychomycosis represents up to 30% of mycotic cutaneous infections and is the most common nail disease accounting for approximately 50% of all onychopathies. Onychomycosis shows a worldwide prevalence rate of 2% to 50% and varies with age, time and geographic location with male preponderance and more common in toe nails than finger nails. Onychomycosis expresses itself in various clinical forms like-distal and lateral subungual onychomycosis (DLSO), white superficial onychomycosis (WSO), proximal subungual onychomycosis(PSO), endonyx onychomycosis and total dystrophic onychomycosis (TDO) [3,4].
Attention of the medical fraternity has shifted towards this problem, more so in the Asian countries where it has become a topic of interest for the last two decades [3].

As far as the causative organisms are concerned, they show a tremendous variability. OM can be caused by dermatophytes, non-dermatophytes and yeast or yeast-like isolates. Moreover, the spectrum of different fungal species among these classes also show an extreme variability in terms of their proportional representation. Onychomycosis can be classified into several clinical types: Distal and lateral subungual onychomycosis, proximal subungual onychomycosis, white superficial onychomycosis and Total dystrophic onychomycosis [5-7].
In India relatively less work has been done on the onychomycosis as compared to western countries. The evolving role of non-dermatophytic moulds has added a new dimension to the

clinical patterns of onychomycosis as they are relatively resistant to conventional antifungals [8,9]. There is a need for further studies on onychomycosis and other dermatophytosis in view of the introduction of several newer systemic antifungal drugs.
The clinical presentation may often be confused with other conditions like psoriasis lichenplanus, onychodystrophy and nail trauma, making laboratory diagnosis and confirmation necessary. Fungal cultures are essential for accurate identification of the causative organism. This is of paramount importance because the clinical outcome of antifungal agents varies as to
whether the aetiological agent is a dermatophyte, yeast or a non-dermatophytic mould (NDM) [10].
The present study was undertaken to isolate and identify the aetiological agents of onychomycosis.

Material and Methods

This was a cross sectional study, carried out over a period of one year (February 2023-February 2024) was conducted on a total of 100 nail samples from patients with nail infection were collected after taking proper consent and was processed in the Department of Microbiology.

Patients using topical or oral antifungal drugs at the time of sample collection or up to 15 days before the day of collection and patients with insufficient specimen were excluded from the study. Nail material was taken from clinically abnormal nails or from the first right toenail if all nails appeared normal. Nails were cleaned with alcohol and nail clippings were collected on a sterile black filter paper or cardboard folder. The sample was divided in two portions: one part for fungal culture and another part for microscopy. The wet mount for microscopic examination was prepared using 20% KOH and examined after overnight incubation. Study

Procedure

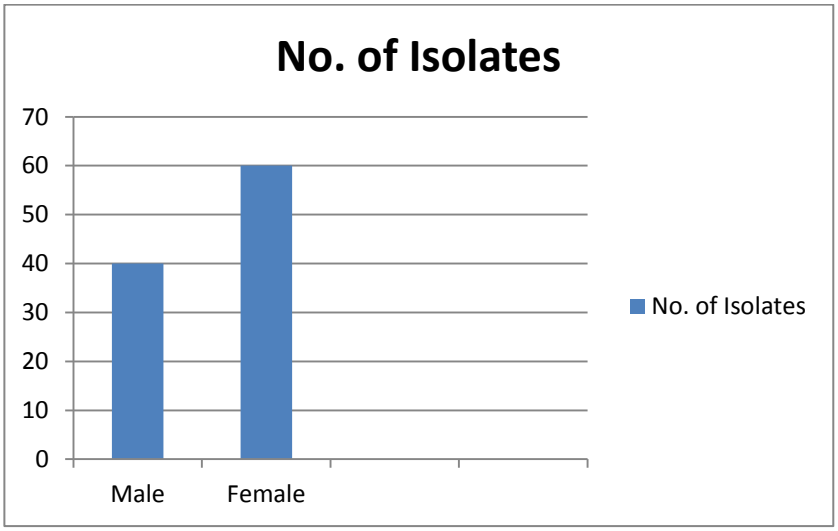
Culture was done in duplicate in SDA tubes; one with actidione (cycloheximide) and another without it and both were incubated at 25°C for four weeks in BOD incubator. Samples were considered negative if no growth was seen after four weeks of incubation. Positive cultures growing dermatophytes and moulds were processed further for identification and speciation by tests like Lacto phenol Cotton Blue (LPCB) staining, slide culture and unease production. Gupta AK et al., inoculums counting (Walsh and English criteria) method was followed for diagnosis of nondermatophytic filamentous fungi [7]. Isolation of dermatophyte was considered as a pathogen irrespective of direct microscopy result. Culture tubes growing yeasts were further subjected to speciation by germ tube test, culture on CHROM agar (HiChrome) Candida differential agar-Himedia and on cornmeal agar (Dalmau plate culture).In-vitro antifungal susceptibility testing was performed against Candida species using disc diffusion method on Muller Hinton agar with 2% glucose and methylene blue for fluconazole (10 μg), itraconazole (10 μg) and amphotericin B (20 μg) as per CLSI guidelines 2023[11].

