


Original Article

Clinico-mycological profile of dermatophytosis in a tertiary care hospital in North-Eastern India

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ABSTRACT

Objectives: While studies from different parts of India do show an increasing trend and change in the pattern of dermatophytosis, the same cannot be said about Northeast India. This study was therefore undertaken to identify the clinical and mycological profile of dermatophytosis in a tertiary care hospital in North-Eastern India. Furthermore, this study will help to identify the various risk factors and study the impact of comorbidities on the disease pattern.

Material and Methods: All diagnosed cases of dermatophytosis (either KOH mount or culture positive or both) were included in the study. Data collection was done in the preformed pro forma, which included demographic and clinical variables, presence of risk factors, and comorbidities.

Results: A total of 111 diagnosed cases of dermatophytosis were included in our study with ages ranging from 3 to 73 years and a mean age of 32.8 years. In adults, the majority belonged to 21–30 years (34.2%) while the pediatric population comprised 8.1%. KOH mount positivity was seen in 90.1%, and culture positivity was seen in 87.4%. History of topical steroid use was present in 69.4% of patients while 62.2% had unhygienic practices, and 9% had immune-compromised status. Combined infection (27.9%) was the most common clinical type followed by tinea cruris (24.3%), tinea corporis (22.5%), and onychomycosis (14.4%). *Trichophyton rubrum* was found to be the most common isolate.

Conclusion: Our study revealed that combined infection (27.9%), tinea cruris (24.3%), and tinea corporis (22.5%) continue to be the three most common presentations clinically while onychomycosis (14.4%) has become less frequent of a presentation. Interestingly, our study revealed that it was the most frequent manifestation in patients with comorbidities (38.46%). *T. rubrum* and *Trichophyton mentagrophytes* were the predominant species that were isolated.

Keywords: Dermatophytosis, Tinea, *Trichophyton*, KOH mount, Steroid, North-Eastern

INTRODUCTION

Dermatophytosis is predominantly a tropical disease, and recently there has been a dramatic change in the trend of this disease. Not only there has been an increase in its incidence at an alarming rate in our country^[1] but also the clinical presentation in terms of disease severity, treatment response, relapse rate,^[2] and changing mycological profile in different parts of the world have all led to its increased morbidity impacting on the quality of life^[3] and posing a greater therapeutic challenge.

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There are studies supporting these changes from different parts of the country; however, studies pertaining to this part of India where climatic conditions favor the growth of the fungi are almost negligible. Hence, we undertook this study to have a better understanding of the clinical presentation, the demographic profile, associated risk factors, and the current mycological profile prevalent in this part of India and compare its trends with other parts of the country.

MATERIAL AND METHODS

An observational cross-sectional study was conducted in a tertiary care hospital in North-Eastern India from March 2020 to June 2021 after obtaining ethical approval from the Institute Ethics Committee.

All diagnosed cases of dermatophytosis (either KOH mount or culture positive or both) were included in the study. Written informed consent was obtained from all the study subjects/guardians after explaining the nature and purpose of the study. A detailed history was obtained from patients in a pre-designed pro forma including age, sex, occupation, state of residence, socioeconomic status, duration of disease, history of steroid use, history of antifungal use, immunocompromised status, hygienic practices, and comorbidities.

Statistical analysis

Descriptive statistics were used for data analysis. The continuous variables are presented as mean \pm standard deviation (\pm SD) or median (range) if the data are skewed. Categorical variables are presented as absolute numbers and percentages.

RESULTS

A total of 111 diagnosed cases of dermatophytosis were included in our study with a prevalence of 6.32 among our outpatient department (OPD) patients. The mean age of the study population was 32.8 years with ages ranging from 3 to 73 years.

Demographic profile of the study population

Tables 1 and 2 show the demographic profile of our study population.

Age group distribution

In our study, the majority of cases were seen in the age group 21–30 years (34.2%) followed by 31–40 years (27%). Nine patients (8.1%) belonged to the pediatric age group. The mean age (mean \pm SD) of the study population was 32.8 \pm 13.0. The youngest patient was three years old while the oldest patient was 73 years old. The median age of patients was 30 years.

Table 1: Demographic profile of patients.

