

## Diagnostic Dermoscopic Feature Patterns of the Parasitic Skin Diseases

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### ABSTRACT

**Background:** Epidermal parasitic skin diseases (EPSD) are a diverse group of neglected parasitic diseases that affect the outermost layer of skin. Diagnosing Scabies, Pediculosis, and Leishmaniasis is a problematic issue. Dermoscopy is regarded in vivo as a highly sensitive and efficient diagnostic approach for EPSD.

**Objective:** The current study aimed to assess and describe typical dermoscopic characteristics utilized for diagnosis of the most prevalent parasite skin disorders in Egypt, including Scabies, Pediculosis, and Leishmaniasis.

**Patients and methods:** The present study included 110 EPSD patients, especially Scabies, Pediculosis, and cutaneous leishmaniasis. All patients underwent a comprehensive history, physical, dermatological examination, and photography of suspicious lesions. Dermoscopes investigated these lesions.

**Results:** Of the included 110 patients, 50 had scabies, 50 had pediculosis, and 10 had cutaneous leishmaniasis. Dermoscopy of 50 scabies patients revealed a darkening triangle in 84% and a burrow in 86%. Among 50 pediculosis patients, 72% exhibited ovoid brownish nits with a nymph, 52% had empty nits, and approximately 16% had both empty and full nits, while 16% had mobile lice. Phthirus crab louse was only identified in 2% of patients. Leishmania dermoscopy exhibited widespread erythema throughout all lesions, hyperkeratosis in eight cases, and central erosion/ulceration in eight cases.

**Conclusion:** Conventional dermoscopy with a handheld Dermatoscope is an effective method for diagnosing scabies, pediculosis, and cutaneous leishmaniasis with a high degree of sensitivity. It significantly improves clinical decision-making and diagnosing skills.

**Keywords:** Scabies, Pediculosis, Cutaneous Leishmaniasis, Dermoscopy, Parasitic Infestation, Skin.

### INTRODUCTION

Dermoscopy is a noninvasive approach that improves the clinical evaluation of pigmented skin lesions by visualizing subsurface skin structures and invisible vascular structures. Dermoscopy was consequently utilized to diagnose non-pigmented skin problems, including malignancies and inflammatory and infectious disorders [1].

Since dermoscopy enhances cutaneous clinical examination by identifying invisible morphologic structures, it is gaining increasing popularity across the general dermatology field. Recent findings suggest that it may also be useful in assessing treatment outcomes and side effects. The development of handheld polarized light dermatoscopes has contributed to dermoscopy spread because of their portability, avoidance of skin contact or immersion fluid, and rapid screening of multiple lesions [2].

Epidermal parasitic skin disorders (EPSD) are a diverse collection of infectious diseases that include parasite-host interactions on the skin's surface. Scabies, pediculosis (capitis, corporis, and pubis), tungiasis, cutaneous leishmaniasis, and hookworm-related cutaneous larva migrans are prominent EPSD. EPSD is prevalent and causes significant main and secondary morbidity, according to current knowledge. Poverty promotes animal reservoirs, transmission, atypical infectious agent distribution, and exposure. Very high prevalence and intensity of EPSD infestations are a direct outcome of a population's lack of resources [3].

There are numerous dermoscopy case reports to diagnose scabies. This evidence supports dermoscopy's usefulness, particularly among specific cases. Dupuy *et al.* [4] and Walter *et al.* [5] assessed dermoscopy's diagnostic properties. There have been few if any, well-designed clinical investigations evaluating skin scraping with and without dermoscopy to determine diagnostic accuracy.

Infestation with blood-feeding ectoparasitic insects of Phthiraptera is known as pediculosis. Any mammal or bird, including humans, is at risk for developing this illness [6].

Dermoscopy also serves as a potential diagnostic and monitoring tool for pediculosiscapitis. Newer models of handheld dermoscopy eliminate the need for physical contact, hence reducing parasite transmission potentiality [7]. For pediculosiscapitis diagnosis, an adhesive tape with a portable contact dermoscopy is proposed. Digital dermoscopy revealed the presence of a living, moving lice on Pthirus pubis [8].

