ORIGINAL ARTICLE

Role of Dermoscope as a Monitoring Tool in Assessing Treatment Response in Patients with Tinea Corporis: A Prospective Clinical Study

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ABSTRACT

Introduction: Tinea corporis is a common superficial dermatophytic infection affecting the glabrous skin. There is a prominent gap in research concerning the use of dermoscopy for monitoring treatment response in tinea corporis. **Aims**: To evaluate dermoscopic findings and assess the treatment response in patients with tinea corporis **Methods:** A prospective clinical study was conducted at the Department of Dermatology, Nepalgunj Medical College and Teaching Hospital, involving 115 patients with tinea corporis over a 12-month period. Baseline dermoscopic examinations were performed for all participants. Patients were treated with oral itraconazole 100 mg twice daily and then re-evaluated with dermoscopy at 2 and 4 weeks. The frequency of various dermoscopic changes was analyzed using the chi-square test. **Results:** At baseline, the most common dermoscopic findings were erythema (98.3%), brown globules (83.5%), and perifollicular scales (80%). Micropustules were the first feature to resolve, disappearing within 2 weeks. Erythema, the predominant finding, showed significant reduction by 4 weeks (P = 0.005). Other features, including dotted vessels, perifollicular scales, brown globules, peripheral peeling scales, moth-eaten scales, translucent hairs, broken hairs, black dots, and telangiectasia, significantly decreased at 2 weeks, with further reduction observed by 4 weeks. **Conclusion:** Dermoscopy is a non-invasive, bedside tool that aids in the monitoring of treatment response in tinea corporis. It is particularly useful in identifying patients who may need extended systemic antifungal therapy to achieve a full resolution of the infection.

***Keywords**:* Dermoscopy, Tinea Corporis, Treatment response

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INTRODUCTION

Tinea corporis, commonly known as 'ringworm,' is a superficial dermatophytic infection affecting glabrous skin.[1,2] The infection is chiefly caused by Trichophyton rubrum.[1] Tinea corporis is the most prevalent dermatophytosis, with a global distribution and an estimated lifetime risk of 10-20%.[3,4,5] In recent years, the incidence of dermatophytic infections has surged, with tinea corporis being the most widespread. Diagnosis is typically achieved through microscopic examination with potassium hydroxide and fungal cultures, which require approximately 3-4 weeks for results.[5] This delay can impede the prompt initiation of treatment. Furthermore, these diagnostic methods are labor-intensive and demand specialized personnel and mycological tools. Diagnosing tinea corporis can be particularly challenging due to factors such as steroid misuse or incomplete treatment. A dermoscope, a noninvasive, portable and bedside device, offers a practical solution for assessing disease activity as well as comparing treatment effects of medicines on various skin conditions by evaluating dermoscopic patterns like hair, pigment and vascular pattern.[6] Although dermoscopic features of tinea corporis have been documented in several studies with small sample sizes, there is a notable lack of research on monitoring treatment response. This study aims to address this gap by investigating dermoscopic findings and assessing the treatment response for tinea corporis.

METHODS

A prospective, clinical study was carried out at the Department of Dermatology, Nepalgunj Medical College and Teaching Hospital, Kohalpur, Banke. Written informed consent was obtained from all participants before their enrollment. The study was approved by the Institutional Review Committee (IRC no. 07/080-081). The prevalence of tinea corporis at Nepalgunj Medical College and Teaching Hospital from April 2022 to April 2023 was 5.03%. Using this prevalence proportion and a margin of error of 4% with a 95% confidence interval

(CI), the sample size was determined to be 115. A convenient sampling technique was employed to select the study population. The study was conducted over 12 months, from August 2023 to August 2024. The patients who met the study criteria were enrolled. The diagnosis of tinea corporis was made clinically and then confirmed by microscopic examination using potassium hydroxide (KOH). Baseline dermoscopic examination was conducted for all cases. Dermoscopy was performed using a DermLite DL1 dermatoscope connected to an iPhone 12. All patients were treated with oral itraconazole 100 mg twice daily and were subsequently evaluated with dermoscopy at 2 and 4 weeks. The contact plate of the dermoscope was cleaned with a sanitizer to prevent cross-contamination.

