RESEARCH ARTICLE

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CLINICOMYCOLOGICAL CORRELATION OF DERMATOPHYTOSIS: A CROSS-SECTIONAL STUDY

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Abstract

Background: Dermatophytosis is a common widespread fungal infection. In India, it poses a significant public health challenge. In Southern Rajasthan, there is a scarcity of research on its clinical and fungal patterns, so we conducted a study to investigate the clinicomycological profiles of patients, focusing on socioeconomic and environmental factors.

Aims: To correlate clinical diagnoses of dermatophytosis with potassium hydroxide (KOH) mount and fungal culture positivity.

Materials and Methods: A cross-sectional study was conducted at Ananta Institute of Medical Sciences, Rajsamand, including 128 patients with suspected dermatophytosis. We gathered demographic, clinical, and lab data (KOH mounts and fungal cultures grown on Sabouraud's Dextrose Agar). Chi-square and Spearman correlation tests were used to analyze the results.

Results: Among the 128 patients, 54% were male, and 41% were aged 31–45 years. KOH tests were positive in 62.5% (80 patients), while fungal cultures were positive in 54.7% (70 patients). Trichophyton rubrum (31%) and Trichophyton mentagrophytes (20%) were the most common fungal species. Strong links were found between clinical diagnoses and lab results (Chi-square: p < 0.000013 for KOH, p < 0.000041 for culture; Spearman: r = 0.861 for KOH, r = 0.799 for culture).

Limitations: The study was limited by single centre design and cross sectional nature

Conclusion: Strong clinicomycological correlation highlights the need for both approaches to accurately diagnose and treat dermatophytosis effectively.

Keywords: Dermatophytosis, KOH mount, fungal culture, *Trichophyton*, clinicomycological correlation

Introduction

Dermatophytosis also known as ringworm or tinea, is the common fungal infection of the skin, hair, and nails due to dermatophytes such as Trichophyton, Microsporum, and Epidermophyton.¹ The most common species is Trichophyton rubrum. It manifests as tinea pedis (athlete's feet), corporis (body),

cruris (groins) or jock itch, capitis(scalp), mannum (hand), barbae(beard) or unguium (nails) and presents with ring-shaped or annular scaly plaques. Globally, it impacts 20-25% of the population, with higher prevalence in tropical climates due to humidity and overcrowding. In India, factors like poor hygiene, limited healthcare access, and rising antifungal resistance exacerbate its burden. Chronic cases, particularly tinea pedis and unguium, often recur due to incomplete treatment or environmental factors. Public health concerns are rising with increased incidence due to factors such as inappropriate use of antibiotics and corticosteroids, immunocompromised populations, and antifungal resistance.

The diagnosis is clinicomycological, that is, a combination of findings from the clinical examination and laboratory tests consisting of potassium hydroxide (KOH) examination, with sensitivity ranging between 60 -80% and 90-95% specificity, and fungal culture which is gold standard with sensitivity between 50- 70% and 90-100% specificity, or polymerase chain reaction (PCR) used for the precise identification of the species.^{3,4,5} Topical therapies (azoles, allylamines, ciclopirox, tolnaftate) are used for mild infections, whereas systemic drugs (griseofulvin, terbinafine, fluconazole) are used for severe and chronic infections. Resistance to antifungals, especially among Trichophyton species, results from enzyme mutations, efflux pumps, and biofilms due to overuse, self-treatment, and chronic infection.^{6,7} This results in therapeutic failures, long-term infections, and excess costs, requiring stewardship, surveillance, and new therapies.^{8,9}

In the hot and humid zone of Southern Rajasthan, tinea corporis and cruris are prevalent conditions with Trichophyton rubrum and Trichophyton mentagrophytes as key pathogens associated with the inappropriate use of topical steroids.

The cross-sectional study titled "Clinicomycological Correlation of Dermatophytosis" explores the demographic differences in clinical presentations and the prevalence of dermatophyte species. It also analyzes diagnostic methods and identifies the main dermatophyte species involved. The research focuses on achieving better diagnostics and treatments to help patients and deal with the health problems linked to dermatophytosis by correlating clinical data with mycological data.