Leishmaniasis is spread by sandflies that transmit protozoan parasites of genus Leishmania. Leishmaniasis can manifest in 3 primary forms: cutaneous, mucocutaneous, and visceral. Ulcers on the mouth, skin, and nose are the hallmark of cutaneous form; fever and anemia, along with enlarged spleen and liver, characterize mucocutaneous and visceral types, respectively [9]. The microscopical examination of parasites enables the diagnosis of all three types.

Moreover, blood testing can diagnose visceral infection [10].

Although dermatoscopy has been found to be useful in complementing clinical examination in parasite identification, it has not been extensively adopted.

The current study aimed to assess and describe typical dermoscopic characteristics utilized for diagnosis of the most prevalent parasite skin disorders in Egypt, including Scabies, Pediculosis, and Leishmaniasis

## PATIENTS AND METHODS

A descriptive study was conducted and included patients attending the outpatient clinic of Dermatology, Venereology, and Andrology Department, at Zagazig University (ZU) Hospital, during the period from September 2016 to March 2017.

The study included 110 Egyptian patients who were classified according to parasitic skin disease; 50 had scabies, 50 had pediculosis, and only 10 had cutaneous leishmaniasis.

**Inclusion criteria:** EPSD patients, especially scabies, pediculosis, and cutaneous leishmaniasis, were diagnosed clinically at any age and any sex.

**Exclusion criteria:** Patients underwent PUVA (psoralen and ultraviolet A radiation) sessions 6 months before the study, and any patient having other types of illness, including atopic diseases and vitiligo, were excluded from this study.

### Methods:

All patients underwent a comprehensive history, physical, dermatological examination, and photography of suspicious lesions of skin, hair, and nail for characteristic features of each disease. Criteria for diagnosis of scabies clinically include the presence of night itching, more than a member of the family being affected, and the presence of a burrow. Pediculosis was diagnosed clinically by the presence of scalp itching, whitish to brown nits fixed to hair, and the presence of adult lice, additionally, Cutaneous leishmaniasis by the presence of infiltrated papule or nodule, central ulceration, and central crustation.

The lesions were studied utilizing DermLite II Pro [3Gen, USA], which is a palm-sized dermoscopy with a wide 25 mm lens, 10x magnification, camera flexibility, and a Li-ion battery. Polarized and immersion fluid dermoscopy combined in the dermoscopy.

Digital camera (Sony Cyber-shot DSC-W710) images at 10- to 50-fold magnification were assessed using the dermoscopic characteristics checklist. Photographs were compared to Dermoscopic pictures of each disease for each patient.

### Ethical Consideration:

**This study was ethically approved by the Institutional Review Board [IRB] of the Faculty of Medicine, Zagazig University. Written informed consent was obtained from all participants. This study was executed according to the code of ethics of the World Medical Association (Declaration of Helsinki) for studies on humans.**

### Statistical Analysis

The collected data were introduced and statistically analyzed by utilizing the Statistical Package for Social Sciences (SPSS, Chicago, IL) version 20 for windows. Qualitative data were defined as numbers and percentages. Chi-Square test and Fisher's exact test were used for comparison between categorical variables as appropriate. Quantitative data were tested for normality by Kolmogorov-Smirnov test. Quantitative data were represented as means with standard deviation (SD) or medians with ranges depending on data distribution. Mann-Whitney U test and Kruskal-Wallis test were used for comparison between non-parametric data. P value  $\leq 0.05$  was considered to be statistically significant.

## RESULTS

The demographic characteristics of the studied group of scabies, pediculosis and cutaneous leishmaniasis according to age and sex of patients are summarized in **Table 1**. There was a statistically highly significant difference between scabies, pediculosis, and leishmania groups regarding sex ( $P < 0.001$ ). There was also a statistically highly significant difference between scabies, pediculosis, and leishmania groups regarding age ( $P < 0.001$ ).

The majority of Scabies patients lived in low socio-economic conditions (48%), (26%) were very low class, (14%) were high class, but only (12%) were moderate level.