Age in group	Number of patients	Percentage
≤ 20	18	16.2
21–30	38	34.2
31–40	30	27.0
41–50	12	10.8
51–60	10	9.0
>60	3	2.7
Total	111	100.0
Sex	Number of patients	Percentage
Male	85	76.6
Female	26	23.4
Total	111	100
Socioeconomic status	Number of patients	Percentage
Lower middle	57	51.4
Upper middle	27	24.3
Upper lower	24	21.6
Upper	3	2.7
Total	111	100

Sex distribution

The majority of patients were male (76.6%) with a male-to-female ratio of 3.26.

Socioeconomic status

The majority of patients 57 (51.4%) belonged to lower middle socioeconomic status followed by upper middle (24.3%) and upper lower (21.6%). Only three patients (2.7%) were from the upper class.

Duration of disease

The mean duration of the disease was 15.8 months, and the median disease duration was six months while the maximum disease duration noted was 96 months (8 years).

Risk factors and comorbidities

Table 3 shows various risk factors and comorbidities associated with dermatophytosis in our study.

Hygienic versus unhygienic practices

Unhygienic practices of sharing towels and clothes among family members and not taking baths daily were seen in a significant proportion (62.2%) of patients in this study.

History of steroid and antifungal use

History of topical steroid formulation was seen in 77 (69.4%) patients, and 33 (29.7%) patients had a history of antifungal

Table 2: Distribution of mean age and disease duration.

	Number	Mean	SD	Minimum	Maximum	Median
Age (in years)	111	32.8	13.0	3.0	73.0	30.0
Disease duration (in months)	111	15.8	18.4	0.5	96.0	6.0

SD: Standard deviation

Table 3: Associated risk factors and comorbidities.

Personal hygiene	Number of patients	Percentage
Unhygienic	69	62.2
Hygienic	42	37.8
History of steroid use	Number of patients	Percentage
Yes	77	69.4
No	34	30.6
History of anti-fungal use	Yes	No
Yes	33	29.7
No	78	70.3
Immunocompromised status	Number of patients	Percentage
Yes	10	9.0
No	101	91.0
Total	111	100
History of other comorbidities	Number of patients	Percentage
No comorbidities	98	88.3
DM	7	6.3
Hypothyroidism	2	1.8
Alopecia areata	1	0.9
Leprosy	1	0.9
Psoriasis	1	0.9
Hypertension+DM	1	0.9
Total	111	100.0

DM: Diabetes mellitus

use. Combined usage of topical steroids and antifungal agents was noted in 12.6% of patients.

Immunocompromised status

Among study participants, 10 (9.0%) patients had immunocompromised status. The most common clinical presentation was tinea corporis and onychomycosis in this group (30% each). *Trichophyton* growth was detected in 80% of patients.

History of comorbidities

A total of 11.7% of patients had the presence of some comorbidities of which diabetes mellitus (DM) (6.3%) was the most common comorbidity noted followed by hypothyroidism (1.8%). Among other comorbidities, alopecia areata, leprosy, psoriasis, and both hypertension and DM were distributed equally in the study (0.9% each).

Table 3 shows the associated risk factors and comorbidities in our study population.

Clinical profile of patients in our study

Combined infection (27.9%) was the most common clinical type followed by tinea cruris (24.3%), tinea corporis (22.5%), and onychomycosis (14.4%). Combined infection of tinea cruris and tinea corporis [Figure 1], which comprised 22.5% of total cases, was the most common followed by tinea cruris + tinea corporis + tinea faciei [Figure 2], which is 1.8% of total cases. Tinea faciei [Figure 3] comprised 6.3% of cases while tinea pedis was 2.7% of total cases in the study.

In male patients, 29.4% of the patients had combined infection of which tinea corporis + tinea cruris was most common (24.7%) followed by tinea cruris [Figure 4] (24.7%) and tinea corporis (21.1%). Among female patients, tinea corporis (26.9%) and tinea cruris (23.1%) were the most common clinical type, and combined infection comprised 19.2% of total female participants.

Among the pediatric age group, tinea corporis (44.44%) was the most common type followed by combined infection (22.22%). Tinea capitis, tinea faciei, and onychomycosis were the other clinical presentations in this age group (11.1% each).