Inclusion criteria

1. Patients of age 16-70 years with diagnosis of tinea corporis

2. Willing to provide written informed consent for participation

Exclusion criteria

1. Patients with elevated liver enzymes or serum bilirubin levels

2. Patients with history of topical or systemic antifungals in last three months.

3. Patients who are on topical steroids

4. Pregnant or lactating women.

5. Patients not willing to give consent for study

6. Patients with other comorbidities and immunosuppression

Statistical analysis: All the data were entered in MS-EXCEL sheet and proceeded for data analysis by using Statistical Program for Social Sciences (SPSS) version 26. The categorical data were presented as numbers (percentages). The continuous data was presented as either mean ± standard deviation or median (inter-quartile range) depending on the normality of the data distribution. Chi-square tests was used to evaluate for the statistical significance amongst independent variables. A P value less than 0.05 was considered significant.

RESULTS

Demographic features: Total 115 patients of KOH positive cases of tinea corporis were included in the study. Out of 115, 63 (54.8%) were female and 52 (45.2%) were male. Age of patients ranged from 16 to 69 years, with a mean age of 32.8 ± 13.4 years. In our study, median duration of disease was 10 weeks; it ranged from 1 week to 48 weeks. Dermoscopic features: Baseline dermoscopic findings of tinea corporis are shown in Table I. Baseline findings in decreasing order of frequency were erythema (98.3%), brown globules (83.5%), perifollicular scales (80%), peripheral peeling scales (79.1%), dotted vessels (69.6%), moth eaten scales (60.9%), translucent hairs (60%), broken hairs (31.3%), black dots (17.3%), micropustule (12.1%), and talengectasia (9.6%).

Baseline Dermoscopic features	Number of patients (N=115)	Percentage (%)
Erythema	113	98.3
Dotted vessels	80	69.6
Peripheral peeling scales	91	79.1
Perifollicular scales	92	80
Moth-eaten scales	70	60.9
Translucent hairs	69	60
Brown globules	96	83.5
Talengectasia	11	9.6
Broken hairs	36	31.3
Black dots	20	17.3
Micropustule	14	12.1

Table I: Baseline Dermoscopic findings of tinea corporis

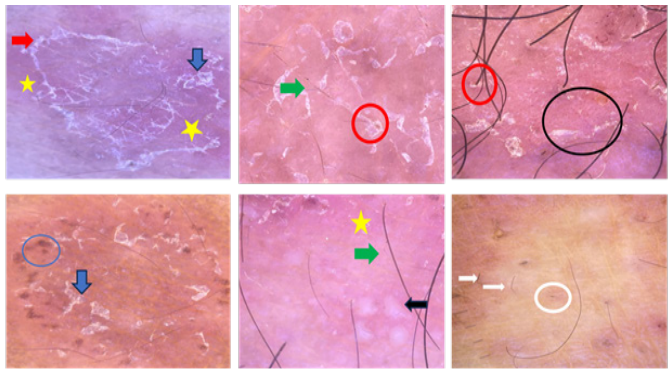

Figure 1: Baseline dermoscopic features of tinea corporis showing background erythema (yellow star), peripheral peeling scale (red arrow), moth eaten scale (blue arrow), brown globules (blue circle), translucent hair (green arrow), perifollicular scale (red circle), dotted vessels (black circle), micropustule (black arrow), broken hair (white arrow), and black dot (white circle)

Dermoscopic follow-up: Dermoscopic findings of tinea corporis at follow-up at 2 and 4 weeks are shown in Table II. The first dermoscopic parameter to resolve completely was micropustules, which decreased from 12.1% at baseline to 0% at 2 weeks, followed by black dots, which decreased from 17.3% at baseline to 0% at 4 weeks. Erythema, the most common dermoscopic finding, showed a slow response, decreasing from 98.3% at baseline to 76.5% at 2 weeks (P = 0.179), but reduced significantly to 17.4% at 4 weeks of treatment (P = 0.005). The frequency of other dermoscopic parameters, including dotted vessels, perifollicular scales, brown globules, peripheral peeling scales, moth-eaten scales, translucent hairs, broken hairs, black dots, and telangiectasia, significantly decreased at 2 weeks. By 4 weeks, dotted vessels, perifollicular scales, translucent hairs, brown globules, broken hairs, and telangiectasia showed a significant reduction compared to 2 weeks. However, peripheral peeling scales and moth-eaten scales did not decrease significantly at 4 weeks compared to 2 weeks (P = 0.30 and P = 0.74, respectively).

