

Role of dermoscopy in the diagnosis of alopecia

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Abstract *Objective* The aim of the study was to evaluate the dermoscopic findings in various types of alopecia.

Methods A total of 100 patients presenting with alopecia were subjected to dermoscopy with a videodermoscope of magnification 50X and 200X.

Results Among 100 patients studied, 21 had alopecia areata (AA), 38 had male androgenetic alopecia (MAGA), nine had female androgenetic alopecia (FAGA), 27 had telogen effluvium (TE), and five had cicatricial alopecia. The most common dermoscopic findings observed in AA were black dots (76%), short vellus hairs (71%) and broken hairs (67%). More than 20% hair diameter diversity (HDD) was observed in the affected areas of all male and female AGA cases. Pigment incontinence, follicular keratotic plugging and follicular effacement were seen in both discoid lupus erythematosus (DLE) and lichen planopilaris (LPP). The characteristic dermoscopic findings in DLE were red dots and arborising red lines. Peripilar cast was the specific finding for LPP.

Conclusion Each type of alopecia has unique dermoscopic findings and this facilitates the diagnosis of alopecia. Pili bifurcati like finding was noted in AA.

Key words

Dermoscopy, alopecia areata, pili bifurcati, androgenetic alopecia, telogen effluvium, lichen planopilaris, discoid lupus erythematosus.

Introduction

Hair loss is a very common distressing complaint and patients often feel that they are not properly examined. It can result in low self-esteem, causing psychosocial problems and greatly affects the quality of life.¹ Methods used to investigate scalp and hair disorders include hair pull test, trichogram and biopsy, which vary in sensitivity and reproducibility. Moreover, scalp biopsy is an invasive method required for the diagnosis of cicatricial alopecia. Dermoscopy is a new and valuable tool in the diagnosis of alopecias.^{2,3} It has become an

integral part of diagnosing scalp disorders and differentiating cicatricial from noncicatricial alopecia.

Dermoscopy can be helpful in selecting appropriate biopsy site for confirming the diagnosis. It not only facilitates the diagnosis of alopecia, but also gives clues about disease progression and aids in assessing treatment response. The main aim of this study was to evaluate the dermoscopic findings in various types of alopecia.

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Methods

The study was carried out in 100 patients presenting with alopecia over a period of one

year between April 2015 and March 2016. All patients with alopecia, attending the outpatient department of dermatology in our institute were included in the study after getting written informed consent. Institutional ethical clearance was obtained.

Patients with hair loss occurring due to any external injury or due to prior chemotherapy, drug intake and any history of treatment in the past one year were excluded. Diagnosis was established after a detailed history taking and clinical examination. Further investigations like 10% KOH mount and biopsy were done in doubtful cases.

A videodermoscope of magnification 50X and 200X was used to record the findings and digital photographs were taken. Dermoscopy was carried out by two methods. Initially dry method was used, followed by wet method by application of liquid paraffin over the scalp.

Data were spread over Microsoft excel sheet and analyzed at the end of the study. Descriptive statistics were generated for all variables. Continuous variables were demonstrated as mean±SD for normally distributed data. Categorical variables were given as percentages.

Results

Of the 100 patients, 21 had alopecia areata (AA), 27 had telogen effluvium (TE), 38 had male androgenetic alopecia (MAGA), 9 had female androgenetic alopecia (FAGA) and 5 had cicatricial alopecia. Various types of cicatricial alopecia included: 3 cases of discoid lupus erythematosus (DLE) and 2 cases of lichen planopilaris.

Dermoscopic findings of alopecia areata

Black dots (16, 76%), and broken hairs (14, 67%), were the most common findings seen in alopecia areata. Other findings observed were as follows: honeycomb pigmentation (HCP) 10 (48%), yellow dots (YD) 10 (48%), white dots (WD) 15 (71%), circular hairs (CH) 10 (48%), coudability signs (CS) 9 (43%), short vellus hair (SVH) 15 (71%) and exclamation mark hairs (EH) 10 (48%). Exclamation mark hair was seen only in patchy alopecia and not seen in other types of alopecia areata. Yellow dots and black dots were the only findings seen in a single case of alopecia universalis. Yellow dots and black dots were seen commonly in patchy alopecia. Pili bifurcati like features were seen in patches of alopecia areata in two patients. Dermoscopic features in various patterns of alopecia areata are tabulated in **Table 1**.

