

## REVIEW

# Dermoscopy for cutaneous fungal infections: A brief review

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**Abstract**

**Background:** Fungal dermatological diseases are significant public health issues. Dermoscopy is a useful bedside assessment tool that helps clinicians diagnose various skin neoplasms and general dermatological diseases.

**Aim:** This brief review aims to update clinicians on the dermoscopic features of cutaneous fungal infections such as tinea capitis, tinea corporis, tinea incognito, onychomycosis, and pityrosporum folliculitis.

**Methods:** The PubMed database was searched using the terms “dermoscopy” or its synonyms, “tinea capitis”, “tinea corporis”, “tinea incognito”, “onychomycosis” and “pityrosporum folliculitis”.

**Results:** The diagnostic value of dermoscopy is well-recognised in the evaluation of tinea capitis and onychomycosis. There are fewer studies investigating the dermoscopic features of tinea corporis, tinea incognito and pityrosporum folliculitis, but the current data suggest that dermoscopy can aid clinical evaluation of these diseases. Understanding dermoscopic features of cutaneous fungal infection has the potential to increase diagnostic accuracy.

**Conclusion:** Dermoscopy in the evaluation of fungal dermatological diseases has the potential to optimize diagnostic accuracy, reduce unnecessary testing, and, consequently, improve clinical practice.

**KEYWORDS**

dermoscopy, folliculitis, onychomycosis, tinea capitis, tinea corporis

## 1 | INTRODUCTION

Fungal dermatological diseases are common and lead to significant public health problems. Dermoscopy is a non-invasive, hand-held examination tool that allows detailed inspection of cutaneous lesions by the bedside. This brief review provides an update on the dermoscopic features of cutaneous fungal infections, including tinea capitis, tinea corporis, tinea incognito, onychomycosis, and pityrosporum folliculitis. We searched the PubMed database using the following keywords: dermoscopy or its synonyms (dermatoscopy, videodermoscopy and onychoscopy), tinea capitis, tinea corporis, tinea incognito,

onychomycosis, and pityrosporum folliculitis. Relevant articles (evaluated by S.S.L. and J.H.M.) that investigated dermoscopic features of cutaneous fungal infection were included in this review.

## 2 | TINEA CAPITIS

Tinea capitis is predominantly caused by dermatophytes, commonly *Microsporum* species in Asia, Europe, South America, and Oceania and *Trichophyton* species in Africa and North America.<sup>1,2</sup> Although children (age group of 3-7 years) are mostly affected, tinea capitis can be seen

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in all ages. Its clinical manifestations range from mild scaling and broken-off hairs to severe inflammation and patchy hair loss.<sup>3</sup>

Trichoscopy (hair dermoscopy) is a tool that detects tinea capitis with a sensitivity of 94% and specificity of 83% (Figure 1).<sup>4</sup> Characteristic features include comma hairs (sensitivity 50%-54.7% and specificity 89.4%-99%), corkscrew hairs (sensitivity 22.6%-32% and specificity 95.7%-100%), zigzag hairs (sensitivity 17%-49.1% and specificity 93.6%-99%), Morse code-like hairs (sensitivity 13%-30.2% and specificity 100%), bent hairs (sensitivity 7% and specificity 100%), block hairs (sensitivity 2% and specificity 100%), i-hairs (sensitivity 6% and specificity 100%), and whitish sheath (sensitivity 83% and specificity 87.2%).<sup>4,5</sup> A recent systematic review reported that zigzag hairs (8/29 [28%]), Morse code-like hairs (6/29 [21%]), bent hairs (4/29 [14%]), and diffuse scaling (4/29 [14%]) were significantly associated with *Microsporum* tinea capitis.<sup>4,5</sup> Corkscrew hairs were more frequently detected in *Trichophyton* tinea capitis (21/38 [55%]) than in *Microsporum* tinea capitis (3/29 [10%]).<sup>5</sup> Therefore, trichoscopy can help to clinically differentiate between hair affected by *Microsporum* and *Trichophyton* species. Identifying the causative species in the early stages of disease guides management, as terbinafine effectively treats *Trichophyton* tinea capitis, while griseofulvin is more effective against *Microsporum* species.<sup>6</sup>