Variables	Baseline N (%)	Post treatment N (%) 2 weeks	Post treatment N (%) 4 weeks	P (Baseline vs 2 weeks)	P (2 vs 4 weeks)
Erythema	113 (98.3%)	88 (76.5%)	20 (17.4%)	0.179	0.005*
DV	80 (69.6%)	49 (42.6%)	6 (5.2%)	<0.001**	0.004*
PPS	91 (79.1%)	29 (25.2%)	3 (2.6%)	0.001**	0.30
PFS	92 (80%)	59 (51.3%)	18 (15.7%)	<0.001**	<0.001**
MES	70 (60.9%)	11 (9.6%)	1 (0.9%)	0.005*	0.74
TH	69 (60%)	64 (55.7%)	29 (25.2%)	<0.001**	<0.001**
Brown globules	96 (83.5%)	74 (64.3%)	32 (27.8%)	<0.001**	<0.001**
Broken hairs	36 (31.3%)	20 (17.4%)	6 (5.2%)	<0.001**	<0.001**
Black dots	20 (17.3%)	8 (7.0%)	0 (0%)	<0.001**	-
Micropustule	14 (12.1%)	0	0	-	-
Talengectasia	11 (9.6%)	7 (6.1%)	2 (1.7%)	<0.001**	<0.001**

*P-value <0.05 and **P-value <0.001

Abbreviations: DV= Dotted vessels, PPS= Peripheral peeling scales, PFS= Perifollicular scales, MES=Moth-eaten scales, TH= translucent hair

Table II: Dermoscopic findings of tinea corporis at follow-up in 2 weeks and 4 weeks

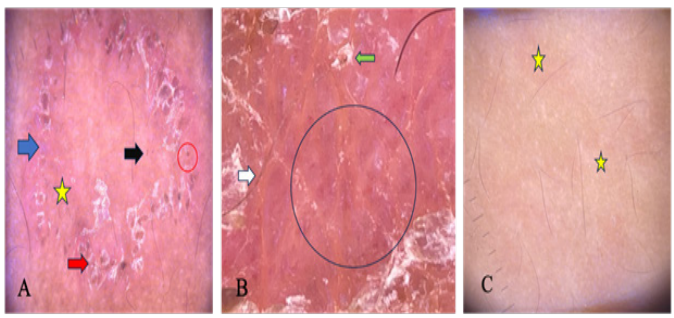

Figure 3: A & B showing pre-treatment dermoscopic features of a patient. A shows peripheral peeling scales (red arrow), moth eaten scale (blue arrow), erythema (yellow star), broken hair (black arrow), and brown globules at the periphery (red circle); B shows dotted vessels (black circle), translucent hair (white arrow) and perifollicular scale (green arrow); C showing post-treatment dermoscopic feature of the same patient.

There's a minimal patchy background erythema (yellow star) and other dermoscopic findings has subsided.

DISCUSSION

Tinea corporis is a common superficial dermatophyte infection of the glabrous skin, characterized by the appearance of the itchy, well-demarcated, oval or annular scaly patch with raised borders and central clearing giving rise to the term 'ringworm'.[5] Traditionally diagnosed through clinical examination, the condition has become increasingly challenging for physicians to identify due to partial treatments and steroid misuse. Dermoscopy can enhance diagnostic accuracy for tinea corporis by allowing in vivo examination of skin features not visible to the naked eye. However, research and case reports on the use of dermoscopy for diagnosing and monitoring tinea corporis remain limited.

