



CLINICAL AND MYCOLOGICAL PROFILE OF ONYCHOMYCOSIS IN A HILLY STATE OF NORTH - EAST INDIA .

Dermatology

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ABSTRACT

Background: Onychomycosis is a chronic fungal infection of finger nails and toe nails. It is a non life threatening condition and requires long-term treatment. Mostly patients seek medical care for cosmetic purpose unless it gets secondarily infected and produce pain.

Aims: The aim of this study was to determine the prevalence of various causative agents of onychomycosis and to study the clinical and mycological patterns of onychomycosis.

Material and Methods: This was a cross sectional observational study which was carried over a period of one year , from December 2019 to November 2020 . A total of 47 patients were included in the study , who visited Dermatology OPD of SMIMS , Sikkim, India. After clinical evaluation , nail samples were subjected for KOH mount and culture.

Results: This study included 47 patients of clinically diagnosed onychomycosis , 30 males and 17 females . In the present study maximum number of patients belonged to the age group 30-40 years with 28 patients . Most of the study subjects , 22 were agricultural worker . We found that trauma to the nails was the commonest predisposing factor 17 . Out of 47 patients 33 patients were KOH positive and 21 patients were culture positive. Most common type of onychomycosis was Distal lateral subungual onychomycosis with 2 cases . Most common species identified in our study was *T.rubrum* with 5 patients , followed by *T. mentagrophytes* with 3 patients.

Conclusion: Along dermatophytes , NDM and yeasts were also common aetiological agents of onychomycosis. Since onychomycosis can cause physical , psychological and occupational problems, the clinico-epidemiological data can be helpful in development of preventive and diagnostic strategies.

KEYWORDS

Onychomycosis, dermatophytes, non-dermatophyte moulds, yeasts

INTRODUCTION-

Onychomycosis is the most common nail infective disorder , and it is responsible for about 50% of all consultations for nail disorders . Onychomycosis has been reported as a gender - and age – related disease , being more prevalent in males and increasing with age in both genders¹. In the elderly , onychomycosis may have an incidence > 40%².

Predisposing factors are diabetes mellitus , peripheral arterial disease , immunosuppression due to HIV or immunosuppressive agents³. In most cases , this infection is caused by anthropophilic dermatophytes , in particular by *Trichophyton rubrum* , followed by *Trichophyton mentagrophytes* var. *interdigitale* . Thenon - dermatophyte molds , like *Scopulariopsis brevicaulis* and *Aspergillus* spp., can be involved in onychomycosis as primary pathogens or as contaminant agents and secondary pathogens⁴.

Other molds that have been isolated from affected nails include *Fusarium* spp., *Acremonium* spp., *Alternaria* spp. and *Neoscytalidium* sp. The estimated worldwide prevalence of non- dermatophyte molds onychomycosis is 10%–15%⁵. Yeasts , like *Candida albicans* and *Candida parapsilosis*, represent the third cause of nail fungal infection , and they occur only when predisposing factors are present , mainly immunosuppression and diabetes⁶.

Toenails are more commonly affected than fingernails : onychomycosis in these cases frequently involves several nails , and dry - type plantar tinea pedis is often present⁷. There are different clinical types of onychomycosis , depending on the modality of nail invasion. Clinical diagnosis of onychomycosis always requires laboratory confirmation , and treatment depends on many factors , like the fungus species and the number of affected nails Onychomycosis in childhood is rare and affects approximately 0.5% to 2.6% of all children⁸. Similar to adults , the most common presentation is distal subungual onychomycosis , and toenails are affected more commonly than fingernails. Children acquire the fungus from a dystrophic or traumatic nail abnormality or from a parent , indirectly , through environment contamination . Genetic predisposition to develop fungal invasion of the soles and nails seems necessary at a young age¹⁰.

AIM AND OBJECTIVES-

The aim of this study was to determine the prevalence of various causative agents of onychomycosis and to study the clinical and mycological patterns of onychomycosis.

MATERIALS AND METHODS

This cross – sectional observational study was conducted after the approval from Ethical committee . The present study was carried out in the Department of Dermatology , Sikkim Manipal Institute of Medical Sciences, Gangtok , Sikkim over the period of one year from December 2019 to November 2020. A detailed history and clinical examination of 47 suspected patients of onychomycosis were recorded and nails samples were sent for KOH mount and fungal culture.

INCLUSION CRITERIA-

Male and female patients with clinically suspected cases of onychomycosis.

