FREQUENCY OF VARIOUS DERMOSCOPIC PATTERNS OF PITYRIASIS VERSICOLOR; A CROSS-SECTIONAL OBSERVATIONAL STUDY

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ABSTRACT

Background: Superficial fungal infections like Pityriasis versicolor (PV) are among the most prevalent dermatological conditions worldwide. Clinical diagnosis is usually straightforward, although certain cases can be confounding, particularly if the presentation is similar to that of other skin disorders. Fungal cultures and potassium hydroxide mounts are traditional confirmatory tools, though each has limitations.

Objectives: To investigate the frequency of various dermoscopic patterns in PV lesions, especially those that are hypopigmented, hyperpigmented or mixed plaques presenting to a tertiary care setting in our population.

Methods: In this cross-sectional observational study, a non-probability consecutive sampling strategy was used to analyze dermoscopic patterns of PV lesions with positive KOH mounts from different body regions.

Results: The study comprised a total of 75 lesions from 75 patients. The most common dermoscopic patterns in hyperpigmented lesions (n=46) were scaling (39%), perilesional hyperpigmentation (34%), non-uniform pigmentation (29%), subtle ridges and furrows (26%), and hair follicular invasion (24%). Conversely, the majority of hypo pigmented lesions (n=27) had clearly demarcated borders (29%) and vascular patterns (18%). The dermoscopic patterns found in mixed lesions (n=2) were scaling, perilesional hyperpigmentation, clearly demarcated borders, and non-uniform pigmentation (2%)

Conclusion: Dermoscopy is a cost-effective tool for the diagnosis of lesions of PV that are difficult to diagnose.

Keywords: Pityriasis versicolor, cross-sectional studies, dermoscopy, diagnostic techniques and procedures

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INTRODUCTION

Pityriasis versicolor (PV), commonly known as tinea versicolor, a superficial mycosis of the skin, results from the excessive proliferation of Malassezia species, particularly M. globosa and M. furfur, which are lipophilic yeasts.[1] These naturally occurring yeasts in the skin can become dangerous under certain situations, such as high humidity, excessive sweating, and hormonal changes.[1,2] PV typically appears as hypo- or hyperpigmented plaques with fine scaling and primarily affects areas with a high concentration of sebaceous glands, such as the upper arms, shoulders, neck, and trunk.[1,3] In children, it can also affect the face and, in rare cases, the scalp. Due to high temperatures and humidity, PV is more common in tropical and subtropical areas.[2,4] Lesions may become less noticeable during cooler months but may persist in chronic cases.[4] Although the illness is largely asymptomatic, discolored patches may cause moderate irritation or aesthetic

concerns. PV mostly affects teenagers and young adults; however, it can happen to anyone at any age.[4,5]

PV and other superficial fungal infections are among the most common dermatological conditions worldwide, with clinical symptoms that may resemble those of other skin conditions. While potassium hydroxide (KOH) preparations showing distinctive spaghetti and meatball appearance and fungal cultures are commonly used for diagnosis, both traditional methods have limitations. The inadequate sensitivity and specificity of KOH preparations may lead to false negative results.[5] However, even though fungal cultures are more reliable, they are labor-intensive, time-consuming, and difficult to obtain in many healthcare settings, especially those with minimal resources.[6,7] To distinguish PV from other dermatological disorders including vitiligo, eczema, or seborrheic dermatitis that present similarly,[7,8] alternative diagnostic methods that provide quick, non-invasive, and precise PV detection are therefore desperately needed.[9] This study advances dermoscopy as a practical and accessible diagnostic tool for dermatologists by improving diagnostic precision through non-invasive method, especially in areas with limited access to sophisticated laboratory facilities for doing fungal cultures.

The dermoscopic features of PV are still not well understood in the literature, despite its clinical significance. The majority of studies focus on clinical and microscopic diagnosis, with little attention to dermoscopic correlations. This technique enables the observation of characteristic dermoscopic characteristics, such as non-uniform pigmentation, a clearly demarcated border, perilesional hyperpigmentation, subtle ridges and furrows, scaling, and vascular patterns, that can distinguish PV from other related dermatoses.[10,11] Given the increasing reliance on non-invasive tools in dermatology, there is a compelling need to define and document consistent dermoscopic features of PV. This study aims to fill this gap by systematically evaluating dermoscopic findings in PV and assessing their utility in clinical differentiation from other mimicking dermatoses particularly in nations with limited access to specialized diagnostic techniques.[12,13]

METHODS

This cross-sectional observational study was conducted over six months, from April to September 2024. Male and female patients aged 10 to 60 years with a clinical diagnosis of PV were enrolled using a non-probability consecutive sampling technique. This age range was selected to include the populations most affected by PV, while limiting age-related physiological variations. Consecutive sampling was employed to reduce selection bias and include all eligible patients during the study period. A clinical diagnosis of PV was confirmed by potassium hydroxide (KOH) mounts. Patients were excluded if they had applied topical antifungal or corticosteroid treatment within the previous four weeks or had coexisting dermatological conditions that could mimic PV, such as vitiligo, pityriasis alba, or seborrheic dermatitis. These exclusions helped ensure diagnostic specificity and uniformity during dermoscopic assessment.