Androgenetic alopecia (AGA)

Hair diameter diversity was seen in all 47 (100%) patients with AGA including males and females. Peripilar pigmentation and honeycomb pigmentation were observed more in males, seen in 27 and 16 patients, respectively. Yellow dots were seen in 7 patients with male AGA and none in females. Pilosebaceous single - hair unit was seen in 26 male patients and 2 female patients with AGA. Short vellus hair was observed in 26 male patients as compared to only one female patient. Dermoscopic findings in male AGA and female AGA are depicted in **Table 2**.

Telogen effluvium

Dermoscopic features seen in telogen effluvium were as follows: peripilar brown halo – 2 (7.4%), focal atrichia – 17 (63%), pilosebaceous single and double - hair units – 21 (78%) and 5 (18%) patients, respectively. Honeycomb pigmentation was seen in 8 (30%) patients,

Table 1 Dermoscopic features in various patterns of alopecia areata.

Pattern	HCP	YD	WD	BD	BH	CH	CS	SVH	EH
(No of patients)	N (%)								
Single patch (4)	2 (50)	1 (25%)	2 (50%)	3 (75%)	3 (75%)	1 (25%)	1 (25%)	3 (75)	2 (50)
Multiple patch (12)	6 (50)	6 (50)	9 (75)	11 (91)	9 (75)	7 (58)	6 (50)	10 (83)	8 (66)
Ophiasis (1)	0	0	1 (100)	0	1 (100)	0	0	1 (100)	0
Saisapho (1)	0	1 (100)	1 (100)	1 (100)	0	1 (100)	1 (100)	0	0
Universalis (1)	1 (100)	1 (100)	0	1 (100)	0	0	0	0	0
Totals (2)	1 (50)	1 (50)	2 (100)	0	1 (50)	1 (50)	1 (50)	1 (50)	0
Total (21)	10 (48)	10 (48)	15 (71)	16 (76)	14 (67)	10 (48)	9 (43)	15 (71)	10 (48)

BD: black dot, BH: broken hair, CH: circular hair, CS: coudability signs, EH: exclamation mark hairs, SVH:, HCP: honeycomb pigmentation, WD: white dots, YD: yellow dots.

Table 2 Dermoscopic findings in male and female androgenetic alopecia.

Dermoscopic findings	Male (n=38)	Female (n=9)
Hair diameter diversity	38 (100%)	9(100%)
Peripilar brown halo	27 (71%)	2(22%)
Focal atrichia	27 (71%)	2(22%)
Pilosebaceous single-hair unit	26 (68%)	2(22%)
Pilosebaceous double-hair unit	3 (8%)	2(22%)
Honey comb pigmentation	16 (42%)	3(33%)
Yellow dot	7 (18%)	0
White dot	23 (60%)	2(22%)
Short vellus hair	26 (68%)	1 (11%)