Our study N=115	Bhat et al[8] N=30	Yadav et al[9] N=31	Lekkas et al[11] N=36
Erythema (98.3%)	Diffuse erythema (100%)	Erythema (100%)	Dotted vessel (100%)
Brown globules (83.5%)	Whitish scales (100%)	Dotted vessels (12.9%)	Peripheral vascular arrangement (63.6%)
Perifollicular scales (80%)	Follicular micropustules (36.7%)	Telangiectasia (12.9%)	Peripheral scles (76.5%)
Peripheral peeling scales (79.1%)	Brown spots surrounded by a white-yellowish halo (20%)	Brown spot with yellow halo (87%)	White scales (86.1%)
Dotted vessels (69.6%)	Wavy and broken hairs (13.3%)	Bent hairs (87%)	Perifollicular scale (13.9%)
Moth-eaten scales (60.9%)	Morse code-like vellus hairs (3.3%)	Translucent hairs (74.1%)	Moth eaten scles (97.2%)
Translucent hairs (60%)		Broken hairs (58%)	Outward peeling scales (97.2%)
Broken hairs (31.3%)		Morse code hair (54.8%)	Broken hairs (63.9%)
Black dots (17.3%)		Perifollicular scales (29%)	
Micropustule (12.1%)		Micropustule (19.3%)	
Talengectasia (9.6%)			

Table III: Comparison of dermoscopic features in tinea corporis

In our study, erythema was the most prevalent dermoscopic feature, observed in 98.3% of tinea corporis cases. Background erythema has been histopathologically linked to inflammation and vascular dilation in previous research.[7] The second most frequent finding in our study was brown globules, present in 83.5% of cases. These globules result from melanin deposition in the epidermis due to a post-inflammatory response.[7] While other studies have reported brown globules surrounded by a halo in tinea corporis, this halo was not observed in our study.[8-10]

Scales are a crucial indicator of dermatophytosis, reflecting hyperkeratosis. Our study identified scales as perifollicular scales (80%), peripheral peeling scales (79.1%), and moth-eaten scales (60.9%). Lekkas et al reported peripheral scales, moth-eaten scales, and outward peeling scales as strong dermoscopic predictors of tinea corporis, defining 'moth-eaten scales' as coalescing peripheral scales that form larger, multicyclic lesions.[11] Additionally, in our study, dotted vessels, which correspond to the tips of dilated vessels, were observed in 69.6% of cases.[7] This finding was seen in other studies, including those by Lekkas et al, Yadav et al and Hussain et al.[9,11,12] In our study, hair changes included translucent hairs (60%), broken hairs (31.3%), and black dots (12.1%). Translucent hairs may result from extensive fungal invasion of vellus hairs, while broken hairs, black dots, morse code-like hair and follicular micropustules are also associated with fungal parasitism.[12] Some researchers suggest that the involvement of vellus hairs could be a criterion for starting systemic treatment.[10,13-15] However, morse code-like hair, characterized by alternating white bands across the hair shaft, was not observed in our study. Micropustules, which correspond to neutrophilic abscesses in the epidermis, were present in only 12.1% of cases, consistent with findings by Yadav et al.[9]

Dermoscopic follow-up

In our study, we conducted a dermoscopic follow-up to assess the treatment response for tinea corporis. Our findings revealed that erythema took the longest to show significant improvement, requiring about 4 weeks, whereas micropustules resolved the quickest, typically within 2 weeks, followed by black dots, which cleared by 4 weeks. Hair-related changes such as translucent hairs, broken hairs, and black dots responded well to treatment, with significant improvement observed at both 2 and 4 weeks. Other dermoscopic features, including dotted vessels, brown globules, perifollicular scales, peripheral peeling scales, and moth-eaten scales, showed considerable improvement at 2 weeks, with further reduction in all these findings by 4 weeks. A similar study, which evaluated the dermoscopy in patients with tinea corporis and tinea incognito also reported the resolution of micropustules within 2 weeks, aligning with our results. Additionally, they found that erythema resolved more quickly in naïve tinea infections compared to tinea incognito. They observed that altered hair morphology features, such as translucent hairs, broken hairs, and morse code hairs, showed a favorable response by 4 weeks in both naïve tinea infections and tinea incognito.[9]

In our study, patients displaying persistent erythema, dotted vessels, and telangiectasia after 4 weeks of treatment may be attributed to prior misuse of topical steroids. Patients who continued to exhibit abnormal hair features, such as translucent and broken hairs, beyond 4 weeks likely experienced a suboptimal response to treatment. This highlights the critical role of dermoscopy in identifying such cases and suggests the need for considering extended treatment beyond 4 weeks. Thus, dermoscopy proves to be a valuable monitoring tool for evaluating treatment efficacy, as it clearly documents the regression of various dermoscopic patterns and the eventual resolution of all altered hair features by the end of therapy.