The WHO sample size calculator was used to determine the sample size. The minimum sample size was determined to be 56 using a reported frequency of PV in hypopigmented lesions of 17.6%, with a 95% confidence level and a 10% margin of error. The sample was enlarged to include 75 patients in order to improve accuracy and take variability into consideration.

The primary outcome was the dermoscopic patterns of PV lesions, evaluated using standardized operational definitions adapted from previously published literature.[14] The dermoscopic features and their definitions were as follows:

Scaling: presence of fine dermatological appendages raised from the surface of the lesion. Scaling could present in patchy, diffuse, peripheral, or perifollicular patterns.

Invasion of hair follicle: invasion of hair follicles by Malassezia species, evidenced by hypopigmentation around the involved follicles.

Vascular pattern: linear branching or dotted vessels within the lesion.Perilesional hyperpigmentation: abnormal melanin pigmentation seen around the margins of the lesion.

Clearly demarcated border: a well-defined and sharply delineated margin separating the lesion from surrounding normal skin.

Inconspicuous ridges and furrows: accentuation of normal skin markings (ridges and furrows) over the lesion, typically made more prominent due to the alignment of fine scaling along these lines.

Non-uniform pigmentation: uneven distribution of pigment within the lesion, giving it a mottled or patchy appearance.

Each patient underwent dermoscopic evaluation of a single representative lesion to standardize observation. A Heine Delta 30 dermoscope in polarized mode at 10× magnification (Heine Optotechnik GmbH & Co. KG, Gilching, Germany) was used in conjunction with a Samsung Galaxy S20FE camera (Samsung Electronics Co., Ltd., Suwon, South Korea) to capture images. All dermoscopic observations were performed under the supervision of a board-certified consultant dermatologist to ensure consistency and accuracy.

STATISTICAL ANALYSIS

IBM SPSS Statistics, version 27 (IBM Corp., Armonk, NY, USA), was used to analyze the data. Means± SD was used to express quantitative factors including age, body mass index (BMI), and lesion duration. Frequencies and

percentages were used to describe qualitative factors such as gender, lesion type (hypopigmented, hyperpigmented, or mixed), and dermoscopic patterns. Non-probability sequential sampling was the sampling strategy employed in order to lessen selection bias. Stratification was used to adjust for effect modifiers like age, gender, BMI, lesion type, and duration. After stratification, the Chi-square test was used to evaluate relationships. Results were taken into consideration, and P-values were published to three decimal places, statistically significant at $P \leq 0.050$. Missing data was not applicable, as all included patients completed dermoscopic evaluation.

RESULTS

A total of 75 lesions from 75 patients were analyzed to assess the dermoscopic patterns. Among these, 27 lesions were hypopigmented, 46 were hyperpigmented, and 2 were mixed in pigmentation. Most patients (57.3%) belonged to the 21–40 years age group, followed by 25.3% aged between 10 and 20 years, and 17.3% in the 41–60 years range. Over half of the patients (53%) reported having lesions for more than three months, while 32% had lesions for one to three months, and 15% for less than a month. Males comprised a greater proportion of the study population at 68%, with females accounting for 32%. When categorized by body mass index (BMI), 49% had a normal BMI, 27% were overweight, 15% were underweight, and 9% were obese. The trunk was the most frequently affected anatomical site (69.3%), followed by simultaneous involvement of the trunk and upper limbs (24.3%), and isolated involvement of the upper limbs (6.7%).

Dermoscopic analysis of hyperpigmented lesions (n=46) revealed frequent findings of non-uniform pigmentation (29%) (Fig.1a), scaling (39%) and perilesional hyperpigmentation (34%). Inconspicuous ridges and furrows (26%) (Fig. 1b) and hair follicle invasion (24%) (Fig. 1c) were also commonly observed. Among the scaling subtypes, peripheral scaling was the most prevalent (60%) (Fig.1d).