Table 4 represents the clinical profile of patients in our study.

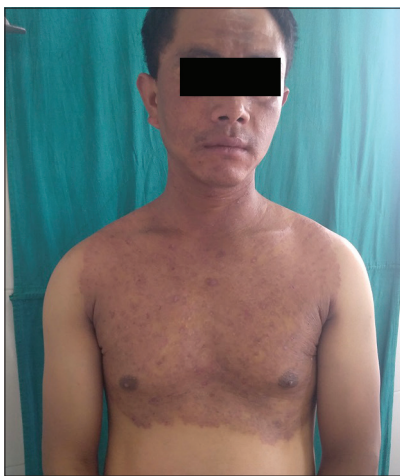
Cultural characteristics of our study

Species grown in culture

Trichophyton rubrum was the most common species grown (26.8%) followed by *Trichophyton mentagrophytes* (17.5%) and *Trichophyton tonsurans* (15.4%). In another 23 patients, there was growth of *Trichophyton*, but species identification could not be done. Mixed growth was seen in 11.3% of patients among which 6.18% of patients showed mixed growth of *T. mentagrophytes* and *T. tonsurans*. *Trichophyton verrucosum* was isolated in 3.09% of patients while *Trichophyton interdigitale* and *Trichophyton ajelloi* were grown in 1.03% each. *T. mentagrophytes* (22.2%) was the most common isolate among the pediatric age group. Pie Diagram 1 shows the distribution of species grown in culture.

Table 4: Clinical profile of patients.

Clinical type	Number of patients	Percentage
Combined infection	31	27.9
A. Tinea cruris+Tinea corporis	25	22.5
B. Tinea cruris+Tinea corporis+Tinea faciei	2	1.8
C. Tinea cruris+Tinea faciei	1	0.9
D. Tinea cruris+Tinea pedis	1	0.9
E. Tinea corporis+Tinea pedis	1	0.9
F. Tinea corporis+Tinea faciei	1	0.9
Tinea cruris	27	24.3
Tinea corporis	25	22.5
Onychomycosis	16	14.4
Tinea faciei	7	6.3
Tinea pedis	3	2.7
Tinea capitis	1	0.9
Tinea manuum [Figure 5]	1	0.9
Total	111	100.0

**Figure 1:** Combined infection – tinea corporis with cruris.**Figure 3:** Tinea faciei involving right side of face.**Figure 2:** Tinea corporis with faciei.

Species variability and laboratory characteristics according to clinical type and gender

In combined infection, *T. mentagrophytes* and *T. tonsurans* were the most common growth comprising 22.58% each followed by *T. rubrum* (19.35%). Mixed growth of *T. mentagrophytes* and *T. rubrum* was seen in 9.67%. The KOH mount positivity rate was 100% among these patients.

Among tinea cruris patients, *T. rubrum* (22.22%) was the most common growth followed by *T. tonsurans* (18.51%). Mixed growth was seen in 14.8% of patients. The KOH positivity rate was 81.48%.

In tinea corporis patients, *T. rubrum* (28%) and *T. mentagrophytes* (16%) were the most common isolates, and mixed growth was seen in 12% of patients. The KOH positivity rate in this category was found to be 92%.



Figure 4: Extensive tinea cruris.



Figure 5: Tinea manuum extending to involve the dorsum of hand.