### 3 | TINEA CORPORIS

Tinea corporis is a fungal infection primarily caused by *Trichophyton rubrum*, which affects glabrous skin.<sup>7,8</sup> It is the most common form of dermatophytosis; the lifetime risk of developing tinea corporis is estimated to be 10% to 20%.<sup>9,10</sup> It frequently occurs in post-pubertal children and young adults. Typically affecting truncal and exposed skin, tinea corporis presents as an itchy, well-demarcated, oval or annular scaly patch with raised borders and central clearing.



**FIGURE 1** Dermoscopy of tinea capitis. Dermoscopic examination of tinea capitis revealing diffuse scaling (blue arrows), comma hair (green arrow), bent hair (red arrow), zigzag hair (yellow arrow), and whitish sheath (white arrow)

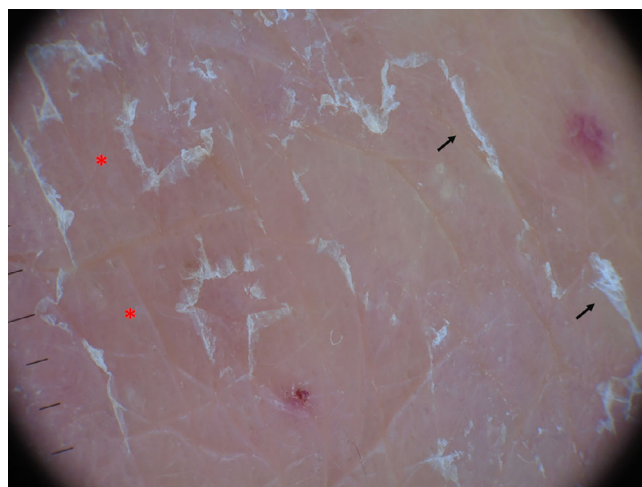
Dermoscopic predictors of tinea corporis were recently reported by Lekkas et al and included peripheral scales (odds ratio [OR] 5.2; 95% confidence interval [CI] 2.0-13.5), moth-eaten scales (OR 3.9; 95% CI 1.9-8.1), broken hairs (OR 5.8; 95% CI 2.0-16.6), and scales that peel outward (OR 14.3; 95% CI 1.3-155.2) (Figure 2).<sup>11</sup> Other dermoscopic features of tinea corporis include peripheral vasculature (63.6% of tinea corporis cases and 0% of controls) in a dotted arrangement (OR 0.767, 95% CI 0.533-1.106), white scales (OR 1.240, 95% CI 0.732-2.100), and lack of perifollicular scales (OR 1.550, 95% CI 0.083-2.719). Bhat et al also reported diffuse erythema and whitish scales (100% of all cases), follicular micropustules (36.7%), brown spots surrounded by a white-yellowish halo (20%), wavy and broken hairs (13.3%), and Morse code-like vellus hairs (3.3%) in 30 tinea corporis cases.<sup>12</sup>

Extramammary Paget's disease is an important differential diagnosis of cutaneous fungal infections in the genital and perianal areas. Dermoscopic features including milky-red area, vascular patterns with dotted, glomerular or polymorphous vessels, and ulcers or erosions are observed more frequently in extramammary Paget's disease than in cutaneous fungal infections.<sup>13</sup>