EXCLUSION CRITERIA-

Patients are not willing to give consent

Clinical and mycological assessment -

Clinically the disease was classified as Distal and Lateral Subungual Onychomycosis , Proximal Subungual Onychomycosis , White Superficial Onychomycosis and Total Dystrophic Onychomycosis . The most severely affected nail was thoroughly cleaned with 70% alcohol and nail clipping / scraping was collected . A part of this sample was dissolved in 20% potassium Hydroxide (KOH) and examined under the light microscope for fungal elements .

The remaining specimen was inoculated on two sets of media (1) Sabouraud's dextrose agar (SDA) supplemented with cycloheximide (100ug/ml) and chloramphenicol (50ug/ml) (2) SDA without cycloheximide supplement . Both these culture tubes were incubated at 37°C and 25°C respectively for four to six weeks .

Dermatophyte test medium was also used for primary isolation . The culture slopes showing fungal growth were examined for colony characters like texture of colony, surface of colony , colour of colony and pigment production. Gram staining and germ tube test were performed on smooth moist and pasty colonies. Carbohydrate fermentation and assimilation tests were also performed to identify yeasts. Lactophenol cotton blue preparation was done on mycelial growth.

RESULTS-

This study included 47 patients of clinically diagnosed onychomycosis

(30 males and 17 females) . (Table 1).

In the present study maximum number of patients belonged to the age group 30-40 years with 28 patients , followed by more than 40 years group with 12 patients. (table 2)

Most of the study subjects , 22 were agricultural worker , and no of labourer and housewife were 12 and 10 respectively . (table 3)

We found that trauma to the nails was the commonest predisposing factor 17 (36.17%).

Surprisingly in 15 patients there no predisposing factor . (table 4)

Discoloration were seen in 17 patients and subungual hyperkeratosis were present in 12 patients . (table 5)

Out of 47 patients 33 patients were KOH positive and 21 patients were culture positive.(table 6)

In our study we found most common type of onychomycosis was Distal lateral subungual onychomycosis with 8 patients . there were 2 cases of Candidial onychomycosis . (table 7)

Most common species identified in our study was *T.rubram* with 5 patients , followed by *T. mentagrophytes* with 3 patients. (table 8)

Table 1 Distribution of subjects according to gender

	Male	Female	Total
No	30	17	47
%	63.8	36.2	100

Table 2 Distribution of subjects according to their age

Age distribution	Male	female	total
10-20 Year	1	-	1
20-30 Year	4	2	6
30-40 Year	17	11	28
Above 40 Year	8	4	12
Grand Total	30	17	47

Table 3 Occupational status of study subjects

Occupation	Male	Female	Total
Agricultural worker	18	4	22
House wife	-	10	10
Labourer	10	2	12
Others	2	1	3
Grand total	30	17	47

Table 4 Preexisting factors of onychomycosis in study subjects

Predisposing factors	No of patients
Trauma	17
Excessive sweating	3
Occlusive footwear	5
Chronic Disease	7
No predisposing factor	15
Grand total	47

Table 5 Nail changes seen in patients

Nail changes	No of patients
Discoloration	17
Subungual hyperkeratosis	12
Dystrophy	9
onychomycosis	4
Leukonychia	2
Paronychia	3
Total	47

Table 6 Microscopy and culture positivity of specimens

	KOH positive	Culture positive
No. of cases	33	21
% of cases	70.21	44.68

Table 7 Clinical types of onychomycosis in study subjects

Distal lateral subungual onychomycosis	8
Proximal subungual onychomycosis	4
White superficial onychomycosis	3
Total dystrophic onychomycosis	4

Candidial onychomycosis	2
Total	21

Table 8 Details of fungal species isolated

Fungal species isolated	Total no.
<i>T.rubram</i>	5
<i>T. mentagrophytes</i>	3
<i>T. verrucosum</i>	2
<i>T. scoenleinii</i>	1
<i>T. tonsurans</i>	2
<i>Fusarium oxysporum</i>	1
<i>Aspergillus niger</i>	3
<i>Scopulariopsis</i>	1
<i>Scedosporium species</i>	1
<i>Candida albicans</i>	1
<i>Candida krusei</i>	1
Grand total	21

DISCUSSION -

Clinically suspected 47 cases of onychomycosis were included in this study . All the age groups and both the sexes were included in the study . Out of the 47 cases of onychomycosis in this study , 63.8% were males and 36.2% were females. The male to female ratio was 1.76 : 1. Pradnya Veer *et al.* ¹¹ also reported higher (65 %) prevalence of onychomycosis among males . In contrast Jorge Lopes *et al.* ¹², and Bokhari *et al.* ¹³, reported higher prevalence among females. Our study revealed that incidence of onychomycosis is increasing with advancing age and it was found to be commonest in the age group 30-40 years . In this study 28 (59.57%) patients were between 30-40 years , 12 (25.5 %) patients were above 40 years of age and only 1 patient was below 20 years of age. High prevalence (58.8%) of onychomycosis during the third decade has also been found in another study conducted by Adhikari *et al.* ¹⁴ .