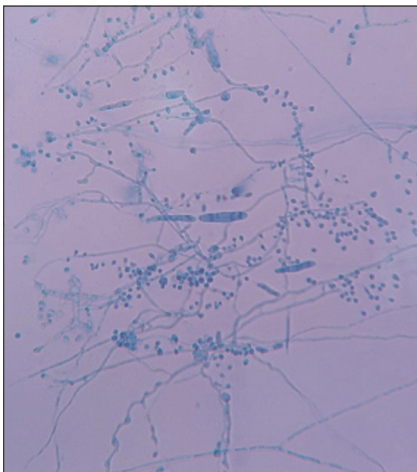
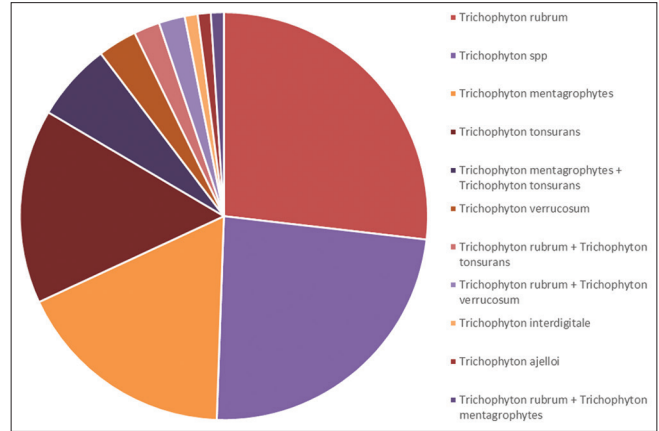
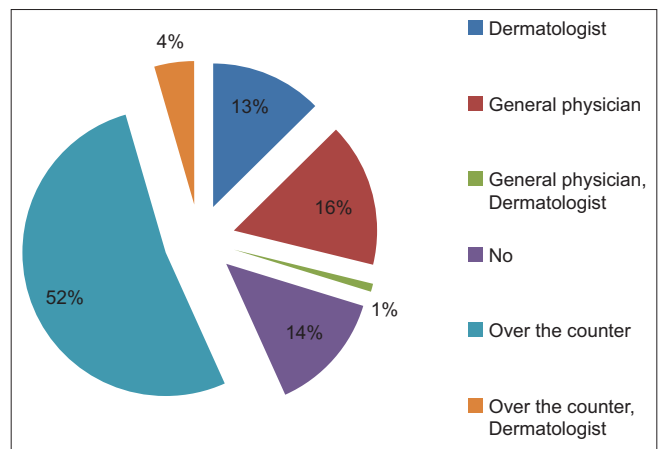


Figure 6: Lactophenol cotton blue mount showing macroconidia and microconidia of dermatophytes.



Pie Diagram 1: Species grown in culture.



Pie Diagram 2: Pie chart showing pattern of seeking consultation among patients.

In onychomycosis, *Trichophyton* growth was seen in 87.5% while species identification could not be done in a significant proportion (62.5%). The KOH positivity rate was lower (75%) in comparison to other clinical variants in this study.

Among male patients, *T. rubrum* (25.88%) was the most common species isolated followed by *T. tonsurans* (15.2%). In another 21.17% of patients, *Trichophyton* growth was detected, but further species identification was not possible. Mixed growth was seen in 8.23%, and growth could not be detected in 10.58%. On the other hand in females, *T. mentagrophytes* (19.23%) was the most common species followed by *T. rubrum* (15.38%). Mixed growth was detected in 15.38% while 19.23% of patients showed no growth in culture. The KOH mount positivity rate was higher in males than in females (91.76% vs. 84.61%).

The overall KOH mount positivity in this study found 90.1% and 87.4% of patients had positive culture growth. Table 5 shows the species variability and KOH mount positivity among different clinical types and genders in our study.

Table 5: Species variability according to clinical types, gender, and KOH mount positivity among clinical variants and gender.

Clinical type	Most common species grown	KOH positivity rate
Combined infection	<i>T. mentagrophytes</i>	100%
Tinea cruris	<i>T. rubrum</i>	81.48%
Tinea corporis	<i>T. rubrum</i>	92%
Onychomycosis	<i>Trichophyton spp.</i>	75%
Gender	Most common species grown	KOH positivity
Male	<i>T. rubrum</i>	91.76%
Female	<i>T. mentagrophytes</i>	84.61%
KOH mount	Number of patients	Percentage
Fungal hyphae present	100	90.1%
Fungal hyphae absent	11	9.9%
Culture report	Number of patients	Percentage
Growth present	97	87.4%
No growth	14	12.6%

T. mentagrophytes: *Trichophyton mentagrophytes*, *T. rubrum*: *Trichophyton rubrum*

Adults versus pediatric characteristics

The M:F ratio was 3.5 in the pediatric age group compared to 3.26 in adults. Among the pediatric age group, tinea corporis (44.44%) was the most common type followed by combined infection (22.22%) in comparison to adults where combined infection (27.9%) was the most common clinical type followed by tinea cruris (24.3%) and tinea corporis (22.5%). The culture positivity rate was lower than the adult age group (55.55% v/s 87.4%). *T. mentagrophytes* (22.22%) was the most common species isolated, while in adults the most common isolate was that of *T. rubrum* (26.8%). There were no immunocompromised patients in the pediatric age group in comparison to adults (9%). Unhygienic practices and a history of steroid use before seeking treatment were present in 66.67%, respectively, which was very similar to the adult age group (Unhygienic – 62.2% and history of steroid use – 69.4%).