More than half of pediculosis patients lived in low socio-economic conditions (52%), (14%) were moderate, (26%) were high class, but only (4%) were very low level.

Regarding the history of coming from endemic areas of leishmania patients, one case was negative, and nine cases were positive.

**Table (1): Demographic data of included patients**

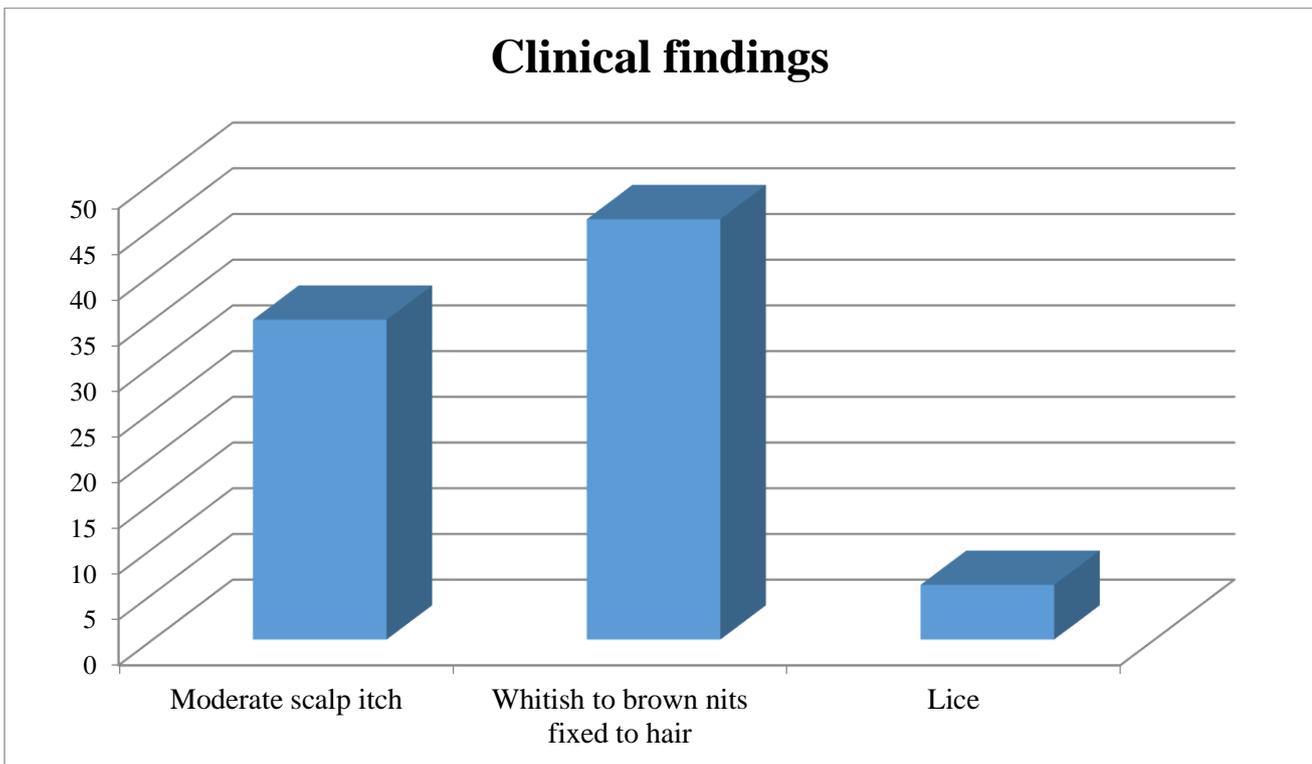
Sex	Group						Total		X <sup>2</sup>	P-value
	Scabies		Pediculosis		Leishmania		No	%		
	No	%	No	%	No	%				
Male	15	30	0	0	9	90	24	21.8	43	0.00 (HS)
Female	35	70	50	100	1	10	86	78.2		
Total	50	100	50	100	10	100	110	100		
Age	Mean ± SD		Range		Kruskal-Wallis				P-value	
Scabies	21.638 ± 13.536		0.9-50						0.00 (HS)	
Pediculosis	13.9 ± 8.7		2-45		22.4					
Leishmania	38.9 ± 7.0		27-50							
Total	19.6 ± 13.1		0.9-50							

Table 2 summarizes the clinical examination finding of the 50 patients with scabies.

