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A Conventional Profile: For The Diagnosis Of Dermatophytosis In Patients Attending Tertiary Care Centre- An Observational Study

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ABSTRACT

Background: Dermatophytosis is one of the most common superficial fungal infections worldwide, with increasing prevalence due to changing lifestyles, environmental factors, and drug resistance. This study aimed to investigate the epidemiological distribution, clinical spectrum, and mycological characteristics of dermatophytosis in patients attending a tertiary care hospital.

Methods: A cross-sectional descriptive study was conducted over Approx. 18 months or till target sample size reached in the Department of Microbiology, Index Medical College Hospital & Research Centre. A total of 200 clinically suspected dermatophytosis patients were enrolled following inclusion and exclusion criteria. Clinical specimens (skin scrapings, nail clippings, and epilated hairs) were collected and processed using KOH mount, Lactophenol Cotton Blue staining, culture on Sabouraud Dextrose Agar (with/without antibiotics, Dermatophyte Test Medium), and biochemical differentiation (urease test, hair perforation test).

AIM: Present study aimed to find out epidemiological distribution, characterization, occurrence and clinic-mycological study of Dermatophytosis among patients attending tertiary care hospital. OBJECTIVE: To identify various species of dermatophytes using mycological & conventional method.,To find out occurrence of dermatophytes in clinical samples.

RESULTS: Out of 200 samples, 124 (62%) were positive by KOH mount and 86 (43%) by culture. Trichophyton species were the most common isolates (81.4%), followed by Epidermophyton (11.6%) and Microsporum (7%). Among species, T. rubrum (51.2%) was predominant, followed by T. mentagrophytes (23.3%), E. floccosum (11.6%), M. fulvum (7%), T. tonsurans (4.7%), and T. verrucosum (2.3%). Tinea corporis was the most common clinical presentation (39.5%), followed by tinea cruris (23.3%), tinea unguium (16.3%), and tinea capitis (9.3%).

CONCLUSION: Dermatophytosis remains a significant public health problem, with Trichophyton rubrum being the most common isolate. Comprehensive mycological evaluation is essential for early diagnosis and effective management. Increasing antifungal resistance highlights the need for surveillance and rational therapy.

Keywords: Dermatophytosis, Trichophyton rubrum, Mycological study, Epidemiology, Superficial fungal infections

INTRODUCTION

Dermatophytosis, a superficial fungal infection caused by keratinophilic fungi of the genera Trichophyton, Microsporum, and Epidermophyton, continues to be one of the most prevalent mycotic infections worldwide. It primarily affects keratinized tissues such as skin, hair, and nails, leading to substantial morbidity, cosmetic disfigurement, and economic burden on healthcare systems. Global estimates suggest that dermatophytosis affects nearly 20–25% of the world's population, with a disproportionately higher prevalence in tropical and subtropical countries, including India, where hot and humid climates create an ideal environment for fungal proliferation (1,2).

Multiple host and environmental factors influence the epidemiology of dermatophytosis. Increased incidence has been linked with poor hygiene, overcrowding, diabetes mellitus, immunosuppressive states, and inappropriate or prolonged use of corticosteroids (3–5). Recent reports from India and other endemic regions have highlighted a shift in clinical patterns, with rising cases of chronic, recurrent, and recalcitrant dermatophytosis, often associated with misuse of over-the-counter topical steroid–antifungal combinations (6,7). Furthermore, antifungal resistance, especially to terbinafine and azoles, is emerging as a significant therapeutic challenge (8,9)

Traditionally, Trichophyton rubrum has been the predominant etiological agent across different geographic regions. However, recent studies indicate a growing prevalence of T. mentagrophytes complex and atypical dermatophytes, which are frequently implicated in severe or resistant infections (10,11). Epidemiological variation is also observed in the distribution of clinical types: while tinea corporis and tinea cruris are most common among adults, tinea capitis and onychomycosis are increasingly recognized in pediatric and immunocompromised populations (12,13). Accurate laboratory diagnosis remains crucial for species-level identification, guiding therapeutic decisions, and monitoring epidemiological trends. Direct microscopy using potassium hydroxide (KOH) mount offers rapid detection, but culture on Sabouraud Dextrose Agar continues to be the gold standard for species identification (14,15). Advanced techniques such as molecular assays and antifungal susceptibility testing are increasingly advocated to address the challenge of emerging drug resistance.

