

# Onychomycosis in Eastern India - study in a peripheral tertiary care centre

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**Abstract** *Objective* To find out various clinical patterns, etiologic agents and to evaluate the clinicomycologic correlation.

*Patients and methods* Two hundred and forty nine cases of clinically suspected onychomycosis were included in this study. Clinical patterns were noted and sample collected from most severely affected nail. They were subjected to direct microscopy and culture.

*Results* Distal and lateral subungual onychomycosis was the commonest clinical pattern (56.6%) followed by proximal subungual onychomycosis (15.7%), total dystrophic onychomycosis (12.1%), white superficial onychomycosis (10.8%) and chronic paronychia (4.8%). 126 cases (50.6%) were confirmed by either microscopy or culture whereas 123 cases (49.4%) were negative by both. Dermatophytes were most common (55.9%) cause of onychomycosis. Amongst them *Trichophyton rubrum* was the most common isolate (65.9%). *Candida albicans* was important (79.2%) amongst the yeast isolates. Nondermatophytic moulds were involved in 15.5% of cases.

*Conclusion* Onychomycosis might be an important cause of absenteeism amongst the working classes in this part of India. Yeasts and nondermatophytic moulds are gradually becoming an important cause of onychomycosis in different areas of the world. So, early diagnosis and initiation of antifungal treatment should be the approach to safeguard the social, emotional and physical well being of the patients.

**Key words**

KOH, onychomycosis, nondermatophytes.

## Introduction

Onychomycosis is a denomination used to describe fungal infection of one or more of the nail units and can be caused by dermatophytes, yeasts or non-dermatophytic moulds.<sup>1</sup> It accounts for up to 50% of all nail diseases and

30% of all mycotic infections of nail.<sup>2</sup> Till late 1990s onychomycosis was a poorly discussed topic of medical science, which has been highlighted only in the last decade. In developing countries, higher priorities in socioeconomic concerns and health issues for other diseases have resulted in low awareness of onychomycosis by physicians and general public alike. Although onychomycosis is rarely life threatening, its high incidence and prevalence and the associated morbidity makes it an important public health problem.

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Onychomycosis shows a worldwide prevalence rate of 2% to 50% and varies with age, time and geographic location.<sup>3</sup> Several factors have been implicated in the increase in disease such as reduced peripheral circulation, diabetes, nail trauma, difficulty to maintain proper nail hygiene, chronic smoking, communal bathing etc. Infected nails serve as a chronic reservoir of infection, which can cause mycotic infection of skin.<sup>4</sup> Not only it can cause an aesthetic problem but also it will affect the physical, emotional, social and occupational well being of the patients. Clinically onychomycosis is subclassified into various forms such as distal lateral subungual onychomycosis, proximal subungual onychomycosis, white superficial onychomycosis and total dystrophic onychomycosis.<sup>5</sup> Therefore, it is imperative to have a clinical suspicion for this condition and to identify the cause to treat it. As there are few data available in the Eastern part of India particularly from rural Bengal, we have carried out the study to find out various clinical patterns, etiologic agents and to evaluate the clinicomycologic correlation.

### Patients and methods

Two hundred and forty-nine clinically suspected cases of onychomycosis attending the outpatient department of skin and V.D. of Midnapore Medical College and Hospital, Paschim Medinipur, a tertiary care center of rural Bengal, were included in the study. The study was carried out over a period of one and a half year from January 2010 to August 2011.

Patients were evaluated clinically. A detailed history of trauma, occupation, sharing of common facilities, age, personal habits such as smoking and drinking, personal hygiene, hyperhidrosis and different predisposing diseases e.g. diabetes were collected from the

patients. Patients whose history of antifungal therapy could be known were excluded from the study. Different clinical patterns of onychomycosis were noted. The most severely affected nail was selected for specimen collection. The selected nail was cleaned with 70% alcohol to remove contaminants. As sites of invasion and localization differ in different varieties of onychomycosis, separate approaches were taken to collect the nail specimens. All specimens were subjected to direct microscopy with the help of 20% KOH solution to determine the presence of any fungal elements. All specimens were inoculated into Sabouraud's dextrose agar (plain), Sabouraud's dextrose agar with antibiotic, Sabouraud's dextrose agar with antibiotic and 5% cycloheximide. Specimens were also inoculated into dermatophyte test medium. The inoculated screw-cap bottles were incubated in a B.O.D. incubator at 25-30°C for 1-4 weeks. The pathogenic organisms were identified by gross morphology and microscopic examination with KOH and lactophenol cotton blue preparation. If a dermatophyte was isolated in culture it was taken as a pathogen. If a nondermatophytic mould or yeast was isolated it was considered to be significant if they were isolated repeatedly in pure culture (three times) on two media and with a positive KOH finding.<sup>3</sup> To identify *Candida albicans* we did germ tube test and corn meal agar inoculation. We also did urease test to differentiate *Trichophyton* species.

