

PREVALENCE OF ONYCHOMYCOSIS IN SOUTH EAST PART OF RAJASTHAN

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ABSTRACT: Onychomycosis is a fungal infection of nail commonly caused by dermatophytes, yeast and mould. The prevalence of onychomycosis seems to vary across the world because of various socioeconomic and cultural factors. However, all the nail diseases are not fungal in origin Hence laboratory investigations are needed to differentiate accurately between fungal infections and other conditions. **MATERIAL AND METHODS:** All clinically suspected cases of onychomycosis send to microbiological evaluation at Department of Microbiology Govt. Medical College & Hospital Kota over a period of one year (January to December 2012) were included in present study. **RESULTS:** A total of 109 samples (82 male and 27 females) were tested in period of one year (January to December 2012). Among them 55 samples (35 male and 20 females) showed fungal growth, the major pathogen found in present study were Tricophyton spp. 28 (50.9) followed by Candida 10 (18.18%) then Aspergillus spp. 9 (16.36%), Scopulariopsis 5 (9.09%), Fusarium 2 (3.63%) and Alternaria spp 1 (1.81%). **DISCUSSION:** - Onychomycosis is a chronic mycotic infection of finger nails and toe nails that affect the quality of life in a significant proportion. There has been a recent increase in the incidence as well as the spectrum of causative pathogens associated with onychomycosis. In our study we found more incidences among men 35 (63.63%) than women (36.36%). the most common etiology of onychomycosis is dermatophytes (Tricophyton) 50.9% but there is a considerable increase in Non dermatophytes moulds 17 (30.9%). For proper management of onychomycosis, diagnosis and accurate treatment play a key role in better outcome.

KEY WORDS: Onychomycosis, Dermatophytes, Non- Dermatophyte moulds

INTRODUCTION: Onychomycosis is a fungal infection of nail commonly caused by dermatophytes, yeast and mould & sometimes it shows a mixed infection^(1,2). The prevalence of onychomycosis is increasing, and the number of organisms recognized as possible fungal pathogens is also increasing. Onychomycosis continues to spread and persist^(2,3). The prevalence rate of onychomycosis is determined by age, predisposing factors, social class, occupation, climate, & living environment. There is a long list of fungi which have a tendency to damage the nail, like dermatophytes (50%), yeasts (27%) and molds (23%)^(2,3). Dermatophytes, particularly Trichophyton rubrum and Trichophyton mentagrophytes, are the most common cutaneous fungal pathogens^(1,2,3,4,5), Non-dermatophyte moulds are fungi with known habitats in soil, decaying plant debris, or plant disease^(3,4). They have been traditionally regarded as uncommon or secondary pathogens of already diseased nails^(1,2,3). The Dermatophytes spp. are mostly distributed in the temperate western countries. The Candida spp. (yeasts) is mostly

distributed in the tropical and the subtropical countries and in the persons whose hands are often submerged in water ^(2, 3). Yeasts include *Candida albicans*, *Candida parapsilosis*, *Candida tropicalis*, etc, while the moulds include a wide range of fungi like *Scytalidium* spp., *Aspergillus* spp., *Geotrichum candidum* and *Fusarium* spp. ^(2,3,4). Overall the incidence is much higher in adults than in children ⁽³⁾. The prevalence of onychomycosis seems to vary across the world because of various socioeconomic and cultural factors ^(3,6). Onychomycosis of finger nail may lead to pain, discomfort, & impaired/lost tactile functions and the condition has cosmetic, psychological & physical determinantal effects ^(3,6,7). However, all the nail diseases are not fungal in origin they are also caused by other clinical conditions like trauma, wet work (with the hand submerged in soap & water), HIV-AIDS, immunodeficiency which is due to organ or bone marrow transplantation, old age, psoriasis, atopic dermatitis, diabetes with a predominance of *Candida* spp, renal transplant recipients etc. ^(2,3,6). Hence laboratory investigations are needed to differentiate accurately between fungal infections and the above mentioned skin diseases for proper management of onychomycosis. Fungal cultures are of paramount importance because the clinical outcome of antifungal agents varies as to whether the etiological agent is a dermatophyte, yeast or mould ^(1, 2, 3, 6, 7).