Despite its high prevalence, dermatophytosis remains under-reported due to widespread self-medication, delayed health-seeking behavior, and lack of routine mycological investigations in many parts of the world. Therefore the present study was undertaken to study the epidemiological distribution, characterization, occurrence and clinic-mycological study of Dermatophytosis among patients attending tertiary care hospital.

MATERIAL AND METHODS

This Descriptive type of observational Cross- Sectional Studywas conducted in the Department of Microbiology, Index Medical College Hospital & Research Centre. A total of 200 clinically suspected dermatophytosis patients from the Dermatology OPD were enrolled after ethical clearance and informed consent.

Inclusion criteria: Patients of all ages and sexes with clinically suspected dermatophytosis, including those with systemic illnesses (diabetes, psoriasis, hypertension).

Exclusion criteria: Patients on systemic/topical antifungal therapy, bacterial/fungal coinfections of skin, hair, nails, and those unwilling to consent.

Specimen collection: Skin scrapings, nail clippings, and epilated hairs were collected under aseptic conditions after cleaning with 70% ethanol. Samples were transported in sterilized black paper envelopes and processed within hours

PROCESSING OF SPECIMEN-: Two samples were collected from each patient for direct microscopic examination with 10% to 40% Potassium hydroxide the samples were taken and processed aseptically for direct KOH mount, and culture on Sabouroud's dextrose agar with antibiotics. Lacto Phenol Cotton Blue mount (LPCB) will be done for fungal colonies resembling mold to reveal hyphal morphology, conidia morphology (microconidia and macroconidia) & arrangements of conidia. Biochemical reaction test will be done on Christensen's urea medium for hydrolysis of urea to diffentiate T.mentagrophyte species from T. rubrum species. T. mentagrophytes species hydrolyse the urea and the medium became deep pink while T.rubrum did not hydrolyse urea. Hair perforation test will be done to differentiate between T. mentagrophytes and T.rubrum

Statistical analysis: Sample size was calculated at 95% confidence level assuming prevalence of dermatophytes in 53% of clinical sample as found in reference study (16). At the relative allowable error of 15% of prevalence, minimum 152 samples are required at sample size. This was further enhance to 200 as final sample size in order to cover the loss to follow up, non-responsive cases; so the present study expecting 20 % iteration. The unpaired T Test and ANOVA test were used for analysis of quantitative variables while chi-square test was used for analysis of qualitative variables. P – Value less than 0.05 were taken as significant. SPSS28 version software was used for all statistical calculations.

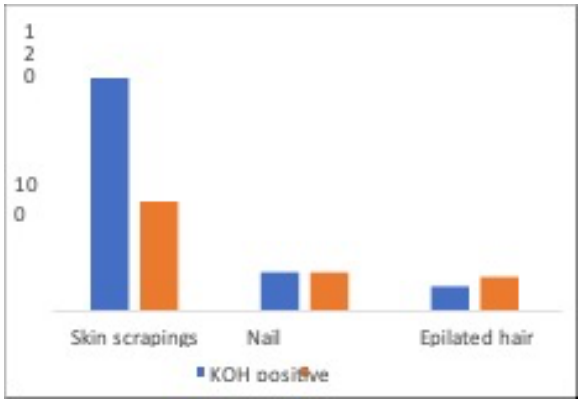
RESULTS

The present study was conducted in Index Medical Collage and Hospital, Department of Microbiology; a total 200 samples were collected from indoor and outdoor patients, after taking informed written consent from them. Out of all 200 samples examined 86 samples were found to be positive for dermatophyte infection. Among them 128 (64%) were male patients &72 (36%)were female patients. Throughout the course of our investigation, a total of 200 specimens, 144 of which were skin scrapings, 32 of which were nail clippings, and 24 of which were samples of hair that had been epilated.

TABLE 1-: THE EFFECTIVENESS OF KOH MOUNT WAS TESTED ON A SAMPLE OF 200 PEOPLE.

Specimen	Total (n)	KOH Positive	Percentage (%)	KOH Negative	Percentage (%)
Skin scrapings	144	98	68.1%	46	31.9%
Nail clippings	32	16	50%	16	50%
Epilated hair	24	10	41.7%	14	58.3%

Figure 1: The effectiveness of KOH mount was tested on a sample of 200



The results of the direct microscopic inspection (KOH) showed that 124 of the samples were positive, whereas 76 of the samples were negative.

