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# PREVALENCE OF ONYCHOMYCOSIS IN A RURAL TERTIARY CARE HOSPITAL IN EASTERN PART OF INDIA

Microbiology

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## ABSTRACT

**Objective:** To point out the changing trend of onychomycosis, its common clinical patterns, and etiologic agents and to evaluate the clinicomycologic correlation in the particular region of rural Bengal.

**Methods:** Three hundred and ten 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, culture and investigated by available resources.

**Results:** Most common clinical pattern of onychomycosis in our observation is Distal Lateral subungual onychomycosis (63%) followed by proximal subungual onychomycosis type (21%). Dystrophic onychomycosis (12%), white superficial onychomycosis (16 %) and chronic paronychia 12%) were the other variants respectively. We found 162 cases (50.6%) of nail lesions, diagnosed by either microscopy or culture whereas 148 cases (49.4%) were negative by culture. A good number of isolates were yeast (72 samples or 23.22%) which were found to be the most important cause of onychomycosis. Dermatophytes were isolated in 66 samples (21.29%) where *Trichophyton rubrum* was the most common isolate (37, 11.93%). Nondermatophytic moulds were involved in 20, 6.4% of cases.

**Conclusion:** Onychomycosis, though a neglected condition, might be an important cause of absenteeism especially amongst the working classes in this part of India. Yeasts and nondermatophytic moulds are gradually emerging as important cause of onychomycosis in different areas of the world. So, early diagnosis and treatment is necessary and should be the right approach towards these patients.

## KEYWORDS

onychomycosis, KOH, yeast, non-albicans Candida dermatophyte Nondermatophytic mould.

## INTRODUCTION:

The very nature of infectious diseases has undergone profound changes in the past few years. Fungi, once considered as non-pathogenic or less virulent are now recognized as a primary cause of morbidity in apparently healthy individuals as well as immunocompromised ill patients. Previously Candida albicans was recognized as the predominant cause of Candida nail infection. However, a shift toward non-albicans Candida species has been observed for last few years.

Onychomycosis, a fungal infection of nails, is a poorly discussed topic of medical science, which has been highlighted only in the last decade. This account for 15 to 40% of nail diseases [1-5]. Progress in mycology has finally recognized Candida's ability to invade the nail plate and cause nail disorders almost identical with those generated by dermatophytes.

As with other microbial infections, the diagnosis of fungal nail infections depends upon a combination of clinical observation and laboratory investigation. The clinical presentations of onychomycosis are extremely varied, ranging from chronic and acute lesions. Superficial fungal infections often produce characteristic lesions, but it is not unusual to find that the appearance of lesions has been modified and rendered atypical by previous irrational treatment especially by some unqualified person in remote areas.

Onychomycosis may be caused by Dermatophytes[1], nondermatophytes, moulds or yeasts.[2,3] Its incidence is progressively increasing, and now it is no more considered merely a cosmetic problem and the present observation represents only the tip of the iceberg. Our study was conducted in rural set up at a tertiary care teaching hospital. Prevalence of onychomycosis is greater in rural set up due to manual labours and farmers' working conditions.

It has been observed that non-albicans candida appears to be indigenous to many pet animals as well as plants, vegetables and the soil. Prolonged contact with these zoophilic, geophilic fungus coupled with poor hygienic practices among the poor villagers help these low virulent organisms to take upper hand to produce these type of chronic difficult to treat cutaneous mycosis. Etiology of onychomycosis is not always fungal but can be other causes of nail dystrophy. [1-5]

We have studied the frequency of most probable single etiological agents (fungi) responsible for onychomycosis in this part of India. Clinically onychomycosis is further classified into various types like[4]

I. Distal lateral subungual onychomycosis,
II. White superficial onychomycosis
III. Proximal subungual onychomycosis
IV. Total dystrophic onychomycosis.

In addition, patients may show different combinations of these patterns. The aim of the study here was to find out various clinical patterns, most common causative agents, and the probable predisposing factors and to evaluate the clinicomycologic correlation in this part of West Bengal.