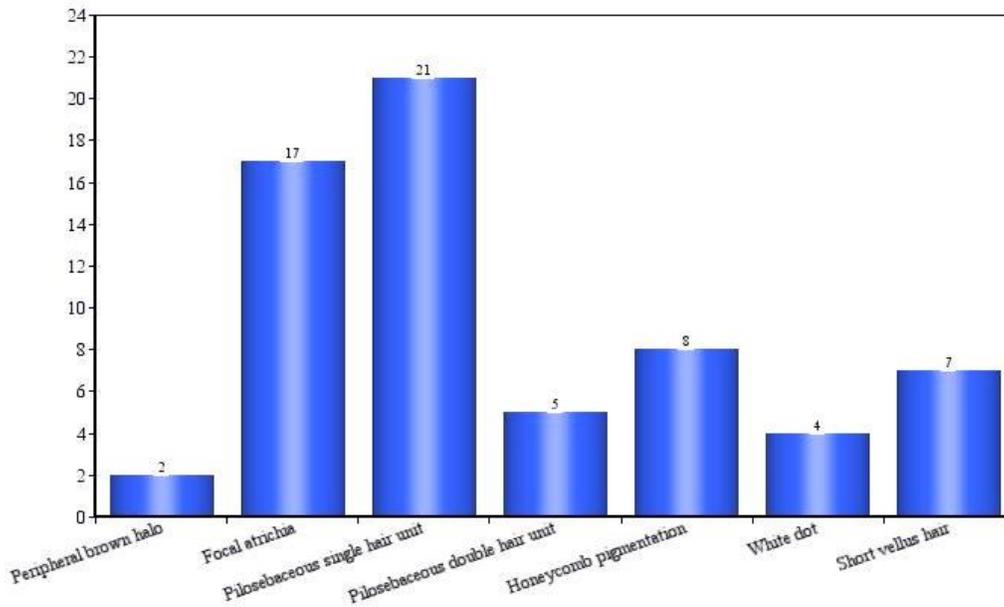


Figure 1 Dermoscopic findings of telogen effluvium.

white dots in 4 (15%) and short vellus hairs in 7 (26%) patients. Dermoscopic findings of telogen effluvium are depicted in **Figure 1**.

Cicatricial alopecia

Pigment incontinence was seen in all patients with DLE and LPP. Red dots and arborising red lines were seen in DLE. Peripilar cast was seen

Table 3 Distribution of dermoscopic features of cicatricial alopecia.

<i>Dermoscopic findings</i>	<i>DLE (n=3)</i>	<i>LPP (n=2)</i>
Follicular keratotic plugging	2 (67%)	1 (50%)
Absence of follicular opening	1 (33%)	1 (50%)
Speckled blue gray dot	1 (33%)	1 (50%)
Peripilar cast	3 (100%)	1 (50%)
Scalp erythema	0	0
Telangiectasia	2 (67%)	1 (50%)
Arborising red lines	1 (33%)	0
Red dot	2 (67%)	0
Interfollicular scale	2 (67%)	1 (50%)
Crust formation	1(33%)	1 (50%)
Black dot	0	1 (50%)
Broken hair	0	1 (50%)
Yellow dot	1 (33%)	1 (50%)
White dot	1 (33%)	0
Honey comb pigmentation	2(67%)	0
Peripilar brown halo	1(33%)	1(50%)
Pigment incontinence	3(100%)	2(100%)
Fibrosis	0	1(50%)

DLE: discoid lupus erythematosus, LPP: lichen planopilaris.

in all patients with DLE and one patient of LPP. Black dots and broken hair were observed in LPP. Various dermoscopic features of cicatricial alopecia are tabulated in **Table 3**.

Discussion

Dermoscopy, also known as epiluminescence microscopy or skin surface microscopy is a non-invasive, *in vivo* technique most commonly used for diagnosing alopecias and pigmented skin lesions. In 2006, Lidia Rudnicka and Algorzata Olszewska⁴ coined the term “Trichoscopy” for dermoscopy of hair and the scalp. For scalp examination, a manual dermoscope (10X magnification) or a video-dermoscope with lenses ranging from 50× to 200× magnifications can be used.

Dermoscopic findings in different alopecias are given as under.

Alopecia areata

In AA, dermoscopy of active disease shows yellow dots, dystrophic hair, as well as cadaverized hair and exclamation mark hair.

