International Journal of Science and Research (IJSR)
ISSN: 2319-7064
SJIF (2022): 7.942

Dermoscopic Findings in Vitiligo with Emphasis on Disease Activity - An Observational Study in a Tertiary Care in Eastern India

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Abstract: ***Aims: To observe the various dermoscopic findings in vitiligo and the correlation of the findings with the disease activity. Materials and Methods: This institutional cross - sectional study involved 75 clinically diagnosed cases of vitiligo. Informed consent and detailed patient histories were obtained, followed by clinical examinations. Baseline data were collected, and patients were categorized into three groups: stable vitiligo, unstable vitiligo, and those receiving treatment (both stable and unstable). Disease stability was defined as the absence of new lesions, progression of existing lesions, or Koebner's phenomenon over the past year. Patient confidentiality was maintained throughout. Dermoscopic imaging of the most recent vitiligo lesion was done using the Dermoscope AM7013MZTS (4S) Dino - Lite Premier, with images saved for future evaluation. Results: The document on vitiligo outlines several features associated with stable, unstable, and treated vitiligo. In stable vitiligo, common characteristics include marginal hyperpigmentation (94.4%), a trichrome pattern (71.87%), and perifollicular hyperpigmentation (83.33%). Unstable vitiligo features include comet tail (micro - Köbnerization) (62.5%), erythema (64.1%), and reticulate pigmentation (77.77%). In vitiligo undergoing treatment, perifollicular depigmentation in perilesional skin (43.75%), starburst with irregular borders (34.38%), and polka dots (25%) are observed. Conclusion: The study concludes that Dermoscopy is a valuable non - invasive tool for assessing vitiligo and guiding treatment decisions based on disease activity. Stable vitiligo is indicated by patterns like marginal, perifollicular, and reticulate pigmentation, while instability is linked to trichrome, starburst, comet tail, and polka dot patterns. Good treatment response is associated with stable patterns, whereas poor response is seen in unstable ones. Dermoscopy helps monitor disease progression, predict prognosis, and signal when treatment adjustments are needed.***

Keywords: Vitiligo, Dermoscopy, Disease Activity, Stable Vitiligo, Unstable Vitiligo, Perifollicular Hyperpigmentation, Marginal Hyperpigmentation, Trichrome Pattern, Comet Tail (Micro - Koebnerization), Reticulate Pigmentation, Starburst Pattern, Polka Dots, Disease Progression

1. Introduction

Vitiligo is a chronic autoimmune disorder characterized by the destruction or dysfunction of melanocytes, the cells responsible for producing melanin, which gives skin its color. This results in the development of white, depigmented patches on the skin. Affecting between 0.3% and 1.1% of the global population, vitiligo occurs without preference for gender, race, or ethnicity. Although the exact cause of vitiligo is not entirely understood, it is believed to result from a combination of genetic, autoimmune, and environmental factors. The condition often begins as small patches of depigmentation that may spread over time, leading to a significant cosmetic and psychological impact, particularly in individuals with darker skin tones. Despite the visible nature of vitiligo, diagnosing the condition early and accurately can be challenging, especially in its initial stages, when the depigmentation may not be obvious. [1]

Dermoscopy, a non - invasive diagnostic technique, has become a vital tool in assessing and managing vitiligo. This method involves using a handheld device with magnification and polarized light to visualize the skin's surface and underlying structures in greater detail than can be seen with the naked eye. Dermoscopy is particularly useful in detecting early vitiligo lesions, which may not be visible on casual examination. It allows clinicians to examine specific pigmentary patterns within the skin and can reveal subtle signs of disease activity. For example, normal skin has a characteristic reticulate or net - like pigmentary pattern, but this pattern is disrupted in areas affected by vitiligo. Early detection through dermoscopy can facilitate prompt

intervention, potentially preventing the progression of depigmentation. [2, 3]