## AIMS AND OBJECTIVE:

1. Isolation and identification of fungi responsible for nail infection by available conventional laboratory techniques.
2. Comparison with advance methods and assessment of observer skill in identification by basic laboratory techniques.

### Inclusion criteria:

**I.** Patients irrespective of age, sex, socioeconomic and immunological status presenting with nail lesion referred by physicians of our hospital during the study period.
**II.** Those who gave informed consent to the study.

### Exclusion criteria:

I. Patients with skin disorders causing onychodystrophy or associated with other systemic immunosuppressive diseases,
II. Patients with chronic mucocutaneous candidiasis,
III. Person not giving consent for follow up were excluded from the study

**Specimen collection:** Clinically suspected onychomycosis were taken into account. The area was cleaned with 70% alcohol to remove dirt and contaminants.[4,7,8] Specimens were collected by nail clipping & scrapping. We collected a total of 310 samples. Figure 1 below shows the flow chart of sample collection and processing.

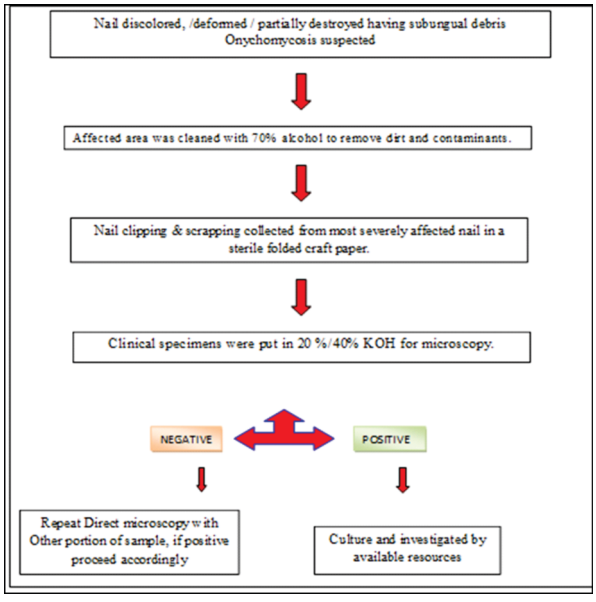


**Figure 1: Flow chart showing collection and processing of the nail samples**

**Direct microscopy**:
Some part of the Nail clippings were dissolved in 20 % potassium hydroxide. Then the clinical specimen was put in for direct microscopy.40% potassium hydroxide with overnight incubation required in cases of hard nails. The direct microscopic examination is of value in differentiating yeast and hyphal forms so that the right culture media could be chosen and, initial impression could be formed but overall it is less sensitive than culture methods.[4,7,8]

The folded craft paper containing the rest part of the specimens were kept in the refrigerator with proper labeling for reinoculation if growth of nondermatophyte mould was noticed in the first culture plate or the culture plate gets contaminated or for repeat wet mount if required in future.

**Culture isolation:** Samples were inoculated in two types of media SDCA (Sabouraud's dextrose agar with antibiotic, i.e. Chloramphenicol) & SDCCA (Sabouraud's dextrose agar with antibiotic and 5% cycloheximide) & kept in BOD at 22-25$^0$C. Specimens were also inoculated into dermatophyte test medium. The cultures were examined on the third, sixth, ninth and twelfth day. Morphology of fungal colonies and growth characteristics were recorded. In case of "no growth", cultures were again examined at second, four/six weeks for slow-growers. 'No growth' at six weeks was considered negative. Positive cultures were identified and confirmed by gross morphology; microscopic examination i.e. wet mounts with 10% KOH and lactophenol cotton blue and/or slide cultures when necessary. If a dermatophyte was isolated in culture it was taken as a pathogen.[1, 2] If a Nondermatophytic mould was isolated it was considered to be significant when same organism was isolated repeatedly in pure culture (at least twice or thrice) on two media. Yeasts were diagnosed with the help of other tests like Germ tube test, Morphodiagnosis with the help of Dalmau plate culture in potato carrot dextrose agar/potato dextrose agar, [7,8,9] Sugar fermentation test, Urea hydrolysis test. We have also grown yeasts in Chrome agar which has helped in diagnosis. Nonalbicans candida specimens were sent for Vitek2 analysis to an upgraded centre placed in Kolkata. In the center where automated machines are available, all nonalbians Candida tested in this study were proved to be of same diagnosis except *C. famata* which was wrongly diagnosed as *Candida tropicalis* in our department.