Pattern of seeking consultation among patients

In our study, 14 (12.6%) patients sought consultation from a dermatologist, 18 (16.2%) patients visited a general physician, one (0.9%) patient visited both general physician and dermatologist, 58 (52.3%) patients purchased medicines over the counter, and five (4.5%) patients consulted a dermatologist and also took medication over the counter. Pie Diagram 2 shows the pattern of consultation seeking among patients.

DISCUSSION

This study intends to determine the recent trend and clinical-with-mycological pattern in dermatophytosis in Northeast India and also analyze if these changes reflect or differ from other parts of India.

Demographic profile

In our study, the majority of cases belong to the age group of 21–30 years, which is similar to the finding of Noronha *et al.*^[4] in North Karnataka and Agarwal *et al.*^[5] in North India, but unlike Vineetha *et al.*^[6] where second decade means 11–20 years was the most common age group affected in the study. The increased incidence in this age group can be attributed to increased outdoor activities and physical exertion leading to increased sweating and maceration of the skin. The next common age group affected was 31–40 years. Due to the COVID pandemic, the number of young population visiting hospitals reduced drastically could be the reason for less number of patients belonging to the 11–20 years age group in our study.

The majority of the patients were male in this study, and the percentage of male patients was 76.6%. This finding was similar to other similar studies conducted by Sahai and Mishra,^[7] Lakshmanan *et al.*,^[8] and Kaur.^[9] The increased male preponderance is explained by increased outdoor activity and involvement in activities that lead to increased perspiration such as farming, labor activities, and hot and humid conditions. On the other hand, females may be reluctant to seek medical attention due to the involvement of body areas that are difficult to expose such as axillae and groins and less involvement in outdoor activities that can be the factor for lesser incidence.

When comparing the socioeconomic status, 51.4% of patients belong to lower middle socioeconomic status, which is similar to the finding of Agarwal *et al.*^[5] Noronha *et al.*^[4] and Poluri *et al.*^[10] In their respective studies, they have stated lower socioeconomic class as the most commonly affected category. During the COVID pandemic, people

belonging to lower socioeconomic class faced difficulty due to the lack of availability of public transportation and other restrictions, which may have led to less participation of lower socioeconomic class patients in this study.

Risk factors associated with and pattern of seeking consultation

Risk factors associated showed an interesting finding that 69.4% of participants in our study gave a history of use of topical steroid formulation, which was reported much lower in studies conducted by Vineetha *et al.*^[6] and Singh *et al.*^[11] (42% and 21.7%). Furthermore, 29.7% of patients used antifungal agents in either topical or systemic form while Singh *et al.*^[11] reported topical antifungal use in 23.1% of patients.

The majority of patients (52.3%) were taking medications over the counter without consultation from a dermatologist or general physician. Only a very small number, i.e., 12.6% of study participants consulted a dermatologist, and 16.2% consulted a general physician for their problem. Lack of patient education and awareness along with a lack of availability of specialists in rural areas and easy availability of topical steroid preparation over the counter may lead to a higher rate of topical steroid abuse among people of this region. Using topical antifungal preparations in inadequate dosage and for insufficient periods without proper prescription may lead to the rise of chronic and recalcitrant cases as seen in our study. The pattern of seeking consultation among patients has been studied for the first time in this region.

Another interesting finding in our study was a much lower rate of chronic infection among treatment naive patients in comparison to those who either used topical steroid formulations or antifungal agents or both.

The second most common risk factor seen was unhygienic practices of not taking baths regularly and sharing personal clothes including towels with family members and with roommates in 62.2% of patients. Vineetha *et al.*^[6] reported sharing of towels (22%) in their study in chronic cases. Unhygienic practices lead to the spread of infection, which can be taken care of by proper counseling.