**Table (2): Clinical findings of scabitic patients.**

Clinical findings		N	%
Nocturnal purities	Yes	47	94.0
	No	3	6.0
Burrow	Yes	40	80.0
	No	10	20.0
Scabitic nodule	Yes	4	8.0
	No	46	92.0
More than one member of the family is affected	Yes	33	66.0
	No	17	34.0
Site	Abdomen	19	38.0
	Arm	9	18.0
	Axilla	1	2.0
	breast	2	4.0
	Buttock	1	2.0
	Chest	1	2.0
	Finger	1	2.0
	Hand & leg	2	4.0
	Legs	5	10.0
	Penis	1	2.0
	Scrotum	1	2.0
	Thigh	7	14.0

The clinical examination of 50 patients of pediculosis proved the following clinical findings: moderate scalp itch in 35 cases (70%), whitish-to-brown nits fixed to hair in 46 cases (92%), and lice in six cases (**Figure 1**).



**Figure (1):** Clinical findings of patients with pediculosis.

The clinical examination of 10 patients with leishmania proved the following clinical findings: erythematous infiltrated papule or nodule in all cases, central ulceration in 8 (80%) cases, and central crustation in 8 (80%) cases. Dermoscopic examination of scabies patients proved the following findings: dark triangle among 42 cases (84%) and burrow among 43 cases (86%). Dermoscopic examination of pediculosis patients indicated 72% had ovoid brownish nits with nymph and 52% had empty nits. (16%) had mobile lice and unfilled and full nits. Just 2% had Phthirus crab louse.

Of leishmaniasis cases, 5 (50%) cases had "yellow tears" (yellow structures with an oval or teardrop shape or both), while 3 (30%) cases had "white starburst-like pattern" (a white halo around the lesion or eroded area) (**Table 3**).

**Table (3): Clinical findings of cutaneous leishmaniasis cases.**

Variable		N	%
Erythematous infiltrated papule or nodule	Yes	10	100
	No	2	20
Central ulceration	Yes	8	80
	No	2	20
Central crustation	Yes	8	80
	No	2	20
Site	Arm	1	10
	Beard	1	10
	Cubit	1	10
	Dorsum of hand	2	20
	Finger	1	10
	Forehead	1	10
	Hand	1	10
	Leg	1	10
	Tibia	1	10

The vessel examination of 10 patients of leishmania by dermoscopy revealed comma-shaped vessels in 5 (50%) cases, a linear irregular vessel in 7 (70%) cases, a dotted vessel in 4 (40%) cases, a hairpin vessel in 2 (20%) cases, arborizing telangiectasia in 8 (80%) cases, a corkscrew vessel in 5 (50%) cases, a glomerular-like vessel in 2 (20%) cases and polymorphous atypical vessel in 9 (90%) cases (**Table 4**).

**Table (4): Dermoscopic findings of scabies, pediculosis, and cutaneous leishmaniasis patients.**

	Dermoscopic findings		N	%
	<b>Scabies</b>	Dark triangle	Yes	42
No			8	16
Burrow		Yes	43	86
		No	7	14
		Total	50	100
	Dermoscopic findings		N	%
	<b>Pediculosis</b>	Ovoid brownish nits with a nymph	Yes	36
No			14	28
Empty nits and full nits		8	16	
Empty nits		Yes	26	52
		No	24	48
Crab louse		1	2	
Lice		Yes	8	16
	No	42	84	
	Total	50	100	
Dermoscopic findings		N	%	
<b>Leishmania</b>	Generalized erythema	Yes	10	100
		No	2	20
	Hyperkeratosis	Yes	8	80
		No	2	20
	Central erosion	Yes	8	80
		No	5	50
	Yellow tear	Yes	5	50
		No	7	70
	White starburst-like pattern	Yes	3	30
		Total	10	100

**DISCUSSION**

In dermatology, dermoscopy is comparable to the stethoscope in that it is used to diagnose skin disorders, much as the stethoscope is used in identifying heart, lung, or abdomen conditions. Consequently, dermoscopy is currently considered a dermatologist's stethoscope [11].