### Results

Out of total 249 cases included in the study, males (n=183, 73.5%) were more commonly infected than the females (n=66, 26.5%), giving rise to a ratio of 2.8:1. While analyzing the prevalence of onychomycosis in different age groups, it was observed that the young adults ranging from 21 to 40 years (42.2%) were most commonly affected followed by 41 to 60 years

**Table 1** Correlation of direct microscopy with culture (n=249).

Test procedure	N (%)
KOH positive	99 (39.7)
KOH positive, culture negative	42 (16.8)
KOH negative, culture positive	27 (10.8)
Culture positive	84 (33.7)
Both positive	57 (22.9)
Both negative	123 (49.4)

**Table 2** Mycologic profile of the study (n=84).

Isolates	Species	Number	Percentage
Dermatophytes (n=47, 56.0%)	<i>Trichophyton rubrum</i>	31	66
	<i>T. mentagrophytes</i>	13	27.6
	<i>Trichophyton</i> spp.	03	6.4
Candida (n=24, 28.6%)	<i>Candida albicans</i>	19	79.2
	<i>Candida</i> spp.	05	20.8
Nondermatophytes (n=13, 15.8%)	<i>Curvularia</i> spp.	05	38.5
	<i>Aspergillus</i> spp.	04	30.8
	<i>Alternaria</i> spp.	03	23.0
	<i>Fusarium</i> spp.	01	07.7

(34.5%) age group. The lowest affected age was 13 years whereas the highest affected age was 75 years. There were no patients below 10 years of age. Considering different occupational groups affected by onychomycosis, it was found that agricultural workers were more commonly affected 130 (52.2%) followed by daily labourers 61 (24.5%). The other occupational groups affected were office workers 20 (8%), students 14 (5.6%), and miscellaneous group comprising of housewives and elderly persons 24 (9.6%).

Fingernails were most commonly affected site 162 (65.1%) whereas toenails were affected in 63 (25.3%) patients. Both the finger and toenails were affected in 24 (9.6%) patients. Distal lateral subungual onychomycosis was the most common pattern 141 (56.6%) found in our study. Other clinical patterns found were proximal subungual onychomycosis 39 (15.7%) followed by total dystrophic onychomycosis 30 (12.5%), white superficial onychomycosis 27 (10.8%) and chronic paronychia 12 (4.8%). Amongst the 249 cases included in our study it was observed that a total of 126 (50.6%) clinically suspected

onychomycosis patients were confirmed either by direct microscopy and/or culture (**Table 1**). Direct microscopy by 20% KOH could identify 99 cases (39.7%) whereas 84 (33.7%) cases were confirmed by culture. Fifty-seven (22.9%) cases were positive by both microscopy and culture whereas 123 (49.4%) cases could not be confirmed by either of the procedures.

Amongst the culture positive cases, the commonest fungi isolated (**Table 2**) in our study were dermatophytes 47 (56.0%) followed by *Candida* species 24 (28.6%) and nondermatophytic moulds (13 (15.4%). While speciating the dermatophytes it was found that *Trichophyton rubrum* was the most common isolate 31 (66%) followed by *T. mentagrophytes* 13 (27.6%) and the other three isolate which we could not identify was *Trichophyton* species 3 (6.4%). Of the candida species isolated in the study maximum was *Candida albicans* 19 (79.2%) and rest were *Candida* spp. 5 (20.8%). The nondermatophytic moulds isolated in our study were *Curvularia* spp. 5 (38.5%), *Aspergillus* spp. 4 (30.8%), *Alternaria* spp. 3 (23.0%) and *Fusarium* spp. 1 (7.7%).

## **Discussion**

Onychomycosis, a chronic fungal infection of nail, is a major public health problem. As there are other more important health related issues for different diseases, which can cause a high mortality and morbidity, people in a developing country like ours are less aware about onychomycosis. Although not life threatening, it can have some negative impact on the patients' social, emotional and occupational functioning. Though there is a clearly diseased appearance associated with this condition, onychomycosis is all too often regarded as merely a cosmetic problem of relatively minor importance that is hardly worth the effort to seek treatment in many cases.<sup>6</sup> As people are gradually becoming more conscious about their health and cosmetics, different factors are gaining more importance now-a-days. There has been a recent increase in the incidence as well as the spectrum of positive pathogens associated with onychomycosis.<sup>7</sup>