TABLE 2 -: PERCENTAGE OF DERMATOPHYTES FOR CULTURE ISOLATION IN THE STUDY POPULATION(N=200)

Total Number Of Persons	200
Total Number Of Dermatophytes Isolated	86
No Growth	114

The total number of samples that grew in culture was 86, and the total number of samples that did not grow in culture was 114.

Figure 2: Number of dermatophytes (n=200) isolated in culture.

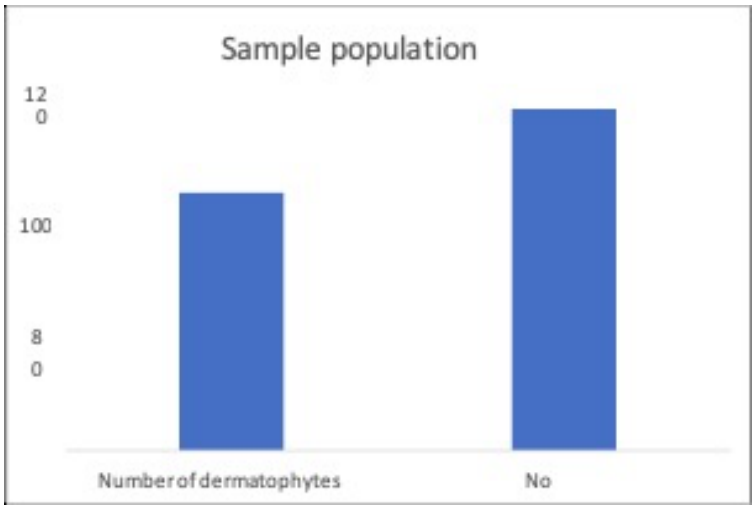


TABLE 3-: THE EFFECTIVENESS OF CULTURE WAS TESTED ON A SAMPLE OF 200 PEOPLE.

Specimen	Total(n)	Culture Positive	Percentage (%)	Culture Negative	Percentage (%)
Skin scrapings	144	**60**	69.77%	84	73.68%
Nail clippings	32	**14**	16.28%	18	15.79%
Epilated hair	24	**12**	13.95%	12	10.53%

Total	200	**86**	100%	114	100%

Among study population, out of 86 cultures isolated, 60 (30%) of them were isolated from the skin scrapings, 14 (16.28%) of them were from nail clippings and 12 (13.95%) of them were from the epilated hair samples.

Figure 3: The effectiveness of culture was tested on a sample of 200 people.

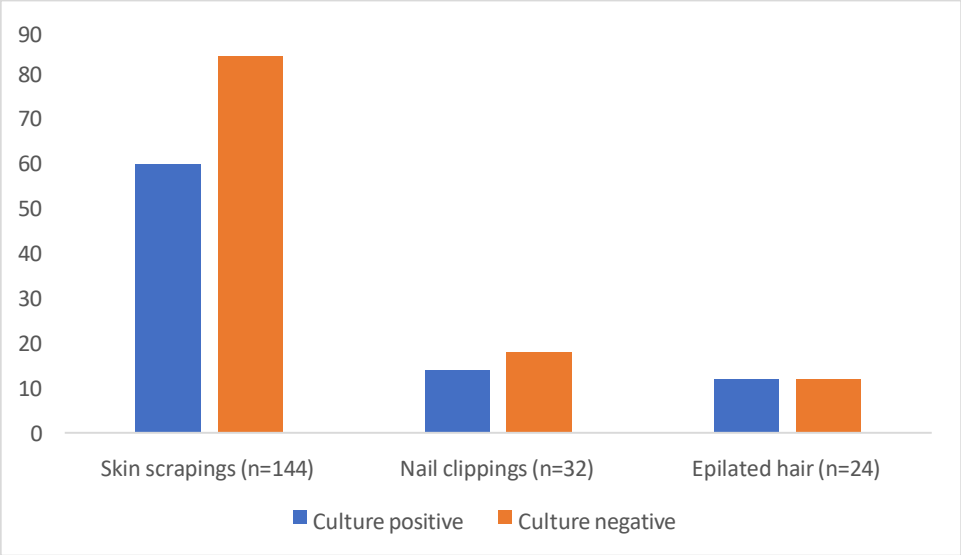
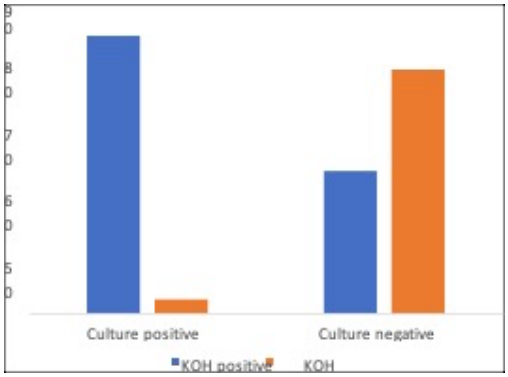