Dermoscopy also plays an important role in determining the stage of vitiligo, which can vary widely among patients. Vitiligo may be classified into three stages: evolving (active), stable, or repigmentation. In the evolving stage, depigmentation is actively spreading, and the affected areas may continue to grow. Dermoscopic patterns associated with active vitiligo include the presence of a trichrome pattern, comet tail, polka dot, or starburst appearance. These patterns indicate instability, suggesting that the disease is progressing. [4] In contrast, stable vitiligo is characterized by the absence of new or expanding lesions. Patterns such as marginal hyperpigmentation, perifollicular pigmentation, and reticulate pigmentation observed through dermoscopy often indicate that the disease is stable. Finally, the process of repigmentation, where melanocytes begin to return to affected areas, can also be monitored using dermoscopy, as early signs of perifollicular pigmentation or other patterns can signal successful treatment. [5]

In addition to aiding diagnosis and disease staging, dermoscopy is valuable for assessing treatment response and guiding therapeutic decisions. Treatment options for vitiligo include topical corticosteroids, calcineurin inhibitors, phototherapy, and, in some cases, surgical interventions. Dermoscopy can help predict how a patient will respond to treatment by monitoring changes in pigmentary patterns over time. For example, patterns like marginal hyperpigmentation, perifollicular pigmentation, and reticulate pigmentation are often associated with a favorable response to treatment, indicating repigmentation. On the other hand, persistent trichrome, starburst, comet tail, and polka dot patterns may signal poor response to therapy or disease instability, suggesting the need for adjustments in the treatment approach. Therefore, dermoscopy not only enhances the precision of vitiligo management but also contributes to better patient outcomes by allowing for early intervention, ongoing monitoring, and timely modifications to therapy. [6, 7]

2. Materials and Methods

This institutional cross - sectional study involved 75 clinically diagnosed cases of vitiligo. Informed consent and detailed patient histories were obtained, followed by clinical examinations. Baseline data were collected, and patients were categorized into three groups: stable vitiligo, unstable vitiligo, and those receiving treatment (both stable and unstable). Disease stability was defined as the absence of new lesions, progression of existing lesions, or Koebner's phenomenon over the past year. Patient confidentiality was maintained throughout. Dermoscopic imaging of the most recent vitiligo lesion was done using the Dermoscope AM7013MZTS (4S) Dino - Lite Premier, with images saved for future evaluation.

Clinical Assessment: The clinical assessment in the study involved a comprehensive evaluation of 75 vitiligo patients, who were categorized into stable vitiligo, unstable vitiligo, and those undergoing treatment based on disease stability criteria. Detailed patient histories were collected, focusing on the onset and progression of vitiligo lesions. Dermatological examinations were conducted, and the most recent lesions were analyzed using a Dino - Lite Premier Dermoscope to capture dermoscopic images for further evaluation. This assessment aimed to correlate specific dermoscopic patterns, such as marginal hyperpigmentation and comet tail (micro - Koebnerization), with the clinical stage of vitiligo to enhance understanding of disease activity and guide treatment strategies**.**

3. Statical Analysis

The study examined dermoscopic patterns in 50 vitiligo patients, dividing them into stable (n=18), unstable (n=32), and those undergoing treatment (n=39). It found that marginal hyperpigmentation and perifollicular hyperpigmentation were predominantly observed in stable vitiligo, with frequencies of 94.4% and 83.33%, respectively, while these patterns were less common in unstable cases and patients on treatment. The trichrome pattern and comet tail (micro - Koebnerization) were more prevalent in unstable vitiligo, suggesting a link with disease instability. Reticulate pigmentation was frequent in stable vitiligo, and intralesional or perilesional erythema was most common in treated patients. Telangiectasia appeared more in patients on treatment compared to those with stable or unstable vitiligo. These findings highlight the utility of dermoscopy in distinguishing vitiligo types and tailoring treatment based on observed patterns.

4. Result

STABLE VITILIGO	UNSTABLE VITILIGO	VITILIGO ON TREATMENT
Marginal hyperpigmentation (94.4%)	Trichrome pattern (71.87%)	All features of stable and unstable vitiligo PLUS
Perifollicular hyperpigmentation (83.33%)	Comet tail (micro - kobernisation) (62.5%)	Erythema (64.1%)
Reticulate pigmentation (77.77%)	Reduced pigment network (56.25%)	Telangiectasia (51.28%)
	Perifollicular depigmentation in perilesional skin (43.75%)	
	Starburst (irregular border) (34.38%)	
	Polka dots (25%)	

The observational study on "Stable Vitiligo" categorizes vitiligo into stable and unstable forms, with a focus on the distinguishing features of each. Stable vitiligo is characterized by several distinct patterns of pigmentation, including marginal hyperpigmentation, which occurs in 94.4% of cases, and perifollicular hyperpigmentation, present in 83.33% of cases. These patterns help in identifying the stability of the condition, which is crucial for determining the appropriate treatment plan. The study also highlights a trichrome pattern observed in 71.87% of stable vitiligo cases, further distinguishing it from unstable forms.