Onychomycosis is chronic fungal infection of fingernails and toenails . There has been a recent increase in the incidence of onychomycosis . This can be attributed to various factors like , expanding number of immunocompromised patients and life style changes.

Involvement of toenails was seen in 28 (59.57%) of patients while fingernails were involved in 12 (25.53 %) patients .Both fingernails and toenails were involved in 7 patients . Various authors have reported higher incidence of onychomycosis in fingernails (Pradnya Veer *et al.* ¹¹ , Rigopuoulos *et al.* ¹⁵) . In majority of patients more than one nail was involved .

Onychomycosis was found to be commonest in agricultural workers 22 (46.8 %) , followed by housewives 10 (21.27 %) and labourers 12 (25.53 %) . Gupta *et al.* ¹⁶ also reported higher prevalence (20%) of onychomycosis among farmers . Many patients in our study were from the occupations which involve the work that predisposes to trauma and injuries .

The most common clinical presentation in our study was Distal and Lateral Subungual Onychomycosis which was seen in 8 cases . Total Dystrophic Onychomycosis was seen in 4 cases , Proximal Subungual Onychomycosis in 4 cases , Candidial paronychia in 2 cases and White Superficial Onychomycosis in only 3 case . In our study the most common factor predisposing to onychomycosis was trauma to the nails . The importance of trauma as predisposing factor in onychomycosis is well established . We found that trauma to the nails was the commonest predisposing factor in 17 patients and surprisingly in 15 patients , there were no predisposing conditions.

We found 33 samples were KOH positive , while the remaining 14 were found negative . Out of 47 cases 21 cases were diagnosed by culture , thus KOH mount found more sensitive than culture in our study. Most common pathogenic fungus in our study was *T. rubrum* . The other dermatophytes were *T. mentagrophytes* , *T. verrucosum* , *T. schoenleinii* and *T. tonsurans* . We isolated *candida albicans* in 1 case and *candida krusei* in 1 patient. Non dermatophyte moulds isolated in this study were *Aspergillus niger* , *Fusarium oxysporum* , *Scopulariopsis brevicaulis* and *Scedosporium species* . Puri D. K *et al.* ¹⁷, reported *Trichophyton mentagrophytes* was the most common isolate followed by *Trichophyton rubrum* . *Candida albicans* is reported as the commonest cause of paronychia onychomycosis . This is reflected in our study where three paronychia cases showed

Candida albicans on culture . Previously regarded as contaminant , yeast is now increasingly recognized as pathogen in fingernail onychomycosis (Vinod S *et al*¹⁸).

Non dermatophyte moulds constituted 17 % of the total cases in this study, suggesting that they are emerging as important etiological agents in onychomycosis . Ramani *et al*¹⁹ ,

reported 22 % incidence of moulds with *Aspergillus* being predominantly isolated in their study (Ramani *et al*¹⁹). The non dermatophyte moulds virtually damage the toenails especially which are damaged by disease or trauma (Andre J *et al*²⁰). Shemer *et al*²¹ ,

suggested that where NDM infection is present in the first culture , the patient should be re-examined on next visit and three separate samples should be taken from the affected nail. If NDM is confirmed in all three of the cultures taken , the diagnosis of NDM is considered established and appropriate treatment can be started.

CONCLUSION-

Onychomycosis becomes a chronic disease and more difficult to treat due to added secondary bacterial infection . So , if the surveillance of this infections and the awareness level in the common population is increased , the burden of this type of disease can be reduced to much lower level . There is need for microbiological confirmation in case of onychomycosis for appropriate management of onychomycosis cases and further epidemiological study .

Declaration of patients consent-

The authors certify that they have obtained written informed consent from all the patients in the form patient (s) / attendants has / have given his / her / their consent for his / her / their images and other clinical information to be reported in the journal . The patients understood that their names and initials will not be published and due efforts will be made to conceal their identity , but anonymity can not be guaranteed.

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