**RESULTS:**
Three hundred and ten clinically suspected cases of onychomycosis attending the outpatient department of Dermatology of Bankura Sammilani Medical College and Hospital, Bankura, a tertiary care center of rural Bengal, who had fulfilled the inclusion criteria, were included in the study. The study was carried out over a period of two years from January 2017 to December 2018. A detailed history of personal hygiene, trauma, and occupation, sharing of common facilities, age and different predisposing conditions such as diabetes were recorded.

Out of total 310 cases included in the study, males (n= 212, 68.4 %) were more commonly infected than the females (n=98, 31.6%), giving rise to a ratio of 2.7:1. While analyzing the prevalence of onychomycosis in different age groups, it was observed that the young adults ranging from 21 to 40 years (145, 46.13 %) were most commonly affected followed by 41 to 60 years (90,29%). No patient samples from those below 10 years were obtained. Highest age of the patients from whom samples were collected was 75 years.

Within the study group, agricultural workers were more commonly affected with 103 of the total samples being from such workers (33.22%). The other occupational groups affected were daily wage labors (87 or 28.06%), students living in hostels (23, 10.32%) and office goers (23 or 7.41%). Women working in agricultural fields and elderly persons were also most commonly affected (65 or 20.96%). Special emphasis should be given to women who work as helping hands in the paddy fields at the time of harvesting. Most of the samples from women were from these women. There was a greater prevalence of samples from males. The reason behind thus could be under-reporting as most of the women do not report to the hospital until the condition is severe and hampers with their day to day activities.

Commonest sites affected were finger nails. Fingernails were most commonly affected site of infection (153 or 49.35%) followed by toenails (88 or 28.38%) . Both the finger and toenails were affected in 69 or 22.25% patients. The pattern of onychomycosis is depicted in Figure 2.

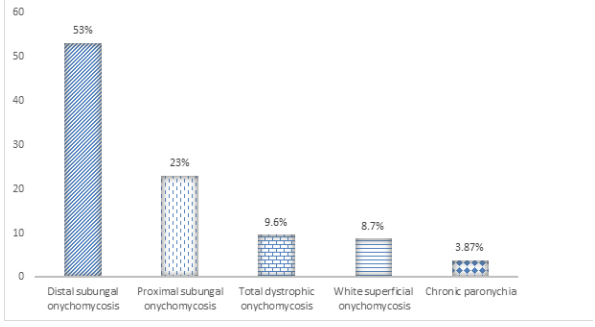


**Figure 2: Percentage of pattern of onychomycosis seen in the patient sample**

When analyzed, not all samples were positive for microscopy and culture. Figure 3 shows the percentage of positive results for the analysis.