Materials and Methods

This hospital-based cross-sectional study was conducted at the Dermatology Outpatient Department of Ananta Institute of Medical Sciences & Research Centre, Rajsamand, Rajasthan. A total of 128 patients with clinically diagnosed dermatophytosis were enrolled after obtaining informed consent. Patients who had taken antifungal drugs within the past three weeks were excluded.

Demographic details (age, sex, occupation, education, socioeconomic status), clinical history (onset, duration, symptoms), and examination findings (lesion sites, morphology) were recorded using a predesigned proforma. Samples from affected sites were collected for KOH mount (10–30% KOH, examined for branching, translucent, septate hyphae under the microscope, For tinea capitis, tiny spores coating hair shafts were spotted) and fungal culture (Sabouraud's Dextrose Agar with antibiotics, incubated at 25°C for 4 weeks). Lactophenol cotton blue staining identified presence of microconidia and macroconidia.

Statistical analysis included Chi-square tests for categorical variables, ANOVA (analysis of variance) for quantitative data, and Spearman correlation for clinicomycological associations. The study was approved by the Institutional Ethics Committee.

Results

The study population comprised 128 patients, with 69 males (53.9%) and 59 females (46.1%). The majority (41.41%, 53 patients) were aged 31–45 years, followed by 27.34% (35) aged 46–60 years (Table 1). Most patients were unemployed (27.35%) or from lower socioeconomic backgrounds (Table 2). Itching was the primary complaint (51.57%), and lesions lasted 3–6 months in 39.06% of cases.

Plaques were the most common lesion type (92.18%), with tinea corporis (32.03%) and tinea pedis (25.78%) being the predominant clinical diagnoses (Table 3). KOH mount was positive in 80 patients

(62.5%), and fungal culture was positive in 70 (54.69%) (Table 4). *Trichophyton rubrum* (31.25%) and *Trichophyton mentagrophytes* (19.53%) were the most frequently isolated species. Statistical analysis revealed strong correlations between clinical diagnoses and laboratory findings. Chi-square tests showed p < 0.000013 for KOH positivity and p < 0.000041 for culture positivity. Spearman correlation coefficients were 0.861 for KOH vs. clincal diagnosis and 0.799 for fungal culture vs. clinical diagnosis (p < 0.05).

Table 1: Age Distribution of Patients

Age Group (Years)	Number of Patients (n)	Percentage (%)
18–30	15	11.72
31–45	53	41.41
46–60	35	27.34
61–80	25	19.53

Our study included 128 patients, mostly middle-aged adults. The largest group, 41% (53 patients), was aged 31–45, followed by 27% (35 patients) aged 46–60, 20% (25 patients) aged 61–80, and 12% (15 patients) aged 18–30, showing dermatophytosis is more common in older or middle-aged adults.

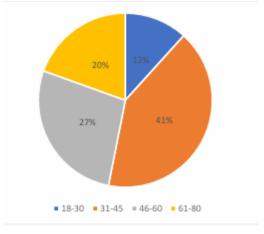


Table 2: Socioeconomic Status (Prasad Scale)

Monthly Per Capita Income (₹)	Socioeconomic Status	Number of Patients (n)	Percentage (%)		
≥7008	Upper Class	5	3.91		
3504–7007	Upper Middle Class	15	11.72		
2102–3503	Middle Class	40	31.25		
1051–2101	Lower Middle Class	35	27.34		
<1050	Lower Class	33	25.78		

In our study, Most patients (31%) were middle class, earning ₹2102–₹3503 monthly. About 27% were lower middle class (₹1051–₹2101), and 26% were lower class (below ₹1050). Only 12% were upper middle class (₹3504–₹7007), and just 4% were upper class (₹7008+). This shows dermatophytosis hits lower to middle-income groups hardest, likely due to higher disease burden and healthcare needs.