Yellow dots

Yellow dots (YDs), initially proposed by Ross *et al.*⁵ are considered to be the most sensitive dermoscopic feature of AA. YDs are marked by distinctive array of yellow to yellow pink, round or polycyclic dots that vary in size and are uniform in colour. These represent distension of affected follicular infundibulum with keratinous material and sebum.⁵ Ross *et al.*⁵ demonstrated yellow dots in 94.8% patients. Inui *et al.*,⁶ however, noted yellow dots in 63.7% of AA cases. Mane *et al.*,⁷ reported an incidence of yellow dots among 81.8% cases. Hegde *et al.*,⁸ demonstrated YDs in 57.3% cases. They concluded that yellowish skin colour of Asian patients may make it more difficult to perceive yellow colour in dermoscopy.⁸ In contrast, yellow dots were seen in 89.6% in a study by Bapu *et al.*,⁹ and they proposed that higher incidence of YDs could be due to the south Indian practice of oiling hair. In our study YDs were seen in 48% cases. Low incidence of yellow dots was observed in our study similar to the studies by Hegde *et al.*⁸ and Inui *et al.*⁶ However, lower percentage of YDs in our study

may be due to small sample size and pigmented scalp skin making it difficult to appreciate YDs.

Black dots

BDs (formerly “cadaverized hair”) which represent pigmented hair broken or destroyed at scalp level are characteristic of black haired individuals.^{6,10} This sign is not a feature of white population due to the hair colour and cuticle resistance. These are sensitive markers for disease activity and severity of AA.⁶ Hegde *et al.*⁸ noted BDs in 84% of cases. Inui *et al.*⁶ demonstrated BDs in 44.3% cases. Mane *et al.*⁷ noted BDs in 67.7% cases. Black dots were seen in 76% cases in our study. The findings in our study were in accordance with Hedge *et al.*⁸

Broken hair

Broken hair (BH), considered to be dystrophic hair produced by the least severely affected follicles in AA, is clinical marker of the disease activity and severity.⁶ Inui *et al.*⁶ demonstrated BH in 45.7% cases. Broken hair was observed in 55.4% patients in the study conducted by Mane *et al.*⁷ Hegde *et al.*⁸ in their study observed BH in 37.33% cases. In our study, broken hair was seen in 67% cases which is higher than previous studies.

Exclamation mark hair

Tapering hair (TH) or exclamation mark hair is characterized by wider diameter in the distal hair shaft and thinner diameter in the proximal hair shaft. TH was seen in 31.7% cases by Inui *et al.*⁶ and 12.1% cases by Mane *et al.*⁷ Hegde *et al.*⁸ noted TH in 14 cases. Exclamation mark hair was seen in 48% patients in our study. Thus the occurrence of exclamation mark hair was noted higher in our study as compared to the previous studies. This finding was seen only in patchy type of AA.

Short vellus hair

Short vellus hair (SVH) is seen as new, thin and unpigmented hair within the patch.¹¹ The regrowth of SVHs can be a sign of treatment response in dermoscopy even when the recovered hair is hardly perceived by the naked eye. Short hypopigmented vellus hair is characteristic of remitting disease.⁶ Inui *et al.*⁶ noted SVH in 72.7% cases. Mane *et al.*⁷ demonstrated SVH in 40.9% patients. In our study, SVH was seen in 71% patients. Regrowing short vellus hair may be due to spontaneous remission of disease activity, as all patients in our study had no active treatment over the past one-year.

Circular hairs

Circular hair on dermoscopy in AA is nothing but short vellus hair, which has a tendency to become coiled.¹² Bapu *et al.*⁹ demonstrated circular hairs in 6.8% patients. In our study, circular hair was seen in 48% patients. Circular hair was observed more in our study compared to the previous study.

This may indicate stable and spontaneous remission of disease activity in alopecia areata.

Coudability sign

Coudability sign represents terminal hair, which kinks towards the proximal end when pushed perpendicularly to the skin. This is important marker of disease activity.⁴ Inui *et al.*⁶ described coudable hair to be a useful marker for disease activity in AA and a substitute for the hair pull test. In our study, we noticed coudability sign in 43% patients.