In contrast, unstable vitiligo presents additional features that indicate active progression or changes in the condition. Some

of the significant markers include the presence of erythema in 64.1% of cases and a comet tail (micro - Koebner phenomenon) in 62.5% of cases. The study also mentions other patterns like reticulate pigmentation, observed in 77.77% of cases, and telangiectasia, seen in 51.28% of cases. These markers are critical for clinicians to assess the activity of the disease and modify treatment strategies accordingly.

Additionally, the study discusses vitiligo that is undergoing treatment, indicating that both stable and unstable forms can exhibit features of both categories as they respond to therapy. For instance, reduced pigment network and starburst (irregular border) patterns are observed during treatment, which may signal either stabilization or progression depending on the overall clinical context.

5. Discussion

The dermoscopic findings in this study corroborate previous research, reinforcing the utility of dermoscopy in evaluating vitiligo. The observed patterns such as perifollicular hyperpigmentation and altered pigment networks were consistent with earlier studies, notably those by Wali et al. and Nirmal et al., where such features were indicative of progressive vitiligo. In contrast, stable vitiligo was often associated with perifollicular depigmentation, highlighting the potential of dermoscopy in distinguishing between different stages of the disease. Unique patterns like starburst, comet tail, and polka dots were particularly noted in unstable vitiligo cases, emphasizing their role in identifying disease activity. [8, 9, 10]

Patients undergoing treatment displayed a mix of stable and unstable vitiligo patterns, with additional dermoscopic features like erythema and telangiectasia being prevalent. These findings suggest that treatment influences the dermoscopic appearance of vitiligo, potentially reflecting the dynamic changes in the skin's pigmentary processes. The presence of marginal hyperpigmentation and perifollicular repigmentation in these patients indicates a positive response to treatment, aligning with studies by ElGhareeb et al. and Wang et al. This correlation highlights the potential of dermoscopy not only in diagnosing vitiligo but also in monitoring treatment efficacy and disease progression. [11, 12]

Overall, this study supports the growing body of evidence that dermoscopy is an invaluable tool in managing vitiligo. By providing clear, non - invasive visual markers, dermoscopy allows clinicians to assess disease stability, monitor response to treatment, and adjust therapeutic strategies accordingly. The ability to identify specific patterns associated with stability or instability can significantly impact the prognosis and management of vitiligo, making dermoscopy a standard part of clinical practice in dermatology. Future research should focus on further validating these patterns and exploring their implications in larger, more diverse patient populations. [13]

6. Conclusion

The study concludes that Dermoscopy is a valuable non - invasive tool for assessing vitiligo and guiding treatment decisions based on disease activity. Stable vitiligo is indicated by patterns like marginal, perifollicular, and reticulate pigmentation, while instability is linked to trichrome, starburst, comet tail, and polka dot patterns. Good treatment response is associated with stable patterns, whereas poor response is seen in unstable ones. Dermoscopy helps monitor disease progression, predict prognosis, and signal when treatment adjustments are needed.

Acknowledgements: NIL

Declaration of Interest
"The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this paper."