TABLE4: THE EFFECTIVENESS OF KOH VERSUS CULTURE WAS TESTED AND CORRELATED WITH MICROSCOPY ON A SAMPLE OF PEOPLE.

KOH Vs CULTURE	Culture Positive		Culture Negative		Total	
	n=86	%	n=114	%	n=200	%
KOH Positive	82	41%	42	21%	124	62%
KOH Negative	4	2%	72	36%	76	38%
Total	86	43%	114	57%	200	100%

Figure 4: The effectiveness of KOH versus culture was tested and correlated with microscopy on a sample of 200 people.



There were 124 KOH-positive isolates out of a total of 200 samples, while there were 76 KOH-negative isolates. 86 of the isolated dermatophytes were culture positive, while 114 of the dermatophyte isolates were culture negative. There was a total of 200 samples, however only 82 of those samples produced a positive result when comparision of both the culture and the direct KOH microscopic was done. There were 41% of samples which were postitive for both KOH & culture out of 86 culture positive samples; 4% samples were negative for both.

TABLE5: DISTRIBUTION OF THE GENUS OF THE ISOLATES AMONG THE STUDY POPULATION (N=86).

Genus of the Isolates	Total number of Isolates(n)	Percentage(%)
TRICHOPHYTON	70	81.4%
MICROSPORUM	6	6.98%
EPIDERMOPHYTON	10	11.62%
TOTAL	86	100%

Out of 86 (100%) cultures isolated, were 70 (81.4%) cases were belonging to the genus Trichophyton, 6 (6.98%) cases to the genus Microsporum and 10 (11.62%) cases were to the genus Epidermophyton.

Figure 5: The species breakdown of the isolates from the n=86 sample.

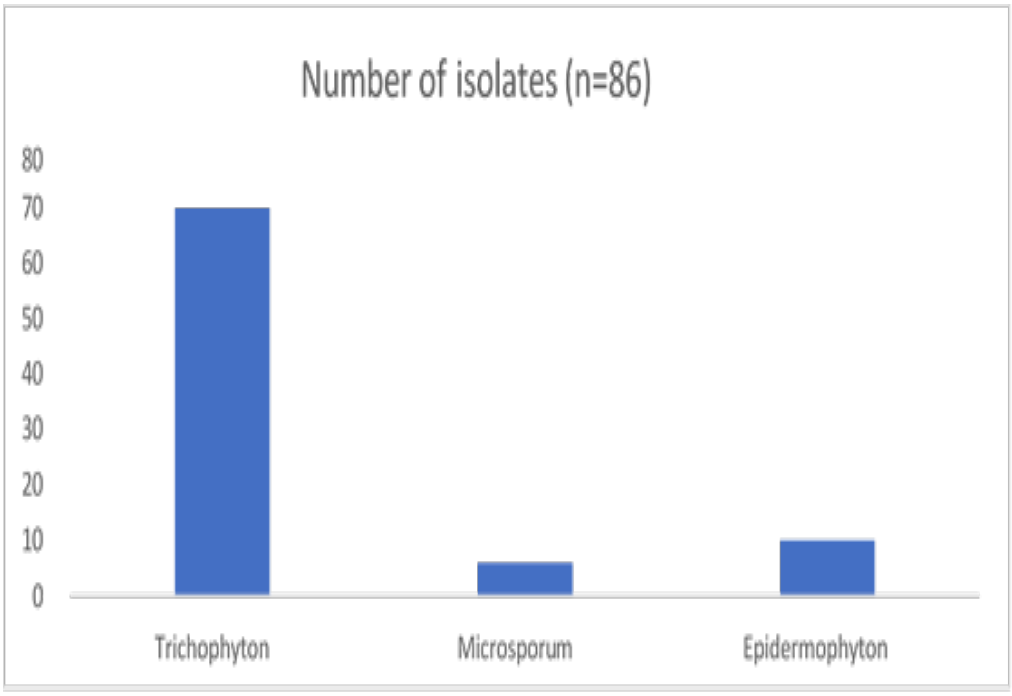


TABLE 6-: THE SPECIES BREAKDOWN OF THE ISOLATES FROM THE N=86 SAMPLE.