Pili bifurcati

In pili bifurcati, the shaft bifurcates into two



Figure 1 Exclamation mark hairs and broken hairs in AA

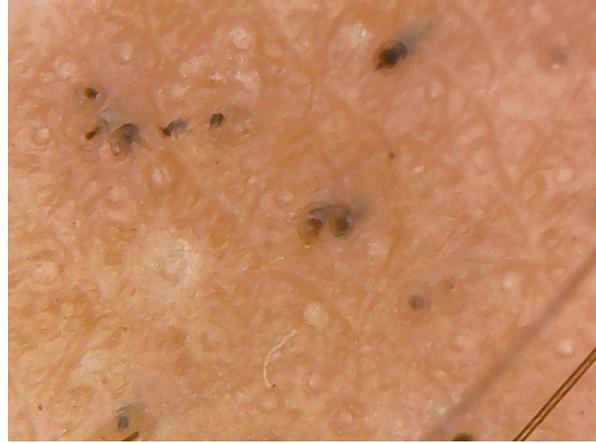


Figure 2 Black dots, white dots and yellow dots in AA

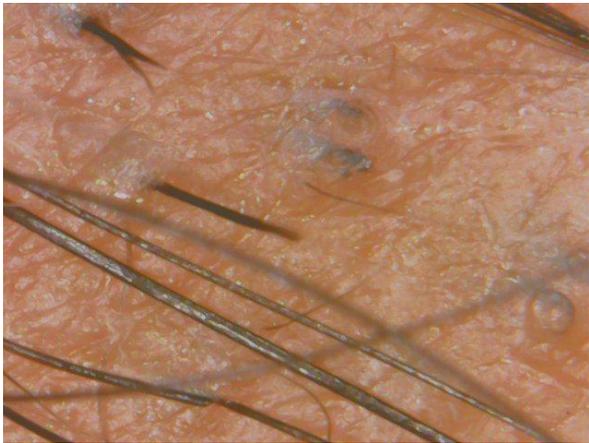


Figure 3 Pili bifurcati and broken hair in AA

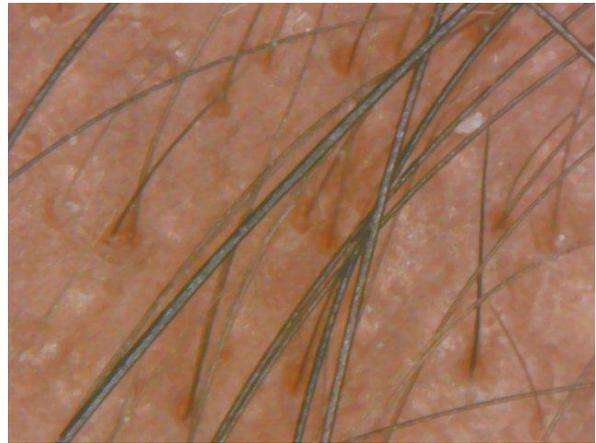


Figure 4 Hair diameter variability, peripilar brown halo and short vellus hairs in AGA.



Figure 5 Telangiectasia and fibrosis in discoid lupus erythematosus.



Figure 6 Peripilar cast in lichen planopilaris.

parts and is covered by its own cuticle; the parts may rejoin distally.¹³ Pili bifurcati like features

were seen in patches of alopecia areata in two patients. This feature was not observed in any

other study. This finding whether it is a coincidence or related to severity of AA needs to be investigated in further studies.

Androgenetic alopecia

Hair diameter diversity

Hair diameter diversity (HDD) or “anisotrichosis”¹⁴ is observed in the affected scalp region of all AGA patients, which is caused by progressive and unsynchronized miniaturization of hair follicles in the genetically predisposed scalp regions. Thus, terminal hair is replaced by vellus hair, which is less than 30 µm thick and 2-3 mm long¹⁵, and meanwhile, single-hair pilosebaceous units also increase. Hair diameter diversity of more than 20% was regarded as a hallmark of AGA.¹⁶ Hu *et al.*¹ demonstrated hair diameter diversity in 100% of patients in their study. Inui *et al.*¹⁶ observed HDD in the affected area of all AGA and FAGA cases suggesting that HDD is an essential feature to diagnose AGA and FAGA. According to de Lacharriere *et al.*¹⁵ diversity in hair diameter was the main and most accurate clinical parameter linked to follicle miniaturization. We observed HDD in all MAGA and FAGA patients.

