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Original Research Article

Non Dermatophytic Superficial Mycoses in a Tertiary Care Hospital in Northeast India- A 3 Year Retrospective Study.

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Abstract:

Background: Superficial mycoses are fungal infections affecting the outermost layer of the skin and the appendages. Prevailing about 20-25% worldwide, onychomysosis accounts for 30% of cutaneous skin infections and 20% of all nail disorders. Dermatophytes are the major causes for onychomycosis but non-dermatophytic superficial fungal infections are in rise during the past decade.

Aims and Objectives: To find the prevalence of non-dermatophytic causes of superficial mycoses in a tertiary care set up.

Materials and Methods: This study is a retrospective study conducted in the Department of Microbiology, Regional Institute of Medical Sciences, Imphal, Manipur, India. A total of 504 samples from 2019-2021 were included in the study. Samples received were processed for

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KOH mount and culture. Species identification was done by Lactophenol Cotton Blue (LCB) mount and Gram Stain.

Results: Out of 504 samples received, 309 (61.3%) and 195 (38.7%) were positive and negative for culture respectively. Maximum culture were received from 21-40 years of age group (37.9%). 53% of the culture positive samples yielded dermatophytic growths, 43.1% non-dermatophytic and 3,9% mixed growths. Aspergillus and Fusarium were found to be the commonest non-dermatophytic infections followed by Penicillium and Mucorales

Conclusion: With a previous study in the sample hospital shown 36.9% prevalence of non-dermatophytic infections, our study demonstrated an increase in the prevalence of the same (43.1%). Non-dermatophytes may be colonizing organisms, contaminants even though they can be the primary pathogens. However, our study suggests correlation with the clinical and microbiological features to arrive at early diagnosis of non-dermatophytic infections.

Keywords: Superficial mycoses, Non-dermatophytic, Onychomycosis, North-East India.

Introduction :

Infections caused by fungi are called mycoses. They can be superficial, deep or systemic. Superficial mycoses are fungal infections restricted to the outermost non-living layers of the skin and its appendages like hair and nails. According to WHO, the prevalence of superficial mycoses ranges from 20-25% worldwide. It is highly prevalent in the tropical and sub-tropical countries like India, where the humidity and heat favors the growth of fungi. Higher prevalence of superficial mycoses is seen among farmers, gardeners, agriculturists, butchers due to more exposure to wet working environment. [1,2]

Onychomycosis, fungal infection of the nail accounts for 30% cutaneous mycotic infections and 20% of all nail disorders[3,4]. Onychomycosis has a prevalence of 0.2%-2.8% in India affecting 5% of world population. Toenails are more prone to infection that fingernails. The longest toe which is more vulnerable to trauma and pressure has more chances of acquiring the infection.[3,5]

Dermatophytes have been implicated as the main causative fungal agent for superficial mycoses. This included Trichophyton, Epidermophyton and Microsporum. These dermatophytes are keratinophilic fungi, which invade the keratin layer of skin, hairs and nails for their nutrients. The prevalence of dermatophytosis has been increasing for the past few years with changing clinical patterns. Non-dermatophytic superficial mycoses have been witnessed to be increasing in the past decade. [6,7,8] This is due to various attributing conditions like diabetes, immunocompromised state due to various underlying conditions like tuberculosis affecting innate immunity which plays an important role in defence against mycoses.

Various conditions which predispose to superficial mycoses include poor personal hygiene, crowded living, malnutrition and poor general social conditions. Other risk factors include occupation related trauma, open footwear or occlusive footwear during exercise, swimming pools and frequency of travel.[4,9,10]

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This study aims in finding the prevalence of non dermatophytic causes of superficial mycoses in a tertiary care setup to throw light on this upcoming change in the trend of superficial mycoses.

Materials And Methods:

The study is a retrospective study conducted in the mycology section of the Department of Microbiology, Regional Institute of Medical Sciences, Imphal, Manipur, India. A total of 504 samples (502- nail, 2- skin) from 2019-2021 were included in this study.

Samples received were skin scrapings, pathological nail cuttings and nail base scrapings. Samples were processed for 10% KOH mount and cultured in Sabouraud Dextrose Agar (SDA) and Dermatophyte Test Medium (DTM). The culture tubes were incubated at 27°C and 35°C for any growth. Culture negative samples were reported after 21 days of incubation. The KOH mount is observed for any yeast cells, hyphae and other fungal elements like pseudo hyphae or conidia. Species identification were done by lactophenol cotton blue mount (LCB) for culture positive moulds. Yeasts were confirmed by Gram staining, morphology and presence of pseudo hyphae.

Statistical Analysis:

Statistical analysis of the variables like percentage were done using SPSS software version 21. Association between the variables were done using Chi- square test and P value of <0.05 is considered significant.