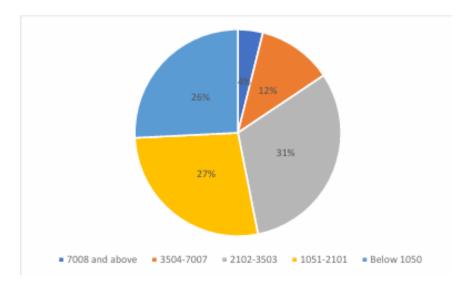


Table 3: Clinical Types of Dermatophytosis

Clinical Type	Number of Patients (n)	Percentage (%)			
Tinea Corporis	41	32.03			
Tinea Pedis	33	25.78			
Tinea Cruris	20	15.62			
Tinea Capitis	13	10.15			
Tinea Unguium	10	7.81			
Tinea Faciei	5	3.91			
Tinea Barbae	6	4.68			

In this study, Tinea corporis was the most common diagnosis, affecting 41 patients (32%), followed by Tinea pedis in 33 patients (26%). Other frequent conditions were Tinea cruris (20 patients, 16%) and Tinea capitis (13 patients, 10%). Less common were Tinea unguium (10 patients, 8%), Tinea barbae (6 patients, 5%), and Tinea faciei (5 patients, 4%).

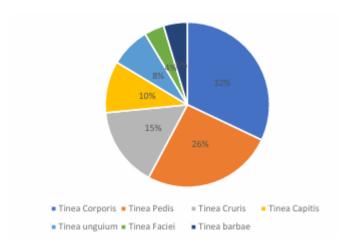
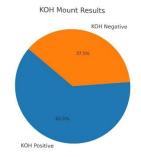
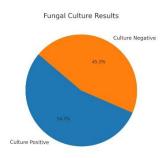


Table 4: KOH Mount and Fungal Culture Results

Test	Positive (n, %)	Negative (n, %)	Total (n, %)
KOH Mount	80 (62.5%)	48 (37.5%)	128 (100%)
Fungal Culture	70 (54.69%)	58 (45.31%)	128 (100%)





KOH positivity was seen in 80 patients (62.5%) and fungal culture in 70 patients.

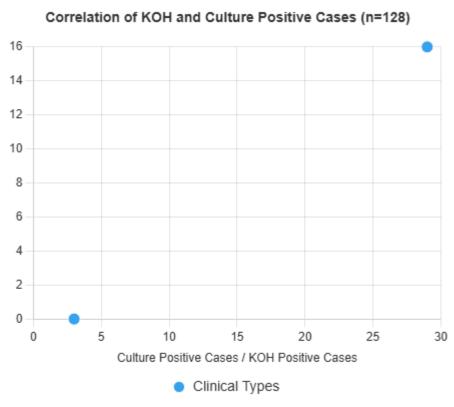
Table 5: Correlation table of clinical types with Laboratory findings and dermatophytes species

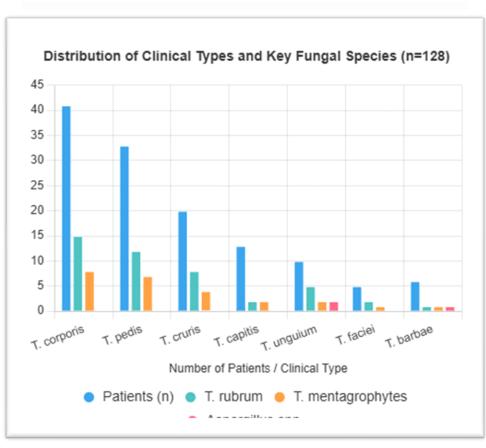
Clinical	Patient	% of	KOH	KOH	Culture	Culture	T.	T.	M.	E.	Aspergill	Mixed	No
Type	s (n)	Total	Positive	Negative	Positive	Negative	rubru	mentagroph	gypseu	floccosu	us spp.	Infectio	Growt
							m	ytes	m	m		n	h
T. corporis	41	31.25	29	20 (40.8%)	16	33 (67.3%)	15	8	5	1	0	1	11
		%	(59.2%)		(32.7%)								
T. pedis	33	23.44	0	1 (100%)	0	1 (100%)	12	7	1	2	0	1	10
1		%		, ,		, , , ,							
T. cruris	20	15.62	3	18 (85.7%)	0	21 (100%)	8	4	0	1	0	1	6
		%	(14.3%)	, ,		, , , ,							
T. capitis	13	14.06	0	0	0	1 (100%)	2	2	3	0	0	0	6
1		%				, , , ,							
T.	10	7.81%	0	0	0	0	5	2	0	1	2	0	0
unguium													
T. faciei	5	3.91%	0	2 (100%)	0	10 (100%)	2	1	1	0	0	0	1
T. barbae	6	4.68%	0	3 (100%)	0	2 (100%)	1	1	0	0	1	1	2