Genus of the Fungal Isolates	Fungal Isolates	Total number of Fungal Isolates (n=86)	Percentage (%)
Trichophyton (n=70)	*Trichophyton rubrum*	44	51.16%
	Trichophyton mentagrophytes	20	23.26%
	Trichophyton tonsurans	4	4.65%
	Trichophyton verrucosum	2	2.33%
Microsporum (n=6)	*Microsporum fulvum*	6	6.98%
Epidermophyton (n=10)	*Epidermophyton floccosum*	10	11.62%
TOTAL(n=86)		86	100%

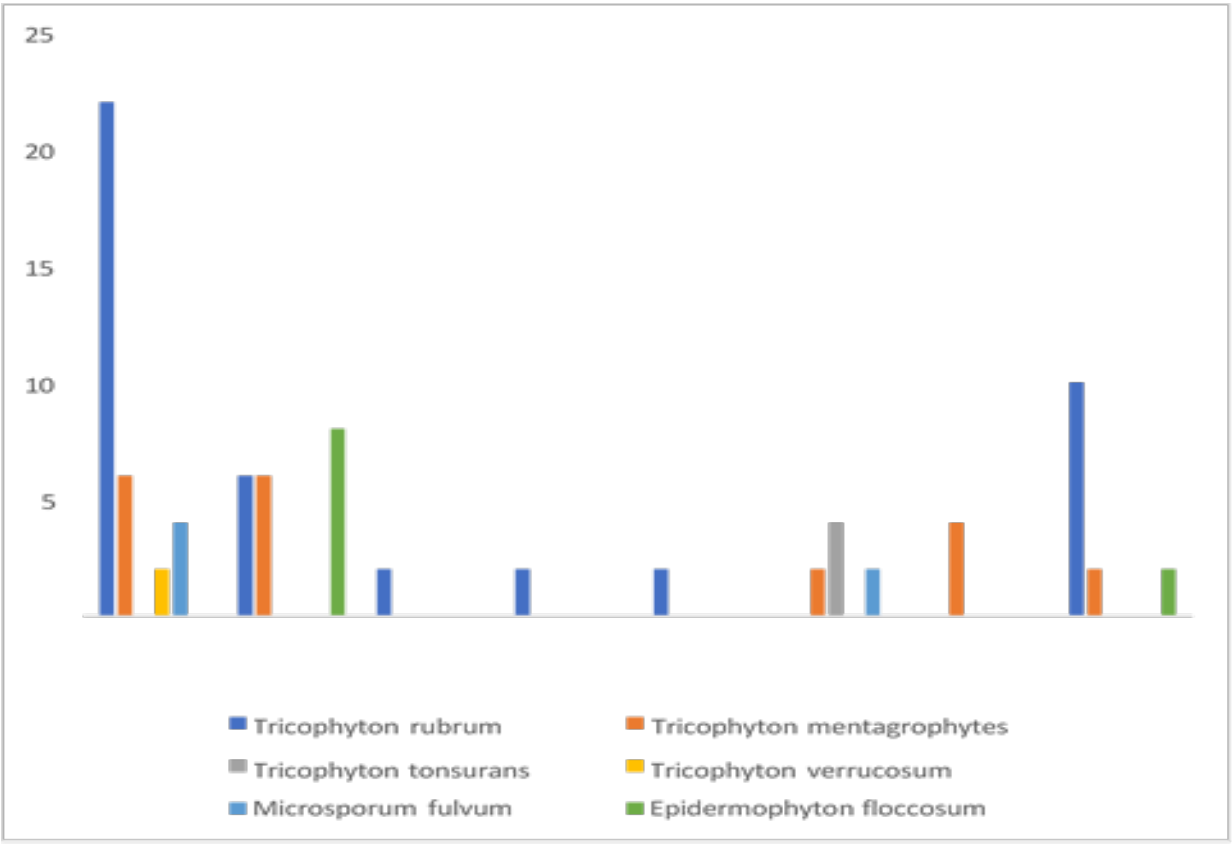
Seventy of the 86 cultures were identified as belonging to the 70 genus Trichophyton, six to Microsporum, and 10 to Epidermophyton. The Trichophyton species accounted for 70 out of the 86 dermatophyte isolates that were examined. Trichophyton rubrum 44 was the most prevalent isolate, followed by Trichophyton mentagrophytes 20, Trichophyton tonsurans 4, and Trichophyton verrucosum 2 respectively. There were 10 separate isolated samples in which Epidermophyton floccosum was discovered. There was a total of six unique isolates that belonged to the microorganism Microsporum fulvum.