Comorbidities

The percentage of immunocompromised patients in our study was found to be 9% while Noronha *et al.*^[4] found 19.6% of the study participants to be immunocompromised. As the immunocompromised patients during the COVID pandemic strictly avoided going outdoors, could be the reason for the lower proportion found in our study.

In our study, DM (7.2%) was the most common comorbidity followed by hypothyroidism (1.8%). Noronha *et al.*^[4] also

reported DM in 23.5% of patients as the most common comorbidity, and Vineetha *et al.*^[6] reported diabetes followed by thyroid disorders as the common morbidities in their study. Hypertension (0.9%), leprosy (0.9%), psoriasis (0.9%), and alopecia areata (0.9%) were the other comorbidities noted in our study.

The association of dermatophytosis with the presence of comorbidities is essential, especially in current times where there is a rampant increase in its prevalence. Many such comorbidities are known to either affect or alter the natural course of skin diseases like dermatophytosis potentially giving rise to chronic and recalcitrant cases increasing the number of combined infections or involvement of greater body areas than isolated involvement and also impacting the choices of available options for treatment of the disease, as it can lead to various drug interactions.

Clinical profile

When comparing the differences in various clinical types of dermatophytosis, we found that the most common presentation was the combined infection comprising 27.9% followed by tinea cruris (24.3%), tinea corporis (22.5%), and onychomycosis (14.4%) while other studies conducted by Lakshmanan *et al.*,^[8] Bhagra *et al.*,^[12] and Poluri *et al.*^[10] reported tinea corporis as the most common clinical manifestation. This difference can either be attributed to different geographical variations or can be a reflection of a change in the trend of the disease in the last few years where there is an increased occurrence of combined infection or simultaneous involvement of multiple body areas as compared to isolated body involvement. Only one study conducted by Singh *et al.*^[11] also resonated with a similar finding to our study where the combined infection was found to be the most common clinical manifestation. However, they reported a much higher percentage of 77%. Another study conducted by Lyngdoh *et al.*^[13] reported tinea pedis as the most common clinical type in Meghalaya as compared to this study, thereby showing a change in the trend of the disease.

We also noted that there was some difference when comparing the clinical presentations between the two genders. The combined infection was the most common clinical type in males accounting for 29.4% while in females tinea corporis (26.9%) was the most common, and combined infection (19.2%) was the third most common presentation in females. This difference can either be due to a smaller sample size or the fact that females sought treatment earlier than males thereby reducing the spread of infection to other body parts.

Among the pediatric age group, tinea corporis (44.44%) was the most common type followed by combined infection (22.22%) in comparison to adults where combined infection (27.9%) was the most common clinical type followed by tinea cruris

Table 6: Comparison of various studies from different parts of India with the present study.

Author, year (Ref)	M:F	Most common age group (years)	KOH positivity (%)	Culture positivity (%)	Most common clinical type	Most common species grown
Bhagra et al., 2014 ^[12]	4:1	21–30	80	68	Tinea corporis	<i>T. rubrum</i>
Poluri et al., 2015 ^[10]	2:1	21–30	58.1	56.3	Tinea corporis	<i>T. rubrum</i>
Noronha et al., 2016 ^[4]	1.6:1	21–30	60	40	Tinea corporis	<i>Trichophyton mentagrophytes</i>
Ray Ghosh et al., 2018 ^[3]	3:2	21–30	72	51	Tinea corporis	<i>T. rubrum</i>
Dhayagude et al., 2019 ^[17]	2.5:1	21–40	91.4	29.4	Mixed infection (Tinea cruris+Tinea corporis)	<i>T. rubrum</i>
Present study	3.2:1	21–30	90.1	87.4	Tinea cruris	<i>T. rubrum</i>

*M:F: Male:Female, *T. rubrum*: *Trichophyton rubrum*

(24.3%) and tinea corporis (22.5%). An interesting finding in our study is that patients with comorbidities presented with onychomycosis (38.46%) as the most common clinical type of dermatophytosis, which was otherwise found only in 11.22% of patients without comorbidities, and it represented the fourth most common clinical presentation in them. Based on this, it can be hypothesized that the presence of onychomycosis can be considered as an indicator or a surrogate marker of comorbidities and alert clinicians to either ask or look for their presence in patients. The previous studies did not compare the clinical profile based on gender, pediatric age group, and patients with comorbidities as we did in this study.