Dermoscopy has been shown to be effective in a vast array of dermatological disorders, such as cutaneous/mucosal infections, hair and nail abnormalities, psoriasis, and others. Both dermoscopy and video-dermoscopy (VD) are vital and simple aids in daily clinical practice, and it is essential for differential diagnosis and prognosis evaluation [12].

The rising usage of dermoscopy can be partially attributed to the commercial availability of new generations of pocket-sized dermoscopes. In addition, certain devices lack direct contact between the optical glass plate and the patient's skin, allowing for a quick and risk-free inspection avoiding transfection possibility. Dermoscopy, epiluminescence, and surface microscopy is a noninvasive technology that enables quick and magnified (×10) in vivo monitoring of skin, enabling visualization of morphologic aspects that are often invisible to the human eye [13].

Six EPSD are particularly significant: scabies, pediculosis (head lice, body lice, and pubic lice infestation), tungiasis (sand flea illness), and hookworm-associated cutaneous larva migrans (HrCLM). Either they are frequent in resource-poor environments, or they are linked to substantial morbidity [3].

In our study, dermoscopy was utilized to confirm the diagnosis of various parasite skin disorders. The most common EPSD in Egypt are Scabies, Pediculosis, and cutaneous leishmaniasis. There are roughly 300 million new scabies cases each year. In developed nations, scabies is typically detected as occasional or institutional epidemics across schools, hospitals, nursing homes, jails, retirement homes, and long-term care institutions. Scabies is an endemic disease in many third-world populations and tropical/subtropical regions, including Central and Southern America, Northern Southeast Asia, and Africa [14].

The socio-demographic characteristics of studied group of scabies according to sex, age, and socio-economic condition of the patients were (30%) of them were males, and (70%) of the scabies cases were females. In 2010, it affected around 100 million individuals and was equally prevalent in both sexes [14].

In our study, according to age in years mean was 19 (SD 13.5). Among certain resource-poor urban and rural populations in emerging nations, its incidence could approach 10% of the overall population and 60% of children. The majority of them live in low socio-economic conditions (48%), (26%) were very low class, (14%) were high class, but only (12%) were moderate level. This trend is consistent with the fact that scabies is more prevalent in crowded, unsanitary environments [14].

Skin scraping remains a popular laboratory diagnostic technique for scabies. Unfortunately, it is time-consuming and requires laboratory equipment, making its performance in a clinical context challenging. Patients may have pain and other negative outcomes as a result of this operation, including the potential for unintentional exposure to blood-borne pathogens like HIV and HCV [15]. Scabies is clinically defined by intense nocturnal itching and is contagious, and they can be recognized in the vast majority of cases without laboratory testing. Furthermore, scabietic nodules and apparent skin burrows can be pathognomic scabies lesions [16].

In this study, the most frequent clinical finding among scabietic patients was Nocturnal pruritis (94%). Burrow was present in 80% of them. **Andrews et al.** [17] reported that the characteristic symptom of scabies is burrows made by mites within the skin in 76% of his cases, 66% of patients presented with a history of other family member affection; scabietic nodule was the least frequent presentation in only 6% of cases. Abdomen (38%), arms (18%), and thighs (14%) were the most frequently affected sites. These findings are going online with **Bouvress and Chosidow** [18], who found that the trails of burrowing mites were mostly in the abdomen, mostly in stomach folds of skin, arms, thigh, and around genital areas.

Dermoscopy is quicker than conventional methods for identifying mites. At the very least, dermoscopy allows the mites to be found, allowing traditional mineral oil scabies remedies to be carefully targeted [11].