Result

In the present study the ratio of Females (60%) were more commonly affected than males (40%). The most common age group affected was 30-40 years (30%). Females showed more finger nail involvement (60%) and males toe nail involvement (40%). Onychomycosis was most commonly seen in house wives (50%), followed by farmers (30%).

Table 1: Shows nail involvement according to gender.

Gender	Type of nail Toe	Type of nail Finger	N=10	Percentage
Male	4 (40%)	0	4	40%
Female	0	6 (60%)	6	60%
Total	4	6	10	100%



Graph No. 1: Graphical distribution of the Genderwise

Table 2:-Shows Agewise distributionof the study group

Age	N=10	Percentage
</=20	0	0%
21-30	4	40%
31-40	3	30%
41-50	1	10%
51-60	0	0%
>60	2	20%

Table 3:-Shows Occupational status of the study group

Occupation	N=10	Percentage
Student	0	0
Housewife	5	50%
Business	2	20%
Farmer	3	30%
Others	0	0

Table 4:-Shows KOH mount of the study group

KOH	N=10	Percentage
Positive	2	20%
Negative	8	80%

Table 5: Spectrum of fungi isolated

Fungalisolates	N=10	Percentage
Dermatophytes-(1)		
T.mentagrophytes	1	10%
Yeast(1)		
Candida albicans	1	10%
Non-dermatophytes(5)		
Cladosporum	1	10%
Fusarium	2	10%
Aspergillus niger	4	40%
Aspergillus flavus	1	10%

Figure 1: Onychomycosis of the finger nails

Out of the 100 patients in our study, 10 demonstrated onychomycosis positive fungal growth on culture were observed. Non dermatophyte moulds (NDM) (80%) were the most common fungal isolates followed by Candida species (10%) and dermatophytes (10%), compromising the functional capacity.

Discussion

Onychomycosis occurs worldwide and appears to be a variable entity presenting in different forms in different parts of the world with every country and every region of country having its own characteristics of presentation. In the present study, Females (60%) were more commonly affected than males (40%), which is comparable with the studies of Madhuri JT et al (51.96%) and Bokhari et al (72%) [12,13]. The study by Adhikari L et al,NeupaneS et al, have reported higher prevalence in males which was in constrast to the present study [14,15].

Toe nail infection (40%) was commoner in males, while finger nail infection (60%) was common in females. This may be due to increased exposure to wet work in females, as most of them were house wives. In this study, age group most affected was 31-40 years (30%) which was in accordance with Gopi A et al., and Veer P et al., [16,17].

Onychomycosis was most commonly seen in house wives (50%), followed by farmers (30%), similar to study by Veer P et al[17], High prevalence in farmers and house wives may be due to increased outdoor physical activity and increased exposure to wet work respectively. This variation in direct microscopy and culture may be due to non viability of fungal elements in some cases. Out of the 10 fungal isolates, non dermatophytic moulds (80%) were the commonest followed by yeasts 1 (10%) and 1 dermatophyte (10%). Among the dermatophytes, *T. mentagrophyte* was the predominate isolate 1 (10%) followed by the yeasts, C.albicans1 (10%) was the most. Among the non dermatophytic moulds isolated, A.niger4 (40%) was the most common followed by Fusariumspp2 (20%).

A.niger and Cladospora were isolated one each (10%)) and is comparable with the studies of Niranjan et al Das NK et al, Veer P et al and Malik NA et Al , and Adhikari L et al [18,19,17,20,14].Treatment of onychomycosis has been attempted throughout the ages, but success has been limited until the current decade [21]. In this study, Candida isolates showed maximum susceptibility towards amphotericin B (100%); 85.7% and 75% towards fluconazole and itraconazole, respectively.

Despite in depth development in life science, fungal infection is the rifest disease that includes individuals of any cohort, sex and working area and causes monumental money and emotional disturbances. Fungal infection continues to be thought-about collectively as the main public health issue in several components of the planet [22].
Although direct microscopy can provide clues about the identity of the microorganism, careful matching of microscopic and culture results are necessary for confirmation of the diagnosis. Onychomycosis can no longer be considered a simple cosmetic nuisance confined to the nails. It is a significant and important disease which can generate many physical, physiological and occupational problems, considerably impairing patient quality of life.

Conclusion

A frequent fungal infection of the nails is onychomycosis. Males and females of all ages can be affected, However fingernail involvement was more common in women, particularly in housewives who handle more domestic chores. Yeast, moulds, and dermatophytes are the causes. Non-dermatophytes outnumber dermatophytes in this study. Despite the low rate of fungal isolation, antifungal susceptibility testing and fungal culture are crucial for understanding the primary fungal aetiology and drug resistance pattern in the area for more effective management of onychomycosis cases.

Declarations:

Conflicts of interest: There is no any conflict of interest associated with this study

Consent to participate: We have consent to participate.

Consent for publication: We have consent for the publication of this paper.

Authors' contributions: All the authors equally contributed the work.

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