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Dermoscopic Findings in Vitiligo: A Cross-Sectional Study

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ABSTRACT

Background: Vitiligo, a persistent depigmentary condition with considerable psychosocial ramifications, has been insufficiently evaluated by traditional approaches. Dermoscopy provides a non-invasive method for enhanced vision, however standardized data remain limited. **Aim:** This cross-sectional study aimed to evaluate the dermoscopic features of vitiligo and their clinical implications in disease assessment. **Methodology:** Thirty-four individuals with vitiligo were recruited, and demographic, clinical, and dermoscopic attributes were documented. The dermoscopic assessment encompassed the examination of background, borders, vascular and follicular alterations, pigment networks, and perilesional characteristics. Statistical analysis has been done utilizing SPSS version 26.0. **Results:** All patients displayed a uniform white background devoid of scales, with 88.2% exhibiting clearly defined borders. Notable observations were perifollicular pigmentation (41.2%, p=0.005), leucotrichia (29.4%, p=0.002), and diminished pigment network (44.1%, p<0.001). Satellite lesions were detected in 41.2% of cases (p=0.020). These patterns were associated with disease activity and prognosis indicators. **Conclusion:** In conclusion, Dermoscopy enhances diagnostic accuracy in vitiligo by revealing features associated with disease activity and therapeutic outcomes. Its integration into routine practice can facilitate early detection, better monitoring, and personalized management.

1. INTRODUCTION

Vitiligo is a chronic acquired pigmentary skin condition characterized by the selective destruction of melanocytes, leading to distinct macules and patches of depigmentation [1]. In contrast to most other dermatoses, vitiligo manifests without prior inflammation and affects approximately 1% of the general population[2]. Clinical depigmentation significantly affects psychological well-being, as those afflicted frequently endure stigma, prejudice, and distress, severely undermining their quality of life[3]. The disease exhibits unpredictability in its onset, progression, and therapeutic response, complicating management and exacerbating the psychological burden on the patient[4].

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Recent years have witnessed initiatives aimed at standardizing the classification and evaluation of vitiligo[5]. The Vitiligo European Task Force (VETF) initially established a consensus on clinical criteria and staging; nevertheless, geographical and ethnic disparities necessitated the development of a more comprehensive international framework[6]. As a result, suggestions for regional working groups from Africa, the Americas, Europe, Asia, the Middle East, and the Pacific were formulated to achieve a worldwide agreement[7]. Notwithstanding these advancements, dependable criteria for assessing disease stability and activity remain inadequate and a globally accepted gold-standard methodology for routine clinical use is still lacking[8].

Traditionally, the assessment of vitiligo activity has been conducted through clinical history and examination[9]. The criteria include the presence of new or advancing lesions within one to two years, the Koebner phenomenon, a high Vitiligo Disease Activity Score (VIDA), and a lack of repigmentation in a negative minigrafting test[10]. These methods are deficient: patient recollection is typically inadequate, lesion progression becomes apparent only after several months, and invasive procedures like minigrafting are labor-intensive and poorly tolerated by patients[11]. Histopathological and molecular approaches, however instructive, lack practicality for everyday clinical application—highlighting the necessity for expedited, dependable, and non-invasive equipment.

Dermoscopy, initially developed for pigmented lesions, is now extensively utilized in the assessment of pigmentary and inflammatory skin conditions [12]. By delivering real-time, enlarged perspectives on subsurface structures, it enhances diagnostic accuracy and evaluates both disease stability and activity in vitiligo[13]. Stable illness typically exhibits marginal or perifollicular pigmentation and reticular formations, indicating repigmentation by follicular melanocytes, whereas active disease is characterized by indistinct margins, satellite lesions, and a trichrome appearance, reflecting ongoing depigmentation[14]. Dermoscopy aids in distinguishing vitiligo from similar hypopigmented disorders such as pityriasis alba and lichen sclerosus[15].

However, regarding these advantages, the majority of contemporary research on vitiligo dermoscopy is predominantly descriptive or based on limited case series, leading to restricted generalizability. the existence of standardized dermoscopy interpretation and considerable interobserver variability impede its integration into clinical standards.

2. METHODOLOGY:

2.1. Study Design:

This descriptive, cross-sectional, single-center, hospital-based study was performed in the Department of Dermatology, Venereology, and Leprosy at Maharishi Markandeshwar Medical College and Hospital, Kumarhatti, Solan, from June 2023 to December 2024. The purpose of this study was to evaluate the dermoscopic characteristics of hypopigmentary and depigmentary lesions, specifically vitiligo, with a Dino-Lite Edge/AM7115 dermoscope. Ethical approval was secured, and written informed permission was acquired from all subjects.