Our study found a strong link between clinical diagnoses of dermatophytosis and lab results, with KOH microscopy ($\chi^2 = 42.89$, p = 0.000013; r = 0.861, p = 0.00009) and fungal culture ($\chi^2 = 38.42$, p = 0.000041; r = 0.799, p = 0.00021) showing significant correlations. This confirms that both KOH and culture are key for accurate diagnosis.

We also observed a robust link between clinical types and fungal species ($\chi^2 = 97.55$, p = 0.002; r = 0.968, p = 0.000083). Trichophyton rubrum was the most common species, especially in Tinea corporis (15 cases) and Tinea pedis (12 cases), followed by Trichophyton mentagrophytes in these same conditions (8 and 7 cases). Microsporum gypseum and Epidermophyton floccosum appeared less often, mainly in Tinea corporis, pedis, and cruris, while Aspergillus spp. was limited to Tinea unguium and Tinea barbae (3 cases). Mixed infections were rare, and 36 cases (32%) showed no fungal growth, with Tinea corporis having the most no-growth cases (11).

These results highlight Trichophyton rubrum and Trichophyton mentagrophytes as the most common dermatophytes, with Aspergillus linked to nail and beard cases, guiding targeted treatment choices.





Discussion

Dermatophytosis is a significant public health problem in tropical regions like Southern Rajasthan, driven by environmental and socioeconomic factors. The study confirms the high prevalence of dermatophytosis in middle-aged adults, with a slight male predominance, consistent with regional

epidemiology. The predominance of *Trichophyton rubrum* and *Trichophyton mentagrophytes* aligns with previous studies. The strong clinicomycological correlation (p < 0.05) highlights the importance of laboratory confirmation to complement clinical diagnosis, particularly in regions with high antifungal resistance. Factors like excessive sweating (27.34%) and rural residence (54.69%) may contribute to disease prevalence.

Dermatophytosis was most common in adults aged 31–45 years (41.41%), with slightly more men (53.9%) affected than women (46.09%). Middle-aged adults's higher risk stem from immune senescence, change in skin barrier, and occupational exposures which is comparable to the study conducted by Vikesh Kumar Bhatia et al. Men's outdoor jobs and hormonal factors also increase susceptibility, though women are also significantly affected. Singh et al. also reported a male preponderance. Unemployed individuals (27.35%), unskilled workers, and farmers were most affected, also observed in similar study by Sambit ranjan dalei et al. 23.43% cases were illiterate which may contribute to poor hygiene and awareness, increasing infection risk. Most patients were middle-class (31.25%, ₹2102–₹3503/month) or lower-middle-class (27.34%, ₹1051–₹2101/month). Rural residents (54.69%) were slightly more affected than urban ones (45.31%) due to factors like livestock ownership (39.06%), overcrowding, and limited hygiene. While Lakshmi Vasantha Poluri et al. noted contrasting findings with urban population more affected (80.65%) linked to humidity and public facility use.