In hypopigmented lesions, the most characteristic features included clearly demarcated borders (29%) (Fig. 2a), vascular patterns (18%), predominantly linear branching vessels (Fig. 2b) and perilesional hyperpigmentation (Fig. 2c). Scaling (19%) and non-uniform pigmentation (19%) were also noted but were less frequent than in hyperpigmented lesions. Satellite phenomenon, characterized by a large lesion surrounded by smaller lesions at the periphery, was observed in 28% of hypopigmented lesions (Fig. 2d) further adding complexity to PV's clinical presentation. Mixed lesions (n=2) exhibited combinations of non-uniform pigmentation, clearly demarcated borders, perilesional hyperpigmentation, and peripheral scaling.

Statistical analysis revealed that inconspicuous ridges and furrows were significantly more common in male patients ($p = 0.02$), suggesting a gender-related variation. Hair follicle invasion was significantly associated with lesions located on the trunk ($p = 0.03$). Additionally, clearly demarcated borders were significantly more frequent in lesions present for more than 3 months ($p = 0.006$), indicating a correlation between lesion duration and dermoscopic features.

Figure 1: Dermoscopic appearance of hyperpigmented lesions of Pityriasis versicolor showing: (a) nonuniform pigmentation, (b) inconspicuous ridges and furrows, (c) follicular invasion, and (d) peripheral scaling

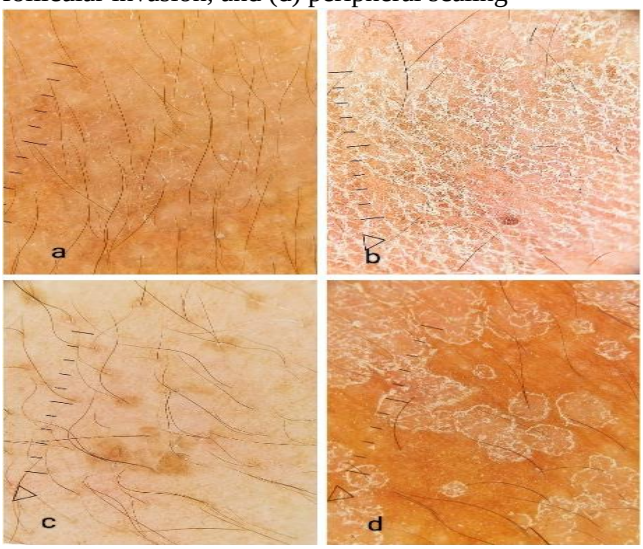
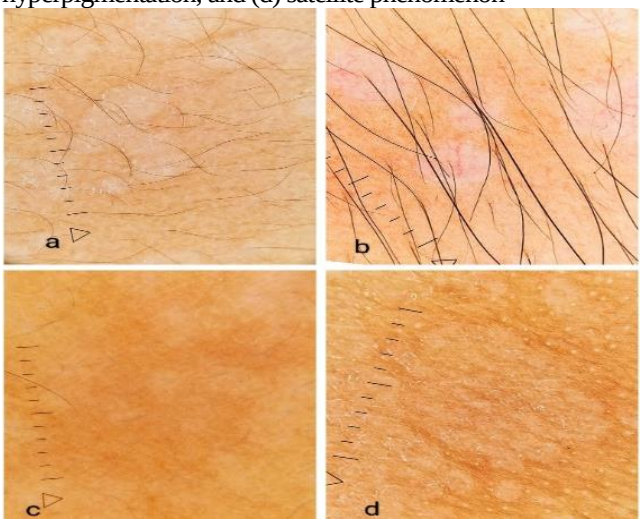


Figure 2: Dermoscopy appearance of hypopigmented lesion of Pityriasis versicolor showing: (a) clearly demarcated border, (b) linear branching vascular patterns, (c) perilesional hyperpigmentation, and (d) satellite phenomenon



These findings underscore the relevance of lesion type, anatomical location, duration, and patient demographics in the dermoscopic assessment of PV. A comprehensive comparison of dermoscopic variables across the lesion types is summarized in Table 1.

Table 1: Dermoscopic patterns of Pityriasis versicolor lesions

Dermoscopic Patterns	Hypopigmented lesions (n=27)	Hyperpigmented lesions (n=46)	Mixed Lesions (n=2)
Nonuniform pigmentation	5 (19%)	13 (29%)	1 (50%)
Clearly demarcated border	8 (29%)	6 (12%)	1 (50%)
Perilesional hyperpigmentation	3 (10%)	9 (34%)	1 (50%)
Inconspicuous ridges and furrows	4 (14%)	12 (26%)	0 (0)
Scaling	5 (19%)	18 (39%)	1 (50%)
Patchy	0 (0)	4 (22%)	0 (0)
Furrows*	2 (40%)	1 (6%)	0 (0)
Diffuse	0 (0)	4 (22%)	0 (0)
Peripheral	3 (60%)	6 (33%)	1 (50%)
Perifollicular	0 (0)	3 (17%)	0 (0)
Vascular	5 (18%)	2 (4%)	0 (0)
Linear branching vessels	5 (100%)	2 (100%)	0 (0)
Dotted vessels	0 (0)	0 (0)	0 (0)
Satellite Phenomenon	8 (28%)	0 (0)	0 (0)
Hair Follicle Invasion	2 (8%)	11 (24%)	0 (0)

Notes: Results are shown as whole numbers (n), and percentages are indicated in parentheses.
*In this category, the number also includes lesions with patchy or diffuse scaling, which had scales present within the furrows.