2.2. Study Population:

A total of 34 patients of all ages and genders presenting with hypopigmented or depigmented lesions—including vitiligo, halo nevus, idiopathic guttate hypomelanosis, post-inflammatory hypopigmentation, and leprosy—were enrolled. Patients with congenital or syndromic hypopigmentation (e.g., albinism, piebaldism, Waardenburg syndrome) were excluded.

2.3. Data Collection:

Demographic information, historical context, and clinical characteristics of lesions were documented. Dermoscopic assessment of vitiligo was conducted utilizing the Dino-Lite dermoscope, and lesion images were captured with an iPhone 12 Pro Max. Appropriate examinations, such as skin scrapings, histopathology, and microbiological cultures, were performed as necessary. Data were documented in a standardized proforma, and analysis was conducted using SPSS v26.0; qualitative data were represented as percentages, quantitative data as mean ± SD, and P-values <0.05 were deemed significant.

2.4. Data analysis:

Data were recorded in a structured proforma and compiled in Microsoft Excel. Statistical analysis was performed using SPSS v26.0 (IBM, USA).

3. RESULTS:

3.1 Demographic Characteristics:

The demographic and clinical characteristics of the patients (n = 34) indicated a predominance in adults, particularly in the 40+ (35.3%) and 20–39 years (32.4%) age brackets, with a significant male majority (58.8%). The occupations most impacted were housewives (22.9%), drivers (20%), farmers (17.1%), and businessmen (17.1%). Clinically, overall involvement occurred in 32.4%, although localized and regional lesions were equally prevalent at 22.9% each. About fifty percent of the cases exhibited a disease duration of one year or less; however, chronic cases (54.3%) and progressive disease (67.6%) were more prevalent. The medical

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history was predominantly unremarkable, with a few concomitant conditions (hypertension, hypothyroidism, pulmonary tuberculosis), and the family history was positive in 11.8% of cases. The condition was predominantly observed in middle-aged males, characterized by its chronic and progressive nature, however it possessed rare genetic and systemic correlations.

Table 1: Demographic and Clinical Characteristics of Patients (n = 34)

Parameter	Category	Frequency (n)	Percentage (%)
Age Group	0–12 years	6	17.6
	13–19 years	5	14.7
	20–39 years	11	32.4
	40+ years	12	35.3
Gender	Male	20	58.8
	Female	14	41.2
Occupation	Student	2	5.7
	Shopkeeper	1	2.9
	Farmer	6	17.1
	Banker	4	11.4
	Driver	7	20.0
	Housewife	8	22.9
	Businessman	6	17.1
No. of Lesions	Localized (single patch/region)	8	22.9
	Regional (face/neck/hands/arms only)	8	22.9
	Multiple regions (more than one body part, not generalized)	7	20.0
	Generalized/whole body involvement	11	32.4
Duration of Disease	≤1 year	15	44.1
	1–3 years	10	29.4
	6–12 years	9	26.5
Disease Type	Acute	15	42.9
	Chronic	19	54.3
Disease Progression	Yes	23	67.6
	No	11	32.4
Past History	None	30	88.2
	Pulmonary TB (2 years ago)	1	2.9
	Hypothyroidism	1	2.9
	Hypertension	2	5.8
Family History	Present	4	11.8
	Absent	30	88.2

3.2 Clinical Diagnosis:

The distribution of lesions in patients (n = 34) revealed that the trunk, arms, and legs were the most frequently afflicted regions (35.3%), followed by the face and neck (29.4%), underscoring a propensity for involvement of both exposed and extensive body surface areas. Hands and feet were involved in 17.6% of instances, whereas periocular areas, including eyelids and eyebrows, represented 11.8%. Lesions confined to the gluteal area were the least prevalent (5.9%). The data indicate a prevalence of lesions in cosmetically and functionally important areas, with a greater incidence on the trunk and extremities than on localized or hidden locations as shown in fig 1.

Table 2: Clinical Diagnosis and Distribution of Lesions (n=34)

Site of Lesion	No. of Patients (n=34)	Percentage (%)
Face, Neck	10	29.4
Trunk, Arms, Legs	12	35.3
Eyelids & Eyebrows	4	11.8
Gluteal region	2	5.9
Hands & Feet	6	17.6

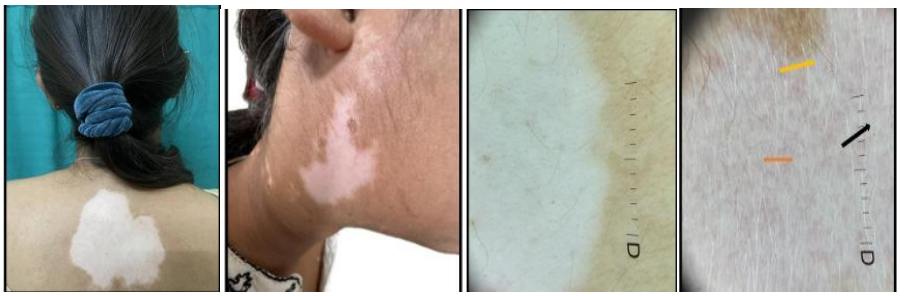

Fig 1: Dermoscopic patterns in vitiligo lesions showing variations in pigmentation, perifollicular repigmentation, and hair changes.