Itching was the top symptom (51.57%), with lesions lasting 3-6 months (39.06%), indicating chronic infections often due to delayed treatment. Pellakuru Preethi et al¹⁴ also observed itching as common symptom. Sweating, heat, humidity, occlusive footwear, and sharing personal items worsened infections, especially in rural settings with agricultural work. Only 46.88% bathed daily, and 39.06% owned pets (e.g., buffaloes), which may act as infection sources. Most patients (64.06%) had no major health issues, but diabetes (11.72%) and asthma (7.81%) were linked to worse outcomes. Similar observational study by Remya Raj Rajamohanan et al. 15 noted diabetes (20.3%) as significant comorbidity. Tinea corporis (31.25%) and tinea pedis (23.43%) were common, with plaques (92.18%) on the body, feet, and groin. These patterns aid diagnosis but require lab confirmation. Syeda Hajra Fatima et al. 16 findings are in line with our study, while Quiping li et al 17 found tinea unguium to be more prevalent. KOH microscopy (62.5% positive) and fungal culture (54.69% positive) confirmed dermatophyte infection. Similar results were reported by Chakrabarti et al.¹⁸: KOH 62.5%; Dr. Ananya Verma et al.¹⁹: Culture 54.69%. Trichophyton rubrum (31.25%) and T. mentagrophytes (19.53%) were the main culprits. Strong clinical-lab correlations (p < 0.0001) highlight reliable diagnostics, though culture negativity can occur due to sampling issues. Murlidhar Rajagopalan et al²⁰ study and Young bok lee et al²¹ study observed similar findings while Sushil tahiliani et al²² observed discrepant results with Trichophyton mentagrophytes emerging as dominant species. Our study showed a strong correlation between clinical diagnosis and laboratory confirmation of dermatophytosis with KOH microscopy showing 62.5% positivity and fungal culture 54.69% positive. Statistical tests confirmed these connections (KOH: $\gamma^2 = 42.89$, p = 0.000013; Culture: $\gamma^2 =$ 38.42, p = 0.000041), with high correlation coefficients (KOH: r = 0.861, p = 0.00009; Culture: r =0.799, p = 0.00021). We also saw a strong link between clinical types and fungal species ($\chi^2 = 97.55$, p = 0.002; r = 0.968, p = 0.000083).

A study by Sarkar et al.⁶ and Kaur et al.²³ were consistent with our findings showing strong correlation. Venkateswaramma Begari et al.²⁴ reported high KOH sensitivity (81.82%) but lower culture sensitivity (57%), and Nupur Shanker et al.²⁵ also observed KOH-positive, culture-negative cases, suggesting KOH and fungal culture mutually reinforce each other.

This study aligns with others in showing dermatophytosis affects middle-aged adults, men slightly more, and those with lower socioeconomic status or rural lifestyles. Differences in age peaks and urban-rural distribution highlight regional variations, likely due to climate, hygiene, and healthcare access. The characteristic sign of dermatophytosis, such as annular scaly plaques simplify diagnosis, and the humid climate of Southern Rajasthan encourages fungal growth, making detection easier. KOH testing is highly sensitive, spotting fungal elements even in early or treated infections, while negative cultures may stem from prior use of antifungals or improper sampling. These results

highlight the value of combining KOH and culture for precise diagnosis and targeting treatments against Trichophyton rubrum and Trichophyton mentagrophytes. Rural communities would benefit from better hygiene education, and future studies should look into molecular tools like PCR for more accurate fungal identification.

Limitations include the single-centre design and cross-sectional nature, which may limit generalizability. Future research should explore multicentre studies and longitudinal designs to enhance understanding of dermatophytosis management.

Conclusion

This study demonstrates a strong correlation between clinical and laboratory diagnoses of dermatophytosis, emphasizing the need for combined approaches to ensure accurate diagnosis and effective treatment, particularly in high-risk populations.

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Figures



Figure 1Tinea Manuum



Figure 2Tinea Corporis



Figure 3 KOH Mount: Septate fungal hyphae seen



Figure 4: SDA Slant

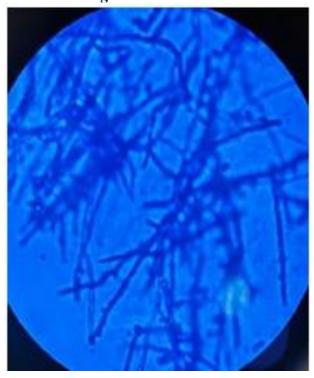


Figure 5: Trichophyton species