Results:

A total of 504 (502 nail samples and 2 skin scrapings) were received during the study period. Out of 504 samples, 309 samples were positive for culture (61.3%) and 195 were negative (38.7%). The results of KOH and culture is as given in the table 1

Table 1:

		KOH			**P value**
		NEG	**POS**	TOTAL	
CULTURE	**NEG**	189	6	195 (38.7%)	**<0.05**
	POS	159	150 (29.8%)	309 (61.3%)	
TOTAL		348 (69%)	156 (31%)	504	

From the culture positive samples (309), pure dermatophyte growths were obtained from 164 of the samples and 133 pure non-dermatophyte growths were obtained. Mixed growths were seen in 12 samples (9 mixed dermatophyte and non-dermatophyte infection, 3 mixed non-dermatophytes growth). Both the skin isolates yielded non-dermatophytic growths. The percentage of the culture results were given as in the figure 1.

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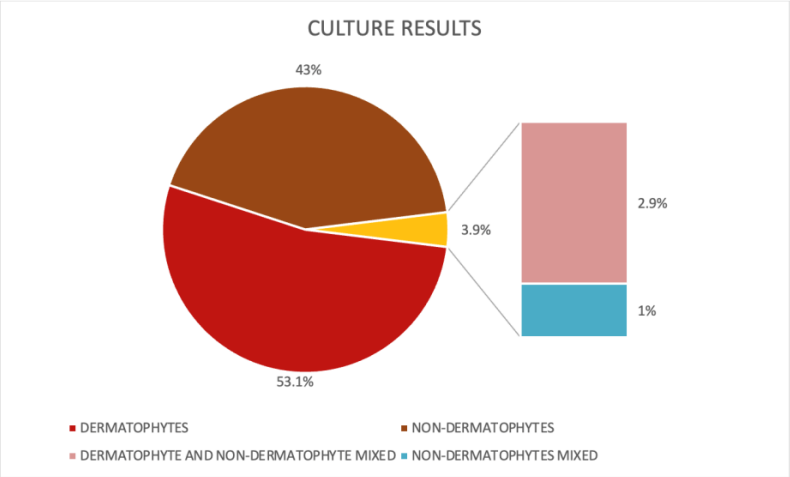

Figure 1:

In the 145 non-dermatophyte growths (133 isolated non-dermatophytic and 12 mixed growths), females (n= 87, 60%) predominated males (n=58, 40%).

Maximum samples were received from 21-40 years of age group (55 out of 145, 37.9%) followed by 41-60 years (54 out of 145, 37.2%). The categorization of age group for the non dermatophytic cultures are as given in the table 2.

AGE GROUP	FREQUENCY
</=20	21
21-40	55
41-60	54
>60	15
TOTAL	145

91.7% (133 out of 145) of the non-dermatophytic growths were pure and 8.3% (12 out of 145) have shown to have mixed non-dermatophytic growth. The pure growths yielded 70.7% of non-dermatophytic moulds (n= 94) and 29.3% (n=39) of yeast which were all Candida spp. The following table (Table 3) shows the non dermatophytic moulds obtained from the pure cultures.

ISOLATES	N
ASPERGILLUS SPP	18
FUSARIUM SPP	18
PENICILLIUM SPP	15
MUCORALES	12
ACREMONIUM SPP	8
CLADOSPORIUM SPP	5
GEOTRICHUM SPP	4
BIPOLARIS SPP	3
CURVULARIA SPP	2

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SCOPULARIOPSIS SPP	2
ABSIDIA SPP	1
BASIDIOBOLUS SPP	1
CHAETOMIUM SPP	1
CLADOPHIALOPHORA SPP	1
HORTAE WERNICKII	1
PSEUDOLLESCHERIA SPP	1

Mixed Trichophyton and candida predominated the mixed growths (n=8, 66.7%) Mixed growths were as given in the figure 2.