3.3 Dermoscopic findings:

The dermoscopic assessment of vitiligo patients (n = 34) identified numerous distinctive characteristics. All patients (100%) presented a structured white backdrop devoid of scales, with the majority displaying well-defined borders (88.2%), while a minority exhibited a trichrome border pattern (11.8%). Vascular alterations were predominantly lacking, with normal vessels observed in 88.2% and telangiectasia in 11.8%. Follicular changes were significant, with perifollicular pigmentation observed in 41.2% ($p = 0.005$) and leucotrichia in 29.4% ($p = 0.002$), both demonstrating statistical significance. Pigment network analysis revealed diminished pigmentation in 44.1% ($p < 0.001$), normal pigmentation in 38.2%, and reticular pigmentation in 17.6%. Perilesional hyperpigmentation (41.2%), satellite lesions (41.2%, $p = 0.020$), and the micro-Koebner phenomenon (35.3%) were variably found, although

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the starburst pattern was infrequently noted (5.9%). The findings emphasize a structured white background, well-defined boundaries, perifollicular alterations, diminished pigment networks, and satellite lesions as essential dermoscopic characteristics in vitiligo, with specific parameters exhibiting considerable diagnostic significance.

Table 3: Dermoscopic features observed in vitiligo patients (n = 34)

Dermoscopic Feature	Finding	Frequency (n, %)	p-value
Background	Structured white area	34 (100%)	–
Borders	Well-defined	30 (88.2%)	0.137
	Trichrome pattern	4 (11.8%)	
Vessels	Normal	30 (88.2%)	0.183
	Telangie-ctasia+	4 (11.8%)	
Scales	Nil	34 (100%)	–
Follicular Findings – Perifollicular pigment	Present	14 (41.2%)	0.005
	Absent	20 (58.8%)	
Follicular Findings – Leucotrichia	Present	10 (29.4%)	0.002
	Absent	24 (70.6%)	
Pigment network within patch	Reduced	15 (44.1%)	<0.001
	Reticular	6 (17.6%)	
	Normal	13 (38.2%)	
Perilesional/Marginal hyperpigmentation	Present	14 (41.2%)	0.899
	Absent	20 (58.8%)	
Micro-Koebner phenomenon	Present	12 (35.3%)	0.337
	Absent	22 (64.7%)	
Satellite lesions	Present	14 (41.2%)	0.020
	Absent	20 (58.8%)	
Specific findings	Starburst pattern	2 (5.9%)	0.337

4. DISCUSSION:

Vitiligo is a persistent depigmentary condition characterized by the loss of melanocytes. Although diagnosis is mostly clinical, dermoscopy is an invaluable non-invasive instrument that improves accuracy, distinguishes it from other hypopigmentary disorders, and evaluates disease activity and prognosis [16]. Notable traits including the loss of pigment network, perifollicular pigmentation, starburst patterns, and leukotrichia have been extensively documented[17]. This cross-sectional study intended to assess dermoscopic patterns in vitiligo and link them with practical implications for improved patient management.

The present investigation provided significant insights into the demographic, clinical, and dermoscopic characteristics of vitiligo in 34 patients. The demographic composition revealed a predominance of middle-aged individuals, with the 40+ age group constituting 35.3%, followed by younger adults aged 20–39 years at 32.4%. This data corroborates the observation of Fekete et.al., (2023), whose study identified the highest incidence over the final three decades of life [18]. Similarly, Shah et al. (2008) also observed that more than half of the patients experienced beginning before the age of 40, reinforcing the notion that the condition tends to appear during the early productive years of life [19]. Conversely, Singh et.al., (2007) identified a considerably younger onset in their study sample, which consisted largely of juvenile patients [20]. The recent findings indicated a markedly lower percentage of pediatric involvement at 17.6%. However, Arora et.al., (2018) observed that findings significantly lower than the 25–30% reported in population-based studies conducted in India [21]. This discrepancy could originate from referral bias and the over-representation of patients with progressive and chronic conditions in our research group.