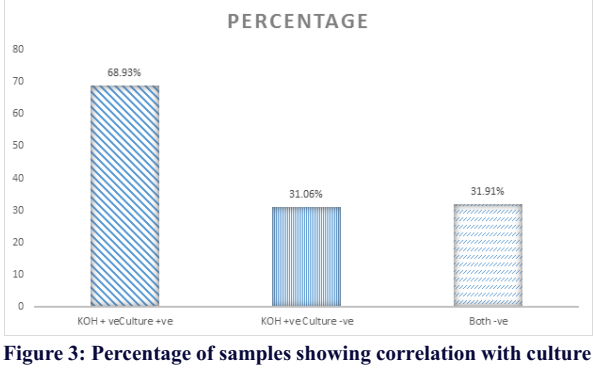


**Figure 3: Percentage of samples showing correlation with culture and microscopy.**

Apart from *Candida albicans*, some other members like *C parapsilosis*, *C gullenmondii*, *C kruseii, C* famata and *Candida dubliniensis*, have also emerged as potential pathogen of onychomycosis. They appear to be obligatory saprobes of humans and some warm blooded animals. We found 66 samples positive for Dermatophytes (21.29%). Of these Trichophyton Rubrum were in 37 samples, Trichophyton mentagrophytes was found in 25 samples and Epidermophyton floccosum was found in only 4 samples. Yeasts were detected in 72 samples (23.22%) of which 66 were Non Albicans Candida and 6 were Candida Albicans. Non dermatophytes moulds were found in 20 samples. In 75 samples no fungal elements were noticed in wet mount and this could be due to local application of antifungal ointments before collection of samples. [7-13]

## DISCUSSION –

Medically important yeasts are found on human and warm blooded animals and in the environment they inhabit. Prevalence of onychomycosis varies with geographical location, occupation, age etc.[1-5] Most common causes of onychomycosis are nail trauma, difficulty to maintain proper nail hygiene, chronic smoking, communal bathing, diabetes, reduced peripheral circulation etc.[4] In developing countries, higher priorities are stressed upon major health issues resulting in low awareness of onychomycosis by physicians and general people. Although onychomycosis is rarely life threatening, its high incidence and prevalence and the associated morbidity makes it an important public health problem. This condition affects an individual's physical, emotional, social and occupational wellbeing.[2]

Onychomycosis is till date a neglected fungal infection of nail though it is a major public health issue.[2] As this ailment directly does not related with mortality, people in a developing country like India, are less aware about it. But there is no doubt that it can have a negative impact on the patients' social, emotional and occupational health. It is one of the most common causes of absenteeism from work. But people are gradually becoming more conscious about their health and cosmetics; Onychomycosis is no more regarded as merely a trivial issue and gaining more importance now-a-days.

Risk factors [1-5, 11-15] for onychomycosis include slow growth of nails in the elderly with reduced blood supply. Outdoor work with profuse sweating in a humid country like India is another risk factor. In most of the cases we encountered people walked bare feet in damp communal areas making them prone to toe nail onychomycosis. In many patients there are repeated minor trauma resulting skin or nail injury which often go unnoticed and there may be associated skin conditions such as psoriasis, lichen planus. Many patients suffer from underlying diseases like diabetes, circulation problems or a weakened immune system that make them prone to develop onychomycosis.

We noted that occupation played a role in risk of onychomycosis. Agricultural workers have frequent/repeated contact with saprobes (nonalbicans candida, non dermatophytes moulds) and also get injured in their fingers and nails while working. They also walk bare feet in damp communal areas. Labours are also prone to nail injuries as part of their work and walk bare feet. Among office goers the toe nails are commonly affected because they wear tight-fitting, sweaty shoes and unwashed socks. Women are also at risk because their nails remain moist and wet due to constant work with water at home or in paddy fields, making them prone to get infections with fungus like yeasts or saprobes (moulds). Elderly persons have suppressed immune systems and are often diabetic with sluggish circulation that make them at risk. Students living in hostels share communal facilities and are often careless about their personal hygiene. This puts them at risk of getting onychomycosis. [1-5,10-15]

This study looked at the (mainly Non albicans Candida) onychomycosis encountered in a teaching hospital in rural West Bengal with an attempt to speciate the Candida by available resources and compare wherever possible with more advanced method. In the peripheral centers where facilities like automated or more sophisticated methods are not available, conventional methods can be relied upon in trained hands and can be attempted to help the clinicians.

## CONCLUSIONS –

The changing trend of the causative organisms should be given due importance. Once known as soil contaminant, yeast has become the most common pathogen of onychomycosis which showed resistance with common available and affordable drugs as well. We found these organisms taking an upper hand. This was one of the notable findings of this study. Notably agriculture workers, students and the elderly were more at risk of onychomychosis at out set up. More studies to assess the sensitivity of these organisms to suitable anti-fungal agents are being undertaken.

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