MATERIAL AND METHODS: All clinically suspected cases of onychomycosis sent to the Department of Microbiology Govt. Medical College & Hospital Kota for microbiological evaluation by Dermatology Department over a period of one year (January to December 2012) were included in present study. Nail clippings or subungual scrapings from all these subjects were collected with a surgical blade after cleaning the affected area with 70% ethanol. Microscopic examination of the samples was performed following clarification with 10% potassium hydroxide (KOH). All samples were inoculated on Sabouraud's dextrose agar (SDA, Hi Media Laboratories) and SDA with 5% chloramphenicol and cycloheximide. Cultures were incubated at 25°C and 37°C and examined daily for first week and twice a week for 6 weeks. Different fungi were identified based on microscopic and culture characteristics which were confirmed by slide culture in case of dermatophytes and other moulds, and by germ tube, sugar assimilation test in case of *Candida* spp. Only those sample which show microscopic evidence of fungi and also grown on culture, considered for further evaluation. The following criteria were taken into consideration for confirming Non-dermatophyte mould as pathogen, on direct microscopic examination large and irregular septate hyphae in KOH mount, the growth of the same agent in pure culture in at least three tubes of SDA and no growth of dermatophytes as well as repetition of these criteria after an interval of 2 weeks ^(3,4,5).

RESULTS: A total of 109 samples (82 male and 27 females) were tested in period of one year (January to December 2012). Among them 55 samples 35 male (63.63%) and 20 females (36.36%) showed fungal growth the major pathogen found in present study were *Tricophyton* spp. 28 (50.9%) followed by *Candida* spp. 10 (18.18%) then *Aspergillus* spp. 9 (16.36%), *Scopulariopsis* 5 (9.09%), *Fusarium* 2 (3.63%) and *Alternaria* spp 1 (1.81%). Distribution of various fungi among male and female is as per **Table-1**

In present study we found that male has more incidence of infection than females. Among total culture positive cases male has 63.63% infection rate and female has 36.36 %. Incidence of Non- dermatophyte moulds are more than *Candida* and this show that involvement of Non-dermatophyte moulds in onychomycosis is increasing. Among *Tricophyton* species *Tricophyton rubrum* showed highest incidence 20 followed by *Tricophyton mantegrophytes* 7

and *Tricophyton tonsurans* 1. Among *Candida* spp. *Candida albicans* showed highest incidence 7 followed by *Candida tropicalis* 3. Among Non-dermatophyte moulds *Aspergillus* spp showed highest incidence and most common spp. were *Aspergillus flavus* 7 followed by *Aspergillus niger* 2, *Scopulariopsis* spp 5, *Fusarium* spp. 2, and *Alternaria* spp. 1. The distribution of various species among male and females are shown in **Table -2**