The current study revealed a male predominance of 58.8%, consistent with findings by Patil et al. (2014), who noted a slight male bias [22]. In contrast, research from South Asia, including studies by Rudainae et al. (2022), indicated a female predominance, potentially attributed to heightened cosmetic concerns and proactive health-seeking behaviors among women[23]. his indicates that vitiligo impacts both sexes without any biological predisposition, however social factors may influence the apparent prevalence. Housewives (22.9%) and drivers (20%) were the most affected occupations, followed by farmers and businessmen (17.1% each). This trend is consistent with observations from India by Modenese et al., 2018, where clustering within particular occupational groups was linked to outdoor exposures, psychosocial stress, and cumulative photodamage, highlighting the contributory role of environmental and lifestyle determinants as cofactors in the pathogenesis of vitiligo [24].

Clinically, localized and regional lesions accounted for 22.9% each, while generalized involvement was seen in 32.4%. These findings align with Sehgal et.al., (2010), who reported generalized vitiligo in about one-third of cases [25]. The chronic nature of the disease was further emphasized in our series, with 54.3% of cases being chronic and 67.6% demonstrating progressive lesions. This resonates with reports by Freeman et al. (2022), who highlighted the protracted and relapsing-remitting course of vitiligo in most patients [26]. The family history was positive in 11.8% of cases, comparable to the 10–15% reported by Zhang et al. (2005), suggesting a moderate but consistent genetic contribution [27]. Higher rates (20–30%) have been reported in European populations by Alkhateeb et al., 2004, possibly reflecting ethnic or genetic heterogeneity[28]. Importantly, systemic associations in our cohort were rare, with hypothyroidism and hypertension being noted in a small subset, echoing the findings of Ruggeri et al. (2017) who reported autoimmune thyroid disease as the most frequent

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comorbidity[29].

Lesion location reported most frequently observed in the trunk and extremities (35.3%) and the face and neck (29.4%). This aligns with research conducted by Juzeniene et al. (2015) indicating that sun-exposed regions such as the face and extremities were predominantly affected due to environmental influences, including UV radiation and trauma [30]. Similarly, Sharma et.al., (2013) observed that Hands and feet were affected in 17.6% of our cases, which is lower than the 25–30% reported in North Indian research[31], possibly due to higher resistance of acral lesions and their earlier presentation to specialists. However, Woodard et.al., (2010) revealed that the Involvement of the periocular and gluteal regions was less prevalent, aligning with prior research that highlight regional disparities in disease localization[32]. The involvement of aesthetically sensitive regions, such as the face and periocular area, signifies the psychological impact, an observation also seen in quality-of-life studies.

The dermoscopic characteristics in our data further validated the diagnostic pattern of vitiligo. However, Ankand et.al., (2020) demonstrated a distinct white background devoid of scales, corroborating the traditional depigmentation outlined in the dermoscopic research [33]. Similarly, Mohammed et.al., (2021) delineated borders were present in 88.2% of our cases, roughly aligning with the 85–90% [34]. A border pattern of trichrome was discovered in 11.8%, consistent with the findings of Hood et al. (2011), who identified transitional zones of pigmentary alterations indicative of the condition's activity [35]. The lack of significant vascular alterations, with 88.2% exhibiting normal vessels and 11.8% displaying telangiectasia, aligns with Kumar et al. (2018), who proposed that vascular changes are not notable dermoscopic characteristics of vitiligo[36].

The researchers were particularly interested in follicular characteristics, noting perifollicular pigmentation in 41.2% ($p = 0.005$) and leucotrichia in 29.4% ($p = 0.002$). However, Ankad et al. (2024) showed analogous frequencies, identifying perifollicular pigmentation as an effective prognostic indication of repigmentation, while leucotrichia has been considered a poor prognostic indicator of therapy[37]. A diminished pigment network was noted in 44.1% of our cases, aligning with the findings of Chen et.al., (2021), who emphasized that alterations in the network signify melanocyte death within the epidermis [38]. Similarly, Park et.al., (2017) observed that the Reticular pigmentation was observed in 17.6% of patients, while perilesional hyperpigmentation was detected in 41.2%, corroborating the transitional changes [39].

However, this study highlights dermoscopy as a dependable instrument in vitiligo, identifying critical characteristics such pigment network loss, perifollicular pigmentation, leukotrichia, and alterations in borders. These findings corroborate previous publications and underscore its significance in evaluating disease activity, forecasting outcomes, and differentiating vitiligo from other hypopigmentary illnesses, thus facilitating prompt diagnosis and management.

5. CONCLUSION:

In conclusion, this cross-sectional study highlights the diagnostic and prognostic value of dermoscopy in vitiligo by identifying key characteristics, including loss of pigment network, perifollicular pigmentation, leukotrichia, and uneven borders. These distinctive characteristics not only correspond with disease activity and treatment response but also aid in distinguishing vitiligo from other hypopigmentary conditions. The incorporation of dermoscopic assessment into standard clinical practice can enhance early detection, improve disease monitoring, and facilitate personalized treatment planning, underscoring its importance as a non-invasive, reliable, and supplementary tool in the comprehensive management of vitiligo.

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