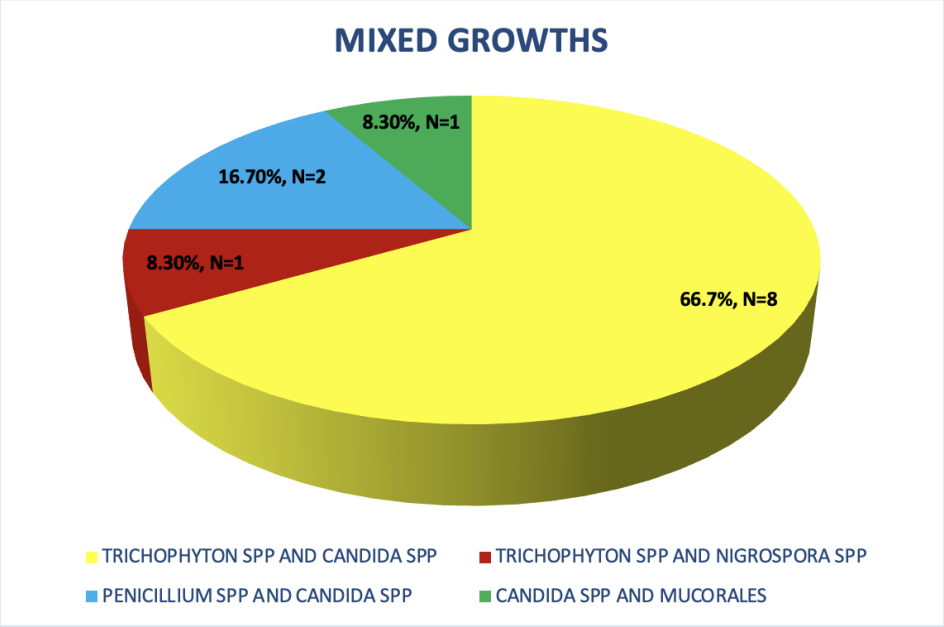

Figure 2:

Discussion:

Fungi causing superficial mycoses can be dermatophytes, non-dermatophytes and yeasts. Common non-dermatophytic fungi associated with onychomycosis includes Acremonium spp, Alternaria spp, Aspergillus spp, Fusarium spp, Geotrichum spp, Cladosporium spp, Scopulariopsis spp etc., the most common yeast being Candida albicans. Similarly, skin infections are predominantly caused by dermatophytes followed by non-dermatophytes like Candida spp being the commonest.[11]

A previous study conducted in the same center during 2020-2012 had shown a prevalence of 36.9% for non dermatophytic onychomycosis, which is found to have increased in our study (43%). Whereas mixed growth have shown a decline from 8.2% to 3.9%. One similar feature seen in both studies are that the Aspergillus spp and mixed Trichophyton spp and candida spp

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are found to be the most common non dermatophytic and mixed growth respectively. This shows that non dermatophytic infections are gaining importance over past few years, but the trend of the isolates remain to be the same.[10]

The prevalence of non dermatophytic superficial mycoses were found to be 14.5% and 34% by Hazarika D et al and Grover et al.[12,13] Similarly, the prevalence of non-deramatophytic onychomycosis in studies conducted in other parts of India were found to be 52.3% (Archana S et al), 42.3% (Mandir R et al).[14,15]

Aspergillus spp was found to be the most common non dermatophytic isolate in many other studies conducted by Tyagi S et al, Ragavendra KR et al, Sharma P et al where the prevalence of Non- dermatophytic growths were found to be75.37%, 35.33%, 53.33% respectively.[16,17,18]

The most common age group affected in study is 21-40 years (37.9%) which is similar to other studies by Khodadadi H et al (42.9%) and conducted in India by Nidhi N et al where the most common age group is 31-40 years (28%) followed by 21-30 years (25%). This is because they are more exposed to job related activities at this age which increases the chances of repeated trauma and more exposure to fungal agents.[19,20]

Female preponderance (60%) seen in our study is comparable with other studies conducted on onychomycosis by Kumar R et al (64%) and Farwa U et al (1:1.8 ratio).[21,22] This can be due to the fact that females are more exposed to wet environment in household works than males which increases the moisture content of the nail and predisposing to fungal infections.[23] Other predisposing conditions include aging, repeated nail trauma, comorbidities like diabetes, cancer, immunodeficiency or peripheral arterial disease.[24]

Our study yielded a KOH positivity rate of 31% and culture positivity rate of 61.3%. 29.8% were both culture and KOH positive and this association was statistically significant ($p<0.05$). It was shown that the KOH and culture positivity rate varied from 35.6% to 100% and 36% to 66.7% in various studies as suggested by Teklebirhan G et al.[11]

Among non-dermatophytes, Aspergillus and Candida are the commonest mold and yeasts causing superficial mycoses. Candida, a normal flora of human body causes infections when the normal balance of body flora is disturbed possibly due to antimicrobial resistance.[1] Other species associated are Alternaria, Fusarium, Penicillium, Curvularia, Rhizopus etc.[6,8]

While all dermatophytic infections are considered pathogens, non-dermatophytes may be colonizing organisms, contaminants rather than pathogens even though they can be primary invaders too. Furthermore, isolation of fungi from nail clippings poses difficulty because of the non-viability of the fungi in the distal nail plate.[25]

Most superficial mycoses are diagnosed clinically and confirmation is done with diagnostic microscopy, fungal culture or Wood’s lamp examination. Treatment is done topical or oral

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with azole antifungals, amphotericin, terbinafine depending on the severity of infection. Preventive measures include good hygiene, wearing airy clothes, avoiding barefoot walking, avoid sharing towel, combs, bedding and keeping the skin clean and dry.[1]

Conclusion:

Maximum number of nail samples with only two skin scrapings and no hair samples make it a limitation for our study. Also our study is less generalizable to the population being single centered. But non dermatophytic infections have seen a rise in our study center in the past few years. Therefore, clinicians should be on watch for these infections too while suspecting a case of dermatophytic superficial mycoses to avoid delay in the diagnosis and treatment

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