DISCUSSION: Onychomycosis is a chronic mycotic infection of finger nails and toe nails that affect the quality of life in a significant proportion ⁽¹⁾. The difficulty in diagnosing the condition clinically, inappropriate collection of material for analysis as well as ineffective treatment makes it hard to assess the true profile of such infections ^(3,6,7,8). There has been a recent increase in the incidence as well as the spectrum of causative pathogens associated with onychomycosis ^(1,3,8,9) which may be due to increase in awareness among peoples towards health, cosmetic consciousness or due to increase in various risk factors like, chronic diseases leading immunosuppression, other fungal infections of the skin, sport and increased age^(10,11,12). It is to note that the treatment of onychomycosis cannot be done only on clinical grounds as we have seen that there are a large number of cases 54 (49.54 %) without any fungal etiology. In our study the onychomycosis was predominant in men 35 (63.63%) which may be due to more exposure to risk factors, This finding is concordant to various other studies ^(1, 3, 7, 8) however study from Gujarat (Prakash Gelotar et al., 2012) show high incidence among females ⁽²⁾. It is clear that most common causative agents of onychomycosis are Dermatophytes (*Tricophyton*) 50.9%. In our study we found much higher incidence of Non-dermatophyte moulds 17 (30.9%) then other studies (Gupta et al., 2003, Ahuja Sanjiv et al., 2011, Prakash Gelotar et al., 2012 etc) which may be due to variation in geographic differences in mould distribution or diagnostic methods ^(3,9). In present study age is also found as a determinantal factor in acquiring fungal nail infections, the majority of patient were of age group of 50-60 years 16 (29.09%) followed by age group 60-70 years 14 (25.45%), then age group 70-80 years 9 (16.36%), then age group 40-50 years 7 (12.72%) **Table-3**. Yeasts are also an important cause of onychomycosis and are more frequent in fingernails than toe nails and were second most common cause of onychomycosis in our study. Although not usually life threatening, onychomycosis can be a source of significant pain and discomfort. It can also pose significant risk for patients, their family and others in contact with them ^(1,6,10). For proper management of onychomycosis, diagnosis and accurate treatment play a key role in better outcome. However several newer diagnostic methods have been introduced like PCR based methods and non invasive methods like optical coherence tomography, confocal laser scan microscopy, matrix assisted laser desorption time of flight mass spectrometry (MALDI-TOF MS) and phase contrast hard x-ray microscopy ⁽⁸⁾. This may help in early diagnosis and better management of infection? But as the spectrum of disease is based on various etiologies, so the culture will remain gold standard in identifying the species causing the infection, and the fact that such complicated and sophisticated methods will remain limited to some higher centers only. Various treatment strategies including topical, systemic and surgery which is used to treat the condition depends on severity of disease. Despite good therapeutic response the long term outcome is unsatisfactory due to therapeutic failure, relapse and reinfection ^(1, 3, 7, 8, 11). To combat poor response newer strategies such as combination, sequential & supplementary therapy have been suggested ⁽¹¹⁾. The following are the strategies to improve cure rate in onychomycosis ⁽¹¹⁾

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- Ensure correct and complete diagnosis
- Choose most appropriate antifungal
- Ensure bioavailability and compliance
- Monitor for any possible drug interactions
- Consider supplemental therapy-in poor prognostic factors
- Consider surgery in addition to antifungal therapy if required
- Education regarding risk factors and nail care
- Ensure treatment of affected contacts
- Maintain proper hygiene of foot

CONCLUSION: Our study concludes that prevalence of onychomycosis is moderate to high in south east Rajasthan. As there are several fungi which cause the infection so it is necessary to perform culture for appropriate treatment. Males are at more risk than females to develop onychomycosis so they should maintain good personal hygiene of nails. Females are more prone to develop onychomycosis of fingernails due to frequent contact with soap and water. The newer diagnostic methods which are rapid and accurate may contribute in early diagnosis and management of infection.

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Table-1

Fungus	Number		Male		Female	
		% (N=55)		% (N=55)		% (N=55)
Trichophyton Spp.	28	50.9	18	32.72	10	18.18
Candida Spp.	10	18.18	06	10.9	04	7.27
Aspergillus Spp.	09	16.36	06	10.9	03	5.45
Scopulariopsis	5	9.09	03	5.45	02	3.63
Fusarium	2	3.63	01	1.81	01	1.81
Alternaria	1	1.81	01	1.81	00	0
Total	55	100	35	63.63	20	36.36

Distribution of various fungi among male and female

Table- 2

Fungus	Species	Number	Male	Female
Tricophyton	Tricophyton rubrum	20	13	7
	Tricophyton mantegrophytes	7	4	3
	Tricophyton tonsurans	1	1	00
Candida	Candida albicans	7	4	3
	Candida tropicalis	3	2	1
Aspergillus	Aspergillus flavus	7	5	1
	Aspergillus niger	2	1	2
Scopulariopsis	Scopulariopsis Spp.	5	3	2
Fusarium	Fusarium Spp.	2	1	1
Alternaria	Alternaria Spp.	1	1	00
Total		55	35	20

The distribution of various species among male and females

Table-3

Age group	Male	Female	Total	
				% (N=55)
0-10	00	00	00	0
10-20	01	01	02	3.63
20-30	02	01	03	5.45
30-40	02	02	04	7.27
40-50	03	04	07	12.72
50-60	09	07	16	29.09
60-70	10	04	14	25.45
70-80	08	01	09	16.36

Incidence of fungal infection among different age