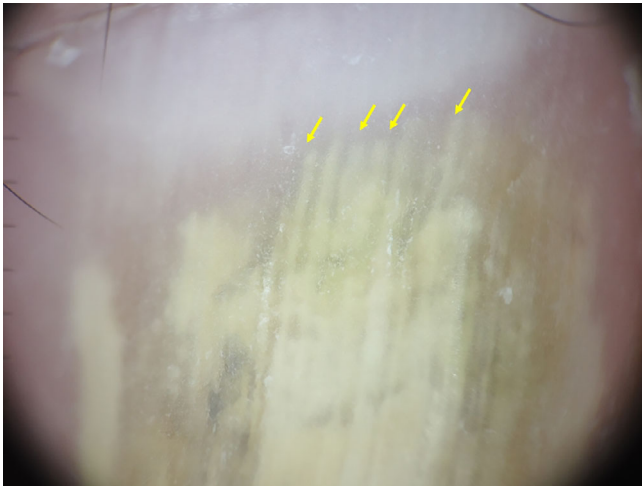
Dermoscopic features of tinea corporis have been reported in a few studies with small sample sizes. Therefore, larger studies that evaluate their sensitivity and specificity are needed.

### 4 | TINEA INCOGNITO

It is challenging to diagnose tinea when its typical clinical presentation is altered by the use of steroids or calcineurin inhibitors. This phenomenon is referred to as tinea incognito. Patients commonly present with an eczematous eruption on the trunk or face. Therefore, this diagnosis should be considered in patients with long-standing or recalcitrant



**FIGURE 2** Dermoscopy of tinea corporis. Dermoscopic examination of tinea corporis revealing diffuse erythema (red asterisks) and white peripheral scales that peel outwards (black arrows)



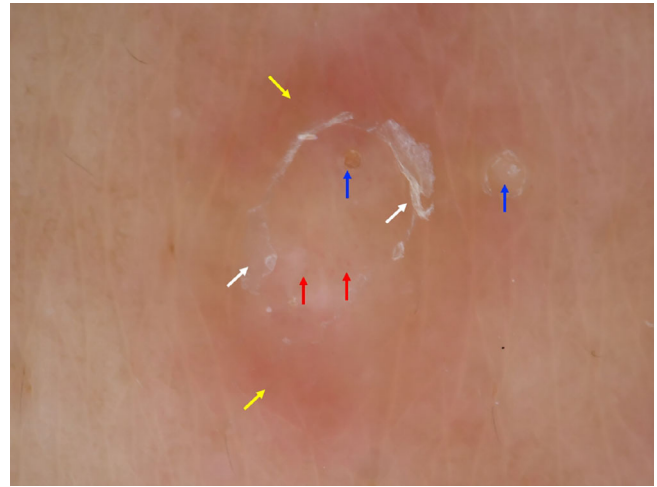
**FIGURE 3** Dermoscopy of onychomycosis. Dermoscopic examination of onychomycosis demonstrating spike patterns (yellow arrows) and yellow discoloration

dermatitis. Concurrent tinea pedis or onychomycosis may serve as clues for tinea incognito.<sup>14</sup>

Dermoscopy has recently been integrated into the clinical examination of tinea incognito. In cases affecting non-glabrous skin, comma, corkscrew, and Morse code-like hairs can be observed.<sup>12,15,16</sup> In addition, concentric erythematous areas separated by scales, follicular micropustules, and black spots surrounded by a white-yellowish halo can be detected.<sup>12,17</sup> Scaly, broken, translucent, and deformable hairs have also been reported.<sup>12,15,16</sup> Such dermoscopic features in a patient presenting with long-standing dermatitis and history of steroid or calcineurin inhibitor use should raise suspicion of tinea incognito.

## 5 | ONYCHOMYCOSIS

Onychomycosis or tinea unguium is a fungal infection of the nails caused by dermatophytes, non-dermatophyte molds, and yeast.<sup>18</sup> It is the most common nail disorder globally, and older people are at a higher risk of developing it. The characteristic dermoscopic features of onychomycosis include spikes (sensitivity 53.6%-86.4% and specificity 58.3%-100%), longitudinal striae (sensitivity 25%-82.5% and specificity 83.3%-100%), subungual hyperkeratosis or ruins appearance (sensitivity 13.6%-85.2% and specificity 41.7%-98.8%), and color changes which are commonly white or yellow (sensitivity 85.2%-95% and specificity 25%-75%) (Figure 3).<sup>19-21</sup> Distal irregular termination and homogenous opacities are also commonly observed. Fungal melanonychia is when the fungal nail infection causes brown-black discoloration of the nail plate. White or yellow streaks, a non-longitudinal homogeneous pattern, yellow color, reverse triangular pattern, subungual hyperkeratosis, and nail surface scaling are significantly associated with fungal melanonychia compared to non-fungal melanonychia such as melanoma.<sup>22,23</sup> Dermoscopy can optimize clinical detection of onychomycosis and fungal melanonychia,