Peripilar sign

Brown peripilar sign (BPPS) is characterized by a brown halo around the emergent hair shaft with a diameter of approximately 1mm. This sign is linked to superficial perifollicular infiltrates mainly composed of lymphocytes.¹⁷ It is seen in early AGA patients with higher density of hair, which indicated that perifollicular lymphocyte infiltration was more common at early stage of alopecia.¹ Inui *et al.*¹⁶ noted peripilar signs in 66% MAGA and 20% of FAGA patients. Hu *et al.*¹ observed BPPS in 44.0% of males and 44.5% of females with

AGA. We observed BPPS in 71% male AGA and 22% in FAGA patients. Thus our findings were in accordance with Inui *et al.*¹⁶

Yellow dots

In AGA, anagen hair becomes shorter but hair shaft differentiation is not impaired and therefore, yellow dots in AGA may consist mainly of sebum.¹⁸ Inui *et al.*¹⁶ observed yellow dots in 26% of AGA and 10% of FAGA patients. The number of yellow dots in AGA and FAGA was limited to 10 on the overall hair loss area. Hu *et al.*¹ noted variable number of yellow dots of different sizes in 20.1% of male and 24.0% of female AGA patients. Our study also showed yellow dots in 18% male AGA patients similar to the previous studies. Yellow dots were not seen in any patients with FAGA; however, the sample size in our study was smaller to come to any final conclusion.

Focal atrichia

Focal atrichia was positively correlated with advancing stage of AGA. Atrophic follicles result in focal atrichia, which was found in 28% of male AGA and 56.5% of FAGA patients in the study by Hu *et al.*¹ Focal atrichia was seen in 71% male AGA patients and 22% of FAGA patients in our study. The findings of focal atrichia was comparatively higher in our study compared to Inui *et al.*¹⁶ suggesting that more male patients with AGA were having advanced disease activity.

Honeycomb pigmentation

Scalp honeycomb pigmentation (HCP) is due to sun exposure, formed by hypomelanotic areas (less in overlying dermal papillae) bordered by hyperchromic lines (melanin of rete ridges), usually seen in thinning or completely balding areas.¹⁹ Hu *et al.*¹ observed HCP in 33.2% of

male AGA and 30.5% of female AGA patients. In our study, HCP was seen in 42% of male AGA and 33% of female AGA patients.

Telogen effluvium

In general, there is no variation in the diameter of the hair shafts, even in the chronic forms.²⁰ Most common findings observed in our study were pilosebaceous single hair unit (78%). Other findings observed were peripilar brown halo (7.4%), focal atrichia (63%), double-hair units (18%), honeycomb pigmentation (30%), white dots (15%) and short vellus hair (26%), respectively. Thus findings in dermoscopy were similar to AGA and not specific for telogen effluvium.

Cicatricial alopecia

Trichoscopy of primary scarring alopecia is characterized by decreased hair density and loss of follicular openings. The most characteristic trichoscopic features of DLE of the scalp are thick arborising vessels and large yellow dots. Scattered brown discoloration may be seen in some patients.²¹ Red dots are considered a good prognostic factor of hair regrowth.²² It was reported in 25% and 38% DLE cases in previous studies.^{22,23} Thakur *et al.*²⁴ reported thick arborising vessels in 80% cases; however, no red dots were seen in their study. In our study, red dots were seen in (67%) patients and arborising red lines in (33%) patients.

Lichen planopilaris

The most characteristic trichoscopic feature of classic LPP is white perifollicular scaling and scales entangling hair shafts up to 2-3mm above scalp surface.²¹ Thakur *et al.*²⁴ observed peripilar cast in all patients. Of the two patients in our study, peripilar cast was seen in one (50%) patient.

Conclusion

Dermoscopy is a useful non-invasive diagnostic tool which can aid in diagnosing different types of alopecias. Several characteristic findings suggestive of each type of alopecia can be identified by dermoscopy. Pili bifurcati like finding was observed in cases of alopecia areata. Further studies are needed to substantiate this finding and its relevance to the severity of alopecia areata

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