These findings underscore the relevance of lesion type, anatomical location, duration, and patient demographics in the dermoscopic assessment of PV. A comprehensive comparison of dermoscopic variables across the lesion types is summarized in Table 1.

DISCUSSION

Various dermoscopic patterns of pityriasis versicolor (PV) lesions were analyzed in this study, providing important insights for clinical diagnosis. These findings highlight the potential of dermoscopy as a non-invasive and cost-effective diagnostic tool. Dermoscopy offers a valuable adjunctive method for distinguishing PV from other dermatoses with similar clinical presentations. Furthermore, the demographic trends observed, such as the higher prevalence in males and the frequent involvement of the trunk, underscore the importance of considering patient characteristics and lesion location in clinical evaluation.

When comparing our results with international studies, both similarities and differences were noted. A study from India by Patro et al. reported that hyperpigmented lesions commonly presented with scaling and irregular pigmentation, consistent with our findings.[15] However, they did not report the prominence of vascular features in hypopigmented lesions as noted in this study. In Canada, Singh et al. described perilesional hyperpigmentation and scaling as key features of PV but found hair follicle invasion to be a less frequent observation.[16] Lee et al. in the UK emphasized the value of dermoscopy in differentiating PV from other pigmentary disorders, aligning with our conclusion regarding its diagnostic utility.[17] Their study, however, did not highlight gender-based differences, such as the increased frequency of inconspicuous ridges and furrows in males observed in our cohort. In Australia, Davis et al. focused on the role of dermoscopy in identifying fungal elements, whereas our study centered on pattern recognition.[18] Kumar et al. from India similarly reported that the trunk was the most commonly involved site.[19] These regional variations suggest that dermoscopic features may be influenced by geographic, ethnic, demographic, or environmental factors.

Dermoscopy serves as a valuable non-invasive diagnostic aid in differentiating PV from other clinically similar conditions such as vitiligo, seborrheic dermatitis, and eczema. In PV, common dermoscopic findings include fine white scaling, often aligned with skin creases, non-uniform pigmentation (either hyperpigmented or hypopigmented), and in some cases, perifollicular involvement.[20] These features help distinguish PV from vitiligo, which typically presents as structureless depigmented areas with absent or faint pigment network and sometimes perifollicular repigmentation.[21] Seborrheic dermatitis, on the other hand, shows yellowish greasy scales and dotted vessels over a reddish background[22], whereas eczema commonly reveals yellow serocrusts and a patchy distribution of dotted vessels.[23] Recognizing these distinct dermoscopic patterns enhances diagnostic accuracy in ambiguous cases and supports timely, targeted management.

Limitations: Only KOH-positive cases were included, which may have led to the exclusion of some patients with PV due to false-negative KOH results. Moreover, fungal cultures were not performed, because of nonavailability, preventing correlation between specific fungal species and dermoscopic features. Importantly, as this was an observational study, causality cannot be inferred. Despite these limitations, the study presents significant strengths. It addresses a relatively underexplored area of Dermatology and identifies distinctive dermoscopic features of PV. These findings may enhance diagnostic accuracy and reduce the need for invasive or less sensitive diagnostic techniques. The comprehensive nature of our analysis also lays the groundwork for future research to refine dermoscopic criteria and explore their relationship with specific fungal subtypes.

CONCLUSION

Dermoscopy is a precise, non-invasive tool for diagnosing Pityriasis versicolor (PV), revealing lesion-specific patterns often missed clinically. This study emphasizes its utility in distinguishing PV from similar dermatoses, especially in resource-limited settings, as a practical alternative to KOH and culture.

ETHICAL APPROVAL

Ethical approval of article was granted by the Institutional Review Board of Services Institute of Medical Science, Lahore vide reference No. IRB 2024/1263/SIMS dated 06 Feb, 2024.

CONFLICT OF INTEREST

Authors declare no conflict of interest.

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AUTHOR'S CONTRIBUTIONS

JBT: Manuscript writing, review of manuscript, supervision
HT: Data analysis, review of manuscript
SB: Manuscript writing, statistical analysis
AA: Manuscript writing, references
UA: Radiological analysis
FA: concept and sdesign, manuscript writing
All Authors: Approval of the final version of the manuscript to be published

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