**FIGURE 4** Dermoscopy of pityrosporum folliculitis. Dermoscopic examination of pityrosporum folliculitis depicting follicular pustules (blue arrows), dotted vessels (red arrows), perilesional scaling (white arrows), and surrounding erythema (yellow arrows)

reducing unnecessary testing and thereby improving the overall diagnostic accuracy.

## 6 | PITYROSPORUM FOLLICULITIS

Pityrosporum folliculitis, also known as *Malassezia* folliculitis, presents as multiple monomorphic, pruritic papules and pustules on the forehead and upper back.<sup>24,25</sup> Differentiating pityrosporum folliculitis from acne vulgaris is essential, as the former is caused by fungi while the latter is caused by bacteria. Pityrosporum folliculitis will persist and even worsen if it is not treated appropriately with topical or oral azole antifungals, particularly if the patient is concurrently on acne treatment.<sup>25</sup>

Dermoscopy has high diagnostic accuracy for dermatophytic, scabetic, and demodex folliculitis as well as pseudofolliculitis. A recent study showed that dermoscopy has a diagnostic accuracy of 67.3% for diagnosing pityrosporum folliculitis.<sup>26</sup> Dotted vessels are associated with pityrosporum folliculitis, having a sensitivity of 67.3% and a specificity of 93.1%. Jakhar et al reported that folliculocentric papules and pustules with surrounding erythema, perilesional scaling, and hypopigmented hair shafts were observed in the majority of pityrosporum folliculitis cases (Figure 4).<sup>27</sup> They also observed keratosis pilaris-like features of coiled or looped hair follicles with surrounding erythema in 8 out of a total 15 cases. Therefore, dermoscopy has the potential to improve the clinical diagnosis of pityrosporum folliculitis.

## 7 | LIMITATIONS

This review is limited by the paucity of literature. Most studies had small sample sizes, and some dermoscopic terminology was newly

reported. Therefore, further research is required to consolidate these findings.

## 8 | CONCLUSION

Dermoscopy can optimize the diagnostic accuracy of fungal dermatological conditions and reduce unnecessary testing. Its role is well established in identifying tinea capitis and onychomycosis at the bedside. Understanding the dermoscopic features of tinea corporis, tinea incognita, and pityrosporum folliculitis is an evolving area of research that has the potential to improve patient care. Studies that investigate the sensitivity and specificity of dermoscopic features or evaluate intra-observer and inter-observer discrepancies in these examinations can further establish the role of dermoscopy in clinical practice.

### ACKNOWLEDGMENTS

None declared.

### FUNDING

This article has no funding source.

### CONFLICT OF INTEREST

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

### AUTHOR CONTRIBUTIONS

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All authors have read and approved the final version of the manuscript.

Sophie Soyeon Lim and Je-Ho Mun had full access to all of the data in this study and take complete responsibility for the integrity of the data and the accuracy of the data analysis.

### TRANSPARENCY STATEMENT

Manuscript is an honest, accurate and transparent account of the study being reported. No important aspects of the study have been omitted. Any discrepancies from the study as planned have been explained.

### DATA AVAILABILITY STATEMENT

All relevant data are included in the article.

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**How to cite this article:** Lim SS, Shin K, Mun J-H. Dermoscopy for cutaneous fungal infections: A brief review. *Health Sci Rep.* 2022;5:e464. doi:10.1002/hsr.2.464