TABLE 7 –SAMPLES WERE ANALYZED FOR THE SPECIES COMPOSITION OF THE DERMATOPHYTES THEY CONTAINED.

Fungal isolates	Tinea corporis	Tinea cruris	Tinea manuum	Tinea pedis	Tinea faciei	Tinea capitis	Tinea barbae	Tinea unguium
Trichophyton rubrum	22	6	2	2	2	0	0	10
Trichophyton mentagrophytes	6	6	0	0	0	2	4	2
Trichophyton tonsurans	0	0	0	0	0	4	0	0
Trichophyton verrucosum	2	0	0	0	0	0	0	0

Microsporum fulvum	4	0	0	0	0	2	0	0
Epidermophyt onfloccosu m	0	8	0	0	0	0	0	2
Total	34	20	2	2	2	8	4	14

Figure 7: Skin scrapings, nail clippings, and epilated hair samples (n=60) were analyzed for the species composition of the dermatophytes they contained.



Trichophyton rubrum was the most prevalent of the 34 different isolates that were discovered in patients with tinea corporis. After that, Trichophyton mentagrophytes (6/34), Microsporum fulvum (4/34), and Trichophyton verrucosum (2/34) were found to be present. In cases with tinea cruris, Epidermophyton floccosum was the most prevalent isolate, accounting for 8/20 of the cases. Trichophyton rubrum and Trichophyton mentagrophytes each accounted for 6/20 of the cases. Tinea manuum, Tinea pedis, and Tinea faciei all contributed one case toward isolating the Trichophyton rubrum fungus. Tinea capitis was the origin of eight distinct species of dermatophytes; four of these were Trichophytotonsurans, two were Trichophyton mentagrophytes, and the other two were Microsporum fulvum. In every single one of the Tinea barbae isolates, the fungus Trichophyton mentagrophytes was discovered. Trichophyton mentagrophytes was determined to be the most prevalent isolate in the hair sample with 6/12 instances, followed by Trichophyton tonsurans with 4/12 instances and Microsporum fulvum with 2/12 instances.

Among the seven different dermatophytes that were discovered in Tinea unguium, it was discovered that Trichophyton rubrum was the one that was isolated the most frequently. After this, Trichophyton mentagrophytes and Epidermophyton floccosum each had one isolate (14.29%), bringing the total number of isolates to a total of 14.29%.

DISCUSSION

Dermatophytosis affects keratinized tissues such as the skin, hair, and nails, contributing significantly to dermatological morbidity worldwide. The global burden of dermatophytosis is increasing, with prevalence ranging from 20–25% of the world population. The present study highlights the epidemiological distribution, clinico-mycological profile, and species characterization of dermatophytes among patients attending a tertiary care hospital. In the present study out of 200 clinically suspected cases, dermatophytes were isolated in 86 (43%) samples, which was in agreement with findings of Gupta et al. (2020) (16) who reported dermatophyte isolation in 41% of cases in a tertiary hospital setting. The prevalence of dermatophytosis in our study indicates its continuing burden as a common superficial fungal infection, particularly in tropical and subtropical climates (17).

Diagnostic Methods

KOH mount detected fungal elements in 62% of cases, while culture positivity was 43%. Although culture remains the gold standard for species identification, KOH mount demonstrated higher sensitivity, as observed in similar studies by Santosh et al. (2015) (15) and other Indian reports (18). This disparity highlights that while KOH provides a rapid and inexpensive screening tool, culture is essential for definitive identification and epidemiological mapping of species (19).