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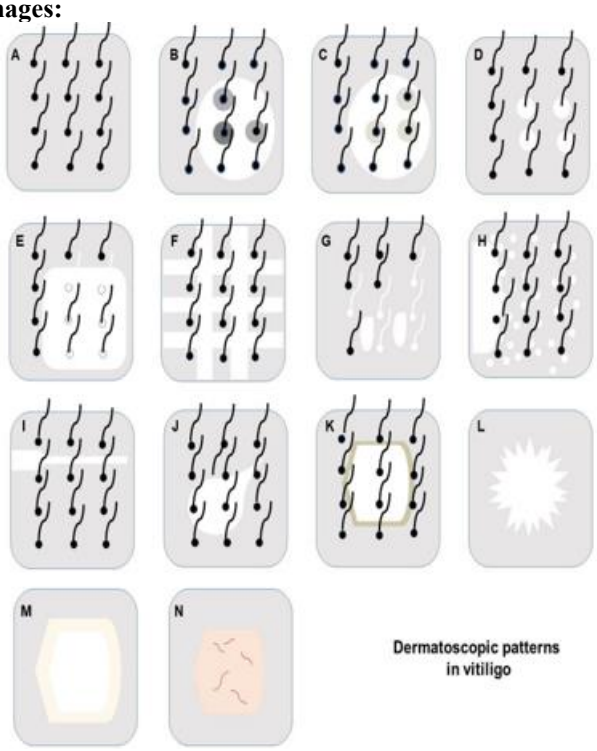
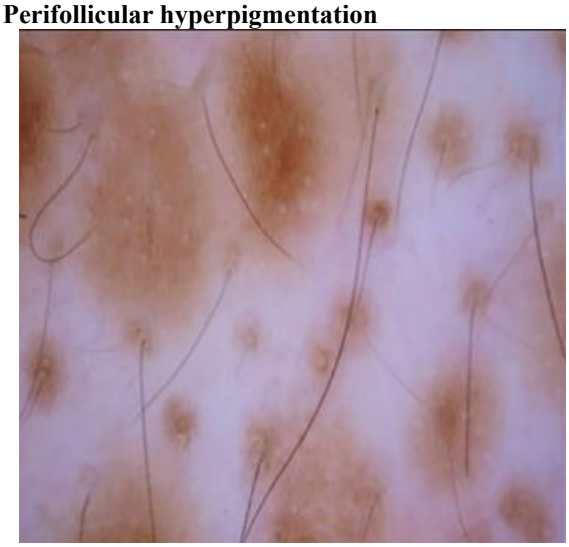
Images:

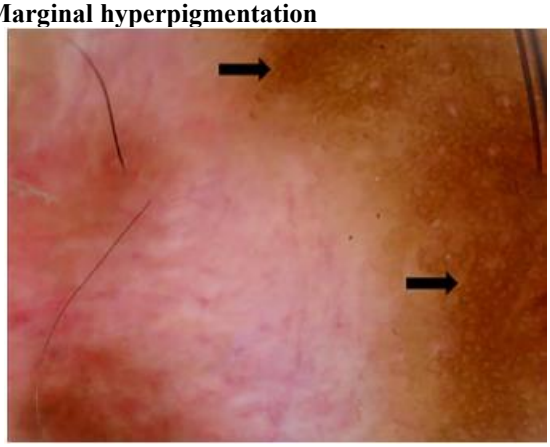


1)
A) Normal pigmentary pattern.
B) Perifollicular hyperpigmentation.
C) Perifollicular pigmentation.
D) Perifollicular depigmentation.
E) Reduced/absent network.
F) Reversed network.
G) Leukotrichia.
H) Polka dots.
I) Micro - Koebner phenomenon.
J) Comet tail pattern.
K) Perilesional/marginal hyperpigmentation
L) Starburst pattern.
M) Trichrome pattern.
N) Erythema with telangiectasia

2) Perifollicular hyperpigmentation



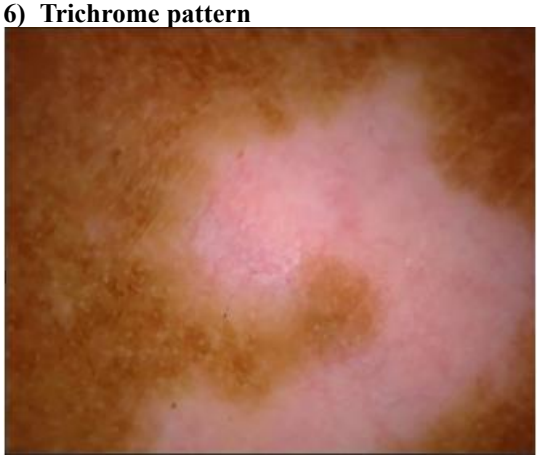
3) Marginal hyperpigmentation



4) Reticulate pigmentation

5) Comet tail (micro – kobernisation

6) Trichrome pattern



7) Polka dot (satellite lesions)