Laboratory characteristics

In this study, 100 out of 111 total participants (90.1%) showed fungal hyphae under direct microscopic examination using a KOH mount [Figure 6]. This finding was similar to Sahai and Mishra^[7] (89.6%), Singh et al.^[11] (97.7%), and Agarwal et al.^[5] (84.67%). On the other hand, Lakshmanan et al.^[8] and Munuswamy and Subramanian^[14] reported lower KOH mount positivity rates (50.5% and 43%). The KOH mount positivity rate was 100% among patients with combined infection while among onychomycosis patients, only 75% showed KOH mount positivity.

The culture positivity rate in our study was 87.4%, which is consistent with Narasimhalu et al.^[15] and Agarwal et al.^[5] who reported 88.2% and 80%, respectively. On the other hand, Garg et al.^[16] and Noronha et al.^[4] reported a very low rate of culture positivity of 23.8% and 40%, respectively.

The most common isolate was *T. rubrum* (26.8%) followed by *T. mentagrophytes* (17.5%) and *T. tonsurans* (15.4%). Bhagra et al.^[12] also reported *T. rubrum* (66.17%) as the most common isolate followed by *T. mentagrophytes* (19.11%). Kaur,^[9] Poluri et al.,^[10] and Dhayagude et al.^[17] all reported *T. rubrum* as the most common isolate in their respective studies. Agarwal et al.^[5] and Singh et al.^[11] reported

T. mentagrophytes as the most common dermatophyte grown in culture. In this study, 11.34% of patients showed mixed growth in culture out of which *T. mentagrophytes* and *T. tonsurans* were the commonest. In another 23.71% of patients, *Trichophyton* species were grown, but species identification could not be done. Other *Trichophyton* species that were grown in small numbers were *T. verrucosum* (2.7%), *Trichophyton interdigitale* (0.9%), and *Trichophyton ajelloi* (0.9%). No *Microsporum* or *Epidermophyton* growth was seen in our study.

We also found out the common species isolated according to the clinical types, gender, and pediatric age group. In combined infection, *T. mentagrophytes* and *T. tonsurans* were the most common growth comprising 22.58%, each followed by *T. rubrum* (19.35%). Among tinea cruris patients, *T. rubrum* (22.22%) was the most common growth followed by *T. tonsurans* (18.51%). Mixed growth was seen in 14.8% of patients. In tinea corporis patients, *T. rubrum* (28%) and *T. mentagrophytes* (16%) were the most common isolates, and mixed growth was seen in 12% of patients. In onychomycosis, *Trichophyton* growth was seen in 87.5% while species identification could not be done in a significant proportion (62.5%). Among male patients, *T. rubrum* (25.88%) was the most common species isolated followed by *T. tonsurans* (15.2%) while in females *T. mentagrophytes* (19.23%) was the most common species followed by *T. rubrum* (15.38%). *T. mentagrophytes* (22.22%) was the most common species isolated in the pediatric population.

Table 6 shows a comparison of various studies from different parts of India with the present study.

Limitations of study

1. The number of patients attending OPD during the COVID pandemic reduced drastically. As a result, the sample size was smaller than the expected one.

CONCLUSION

Our study highlights the importance of understanding the current trend and changing clinical and mycological pattern in Northeast India. Furthermore, it iterates on the association of various risk factors that can lead not only to chronicity and recurrences of the disease but inadequate treatment and thereby guide and equip, especially the medical practitioners from other fields, who are more easily accessible than the limited specialists catering to only a fraction of population here in Northeast India in an attempt to control its rampant increase.

Ethical approval

Approved by the Institutional Ethics Committee at North Eastern Indira Gandhi Regional Institute Of Health & Medical Science, Shillong, number NEIGR/IEC/M10/T7/2020 dated 14th May 2020.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

Use of artificial intelligence (AI)-assisted technology for manuscript preparation

The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using the AI.

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