Clinical Correlation and Specimen Type

Among the various specimens, skin scrapings yielded the highest positivity (69.7%), followed by nail clippings (16.3%) and epilated hair (13.9%). This distribution parallels global literature, where cutaneous forms such as tinea corporis and tinea cruris predominate due to higher exposure and transmission rates (20,21). In our study, tinea corporis was the most common clinical presentation, corroborating findings from similar Indian and international studies (22).

The predominance of Trichophyton species (81.4%) was consistent with previous studies from India and abroad, where T. rubrum has been recognized as the most frequent etiological agent (23). In our isolates, T. rubrum (51.2%) was recorded followed by T. mentagrophytes (23.2%), a trend also noted by other tertiary care studies (24). The emergence of Epidermophyton floccosum (11.6%) and Microsporum fulvum (6.9%) in our setting indicates ecological variation and possible environmental or host-related risk factors. Notably, T. rubrum was strongly associated with tinea corporis and tinea unguium, whereas E. floccosum was more common in tinea cruris (25).

The present study highlights the predominance of Trichophyton species, especially T. rubrum, consistent with studies from India and worldwide (2,6,7,12). Our findings support the global shift toward T. rubrum as the leading cause of dermatophytosis, possibly due to its ability to cause chronic, recurrent infections and its higher keratin affinity (5,7).

The overall positivity rate of 43% in culture aligns with prior Indian studies, which report positivity rates ranging from 35–55% (9,12,15). KOH mount, although rapid and inexpensive, had false positives and negatives, underlining the importance of culture for confirmation.

Tinea corporis was the most frequent clinical form, corroborating findings by Dogra & Uprety (6) and Singh et al. (8), who emphasized its rising incidence in tropical climates. Tinea unguium,

though less common in our series, is gaining epidemiological importance due to lifestyle changes and diabetes prevalence (10).

Isolation of E. floccosum in tinea cruris patients in our study was found to be notable, consistent with other regional studies (12,15). Similarly, T. mentagrophytes and M. fulvum were strongly associated with hair/scalp infections, in line with global observations (3,7).

Our findings reflect trends reported across South Asia, where dermatophytosis has become increasingly recalcitrant due to changing lifestyles, widespread use of topical corticosteroid-antifungal combinations, and environmental factors such as humidity and overcrowding (26,27). While T. rubrum continues to dominate as the major pathogen, recent studies suggest a rising prevalence of T. mentagrophytes complex in chronic and resistant cases (28). This shift has important clinical implications in terms of therapeutic response and recurrence rates (29).

Clinical and Public Health Implications

The higher prevalence among males (64%) compared to females (36%) in our study can be attributed to greater occupational exposure, outdoor activities, and environmental contact (30). The association of dermatophytosis with comorbidities such as diabetes and immunosuppression highlights the need for early diagnosis and tailored treatment strategies (31,32). The persistence of dermatophytosis despite therapy may be attributed to antifungal resistance, as recent evidence suggests rising terbinafine and azole resistance in T. rubrum and T. mentagrophytes (4,8). This highlights the urgent need for antifungal susceptibility testing in clinical mycology laboratories.

CONCLUSION

Dermatophytosis remains a significant public health problem although KOH mount is useful for rapid screening, but culture remains the gold standard for species identification. Continuous epidemiological surveillance, rational antifungal use, and improved awareness among patients are essential to curb the rising burden of dermatophytosis.

Limitations of the Study

1. Since, it was a single-center study conducted at one tertiary care hospital, which may limit the generalizability of the findings to other regions.
2. Secondly, while 200 samples were analyzed, the number of isolates from certain specimen types such as hair and nails was relatively small, making it difficult to draw broader conclusions for those subgroups.
3. The study did not include antifungal susceptibility testing, which is increasingly important given the rising incidence of resistant strains of T. rubrum and T. mentagrophytes.
4. Lastly, this was a cross-sectional study, so follow-up data on recurrence, treatment outcomes, and resistance patterns could not be assessed.

DECLARATIONS

Conflicts of interest: There is no any conflict of interest associated with this study

Consent to participate: There is consent to participate.

Consent for publication: There is consent for the publication of this paper.

Authors' contributions: Author equally contributed the work.

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