In the present study male patients 183 (73.5%) were found to be more commonly affected than the females 66 (26.5%), the ratio being 2.8:1. Our study correlates well with reports from different parts of India.<sup>3, 4,7-9</sup> A higher incidence of males may be due to their increased outdoor activity and physical labour, thereby exposing themselves to repeated trauma of the nails which in turn leads to more proneness to be affected by onychomycosis. Another factor may be that the males report more to the doctors than the females who generally remain indoor and thereby are less concerned about themselves. Other important factors might be the personal habits of the males in these areas like regular smoking of raw tobacco, drinking alcohol and lack of maintenance of personal hygiene. Onychomycosis can occur at any age but is most commonly seen during 40-60 years age group and unusual before puberty.<sup>10</sup> However,

incidence between 21-40 years has been observed in more recent studies.<sup>11,12</sup> Considering the different age groups affected in our study it was found that the commonest age group affected was between 21-40 years (42.2%) and majority of our patients were adults falling within the age group of 21-60 years (76.7%). This finding correlates well with other reports also.<sup>3,4,8,9,12-14</sup> In our study population we did not have any patient below the 13 years age group, corroborating with reports from others which shows that onychomycosis is uncommon in children.<sup>3,4,14</sup> The lower prevalence may be due to less exposure to trauma and increased growth rate of the nails in children.

Analyzing the occupational relationship with onychomycosis it was observed that the bulk of patients in our study were either agricultural workers (130) or daily labourers (61). Together they comprise of 76.7% of the total patients which is in accordance with other studies.<sup>4,8</sup> Repeated trauma to nail, excessive perspiration and contact with the soil saprophytes might be the reason why these sections of population suffer more from onychomycosis. In most of our patients finger nails were more involved (65.1%) than the toe nails (25.3%) whereas both the nails were affected in 9.6%. People in our area cultivate manually and so are more prone to trauma and soil contamination. Moreover fingernail infection can have a negative impact on their job and thereby compelling them to report to a doctor early. Higher involvement of fingernails is reported by many other studies.<sup>3,4,9</sup> But in contrast to our findings many others have reported about more toenail involvements.<sup>15,16</sup> Distal lateral subungual onychomycosis was the most common clinical presentation of onychomycosis in our patients (56.6%) which is in agreement with many previous studies.<sup>3,4,12,13</sup>

In the present study, cases of mycologically (culture/microscopy) confirmed onychomycosis were 50.6%, which is in accordance with reports from other studies.<sup>3,14</sup> We observed direct microscopic examination (39.7%) to be more sensitive than culture positivity (33.7%). But culture positivity helps in the identification of genus and species of different fungi and always remains the gold standard. Many authors have reported a higher positivity than ours,<sup>4,9,17</sup> whereas some have a lower rate of positivity.<sup>18,19,20</sup> Dermatophytes were the most common pathogen (56%) isolated in our study. Many other studies in different parts of India and abroad have also reported dermatophytes as the commonest cause of onychomycosis.<sup>3,4,7,11,13-17</sup> Amongst them *T. rubrum* was the most common (66%) followed by *T. mentagrophytes* (27.6%) and unidentified species (6.4%). *T. rubrum* being the commonest dermatophyte has been reported by Indian authors<sup>3,4</sup> and also by other countries e.g. Finland,<sup>21</sup> Spain,<sup>22</sup> UK,<sup>23,24</sup> USA.<sup>25</sup> The high prevalence of onychomycosis caused by *T. rubrum* might be due to its ability to adapt to the hard keratin of nail.<sup>12</sup> Though candida has been reported to be commonest cause of onychomycosis by many authors in different countries,<sup>12</sup> the present study shows candida to be the second common cause of onychomycosis (28.6%) and out of them *Candida albicans* was the commonest (79.2%).<sup>14</sup> Most of the *C. albicans* in our study were isolated from the chronic paronychia cases. Previously regarded as contaminants, yeasts are now increasingly recognized as pathogens in fingernail infections, as are some moulds.<sup>9</sup>

Nondermatophytic moulds were isolated in 15.4% of the cases in the present study which is compatible with some other studies.<sup>4,8,11,12</sup> The higher incidence may be due to the climate in

this area along with injury to the nails and thereby exposing it to the contaminant fungi.

This study shows that onychomycosis is a common problem particularly amongst the working classes in rural areas of eastern part of the country. This could create hindrance for the agricultural workers and the labourers to perform their regular activities and thereby hampering their economy. Emergence of the yeasts and nondermatophytic moulds as an important pathogen of onychomycosis is gradually increasing. So people should be more aware about it and take care for their personal hygiene and to report to the doctors early to prevent morbidity. Though culture is gold standard, isolation rate is less. Therefore newer diagnostic methods should be evolved for early and accurate diagnosis and initiation of proper treatment.

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