The most frequent dermoscopic findings among the scabietic group of patients: burrow was the most common significant finding in our study (86%) of cases, the dark triangle (jet air triangle) that represents the anterior part of mite was seen in (84%) of cases and thus one case (2%) that show burrow without dark triangle. These findings are consistent with a study performed by **Argenziano et al.** [19], who reported dermoscopic "triangle sign," which corresponds to "head" portion of mite, in 76.9% of their cases and "delta wing jet with contrail" sign, which corresponds to the head of mite and trailing burrow, in 79% of their cases.

Pediculosis is common in both developing and wealthy nations and has reached epidemic proportions in several regions globally, mostly among youngsters [20]. In our study, all cases (100%) were females, which

is consistent with the findings of **Lwegaba** [21], who discovered that girls are more susceptible to head louse infestation than boys because of their social behaviors (e.g., social acceptability of close direct contact; hats share, combs, and hair ties); regardless hair length. Males and women are equally prone to the body and pubic louse infection [21].

According to age in years, the mean age was 4.5 (SD 8.76). More than half of them live in low socio-economic conditions (52%), 14% are moderate, 26% are high class, but only 4% was a very low socio-economic level. Our results were in agreement with the results of prior studies that investigated the age, sex, and socio-economic state of patients with pediculosis infestation, and they consist with **Sarkar and Kanwar** [22], who reported the maximum infestation in the age group of 3 to 10 years. **Negi et al.** [23] found the prevalence among girls to be 35.8% as compared to 11.2% among boys.

In Saudi Arabia, 9.6% of teenage schoolboys had pediculosis capitis [24]. The frequency of head lice among children in Mali was 4.7% [25]. At a STD clinic in South Australia, 1.7% of men and 1.1% of women were discovered to have pubic lice. *P. corporis* is uncommon in affluent nations, except among homeless individuals [26].

According to our results, the clinical findings of studied group showed that about (70%) of them suffered from pruritus (moderate scalp itch), about (46%) had whitish to brown nits fixed to hair, (2%) of cases had nits on eyelashes (*Phthirus pubis*) and only (12%) had viable adult lice. In Sohag study, scalp pruritus was significant statistically [27]. **Morsy et al.** [28] mentioned some of those associated clinical manifestations, scalp pruritus in 74% and 67% had whitish to brown nits fixed to hair, and only 7% had viable adult lice in a study performed in Cairo.

**Zalaudek et al.** [29] described the application of dermatoscopy in the diagnosis of pediculosis. In the case of infestation, dermoscopy indisputably reveals the existence of nits attached to the hair shaft, allowing a speedy distinction from scales of different origin (pseudo nits) that appear as amorphous, whitish objects.

The dermoscopic examination of fifty patients of pediculosis demonstrated the following findings: ovoid brownish nits within nymph in 36 (72%) cases, empty case in 26 (52%) cases, and mobile lice in 8 (16%) cases. About 16% of them were with empty and filled nits, and crab louse was seen in only 2% of cases. Dermoscopy can easily aid in the diagnosis of this illness by recognizing the crab based on the morphology of its louse [30]. These findings are in agreement with **Zalaudek et al.** [29], who determined that dermoscopy can determine if nits contain living, dead, or empty nymphs. Dermoscopy exhibits brown, ovoid nits with nymphs and translucent, oval nits without nymphs. A collapsed nymph is seen as a brown patch at the center of a dead unit, as well as an air

pocket, that manifests as a translucent area within the egg and can reveal a living, moving louse<sup>[29]</sup>.

Cutaneous leishmaniasis is a widespread protozoan skin infection in endemic regions. During a variable incubation period, a subclinical cutaneous infection may become clinically manifest<sup>[31]</sup>.

In our study of sex distribution among leishmania cases, males were the most affected 90% of cases, and females were only 10% of all cases. According to the history of coming from endemic areas, our study showed that all patients were coming from endemic areas (100%). According to the age of patients, the mean was 38.5 (SD 7.09). Twenty-five consecutive patients with 26 lesions of cutaneous leishmaniasis were enrolled in this study (20 women and 5 men; age range: 10–83 years; mean age: 52)<sup>[32]</sup>.