LIMITATION

Long-term follow-up could provide insights into long-term treatment outcomes and help document recurrences.

CONCLUSION

Our study underscores the significant role of dermoscopy in monitoring and evaluating the response to treatment for tinea corporis. The study highlights that dermoscopy not only aids in accurate diagnosis but also serves as a valuable tool for assessing treatment response and guiding therapeutic decisions. Persistent abnormal findings, despite treatment, emphasize the necessity for ongoing evaluation and potentially prolonged treatment to achieve complete resolution.

REFERENCES

1. Carrascal-Correa DF, Zuluaga A, González A. Species distribution of the main aetiologic agents causing skin dermatophytosis in colombian patients: a 23-year experience at a mycological reference center. Mycoses. 2020;63(5):494-9. https://doi: 10.1111/myc.13073

2. Lim SS, Shin K, Mun JH. Dermoscopy for cutaneous fungal infections: A brief review. Health Science Reports. 2022;5(1):e464. https://doi: 10.1002/hsr2.464

3. Poudyal Y, Joshi SD. Medication practice of patients with dermatophytosis. J Nepal Med Assoc. 2016;55(203):07–10. https://doi:10.31729/jnma.2830

4. Adams BB. Tinea corporis gladiatorum. Journal of the American Academy of Dermatology. 2002;47(2):286-90.https://doi: 10.1067/mjd.2002.120603

5. Leung AK, Lam JM, Leong KF, Hon KL. Tinea corporis: an updated review. DIC. 2020;9:1-12.https://doi: 10.7573/dic.2020-5-6

6. Sonthalia S, Yumeen S, Kaliyadan F. Dermoscopy Overview and Extradiagnostic Applications. [Updated 2023 Aug 8]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK537131/

7. Ankad BS, Mukherjee SS, Nikam BP, Reshme AS, Sakhare PS, Mural PH. Dermoscopic characterization of dermatophytosis: A preliminary observation. Indian Dermatol Online J. 2020;11(2):202-07. https://doi: 10.4103/idoj.IDOJ_190_19

8. Bhat YJ, Keen A, Hassan I, Latif I, Bashir S. Can Dermoscopy Serve as a Diagnostic Tool in Dermatophytosis? A Pilot Study. Indian Dermatol Online J. 2019;10(5):530-35. https://doi: 10.4103/idoj.IDOJ_423_18

9. Yadav S, Pandhi D, Grover C, Das S. Dermoscopic Findings and Assessment of Treatment Response in Patients with Tinea Incognito: A Pilot Study. Indian Dermatol Online J. 2024;15(2):205-12. https://doi: 10.4103/idoj.idoj_264_23

10. Knöpfel N, Del Pozo J, Escudero MM, et al. Dermoscopic visualization of vellus hair involvement in tinea corporis: a criterion for systemic antifungal therapy. Pediatric Dermatol 2015;32:e226–22. https://doi: 10.1111/pde.12648

11. Lekkas D, Ioannides D, Lazaridou E, et al. Dermatoscopy of tinea corporis. J Eur Acad Dermatol Venereol. 2020;34(6):e278-e280. https://doi: 10.1111/jdv.16277

12. Hussain AA, Narkhede ND. A Study to Establish Correlation between Dermoscopic and Clinical Findings of Dermatophytosis. Indian Journal of Public Health Research & Development. 2020;11(3), 857–62. https://doi.org/10.37506/ijphrd.v11i3.1436

13. Gómez-Moyano E, Crespo-Erchiga V. Tinea of vellus hair: an indication for systemic antifungal therapy. British Journal of Dermatology. 2010;163(3):603-6. https://doi: 10.1111/j.1365-2133.2010.09811.x

14. Moyano EG, Erchiga VC, Pilar LM, et al.Correlation between dermoscopy and direct microscopy of morse code hairs in tinea incognito.J Am Acad Dermatol 2016;74:e7–8

15. Jartarkar SR, Patil A, Goldust Y, Cockerell CJ, Schwartz RA, Grabbe S, Goldust M. Pathogenesis, Immunology and Management of Dermatophytosis. J Fungi (Basel). 2021;8(1):39. https://doi: 10.3390/jof8010039