The clinical examination of 10 patients of leishmania proved the following findings: erythematous infiltrated papule or nodule in all cases, central ulceration in 8 (80%) cases, and central crusting in 8 (80%) cases. Consistent with findings of **Sundar and Chakravarty**<sup>[33]</sup> who showed that CL originates with reddish infiltrating papules, then painful nodules, ulcerative lesions with a central depression and raised indurated border, and lastly an atrophic scar. Reddish nodules or plaques may persist without ulceration. Lesions are most prevalent in exposed areas, including arms and face.

According to the site of lesion, our results showed that the dorsum of hand 20% was the most affected site, while other parts of the body as the arm, beard, tibia, finger, leg, and cubit, had the same percentage according to the distribution of affection (10%), are different from results conducted in Spain that show 25 consecutive 26 CL lesions patients. A total of 16 cases involved lesions on the face, whereas 10 involved lesions on the limbs<sup>[32]</sup>.

Our dermoscopic findings show generalized erythema in all lesions (100%), hyperkeratosis (yellow or white scaly patches or both) in 8 (80%) cases, and central erosion/ulceration among 8 (80%) cases. Additional structures were detected less frequently: 'yellow tears,' yellow structures with an oval or teardrop shape or both, in 5 (50%) cases, and 'white starburst-like pattern,' a white halo surrounding lesion or degraded area among 3 (30%) cases.

Our dermoscopic pictures were going in line with a Spanish study of 26 CL lesions, which showed generalized erythema in all lesions (100%), hyperkeratosis (yellow or white scaly areas or both) in 13 (50%) cases, central erosion/ulceration in 12 (46%) cases, and erosion/ulceration associated with hyperkeratosis in 10 (38%) cases. Other structures were less common: "yellow tears," yellow structures with an oval or teardrop shape or both in 14 (53%) patients, and "white starburst-like pattern," a white halo on the lesion's periphery or encircling the eroded area in 10 (38%) cases<sup>[32]</sup>.

**Taheri et al.**<sup>[31]</sup> described the dermoscopic features of CL. They revealed that melanocytic and non-melanocytic malignancies had substantial vascular patterns. This infection commonly showed vascular patterns found in melanocytic and non-melanocytic malignancies. Dermoscopy may aid CL clinical prognosis.

Comma-shaped vessels were observed in (9 of 10) 90% of cutaneous leishmaniasis patients. Linear irregular vessels were the second most common vascular structure form found among 7 (70%) cases, followed by dotted vessels in 6 (60%) cases. We observed polymorphous/atypical vasculature in 4 (40%) cases, hairpin vessels in 4 (40%) cases, arborizing telangiectasia in 2 (20%) cases, corkscrew vessels in 2 (20%) cases, and glomerular-like vessels in 1 (10%) case. In 9 of 10 cutaneous leishmaniasis lesions (90%), 2 or more distinct vascular structure types were found.

Our findings are in agreement with a Spanish study that found comma-shaped vessels in 19 of 26 (73%). Linear irregular vessels were seen in 15 (57%), followed by dotted vessels in 14 (53%). Polymorphous/atypical vasculature occurred in 7 (26%) cases, hairpin vessels in 5 (19%), arborizing telangiectasia in 3 (11%), corkscrew vessels in 2 (7%), and glomerular-like vessels in 2 (7%)<sup>[32]</sup>.

## CONCLUSION

Conventional handheld dermoscopy Dermatoscopes are an effective tool for diagnosing scabies, pediculosis, and cutaneous leishmaniasis with a high degree of sensitivity. It significantly improves diagnostic and therapeutic skills. The use of recent models of dermoscopy will facilitate a more accurate diagnosis of parasitic skin infestations that must be tested on a wide scale of patient. Dermoscopy applications examine and diagnose in order to make parasitic skin disease diagnosis easier and faster when a large number of persons have to be examined and diagnosed and the consequent treatment of them in endemic areas.

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