Relevance of trichoscopy in the differential diagnosis of alopecia: A cross-sectional study from North India

Minu Jose Chiramel, Vinod Kumar Sharma, Sujay Khandpur, Vishnubhatla Sreenivas[1]

Departments of Dermatology, Venereology and Leprology and [1]Biostatistics, All India Institute of Medical Sciences, New Delhi, India

Address for correspondence:
Dr. Vinod Kumar Sharma, Department of Dermatology and Venereology, All India Institute of Medical Sciences, New Delhi - 110 029, India. E-mail: aiimsvks@yahoo.com

ABSTRACT

Background: Trichoscopy is an office tool used in the diagnosis of alopecia but its utility has not been assessed. **Objectives:** To compare the trichoscopic characteristics of different types of alopecia, identify features of diagnostic value, and to determine the utility of trichoscopy in the diagnosis of alopecia. **Methods:** A descriptive cross-sectional study was performed in patients with alopecia. After clinical assessment and relevant investigations, trichoscopy was performed using a non-polarized trichoscope ($\times$10). The utility of trichoscopy in difficult cases of alopecia was assessed statistically. **Results:** One hundred and twenty patients of alopecia (90 non-cicatricial, 30 cicatricial) were recruited. The diagnosis was made on the basis of a detailed history and clinical examination, and confirmed by biopsy and relevant investigations in difficult cases. Yellow dots (63.3%) were the most common trichoscopic feature followed by thin hair (40.8%). Among the 21 difficult cases of alopecia, trichoscopy was diagnostic in 19 (90.5%). Statistically significant features on intergroup comparison included black dots (Fischer's exact test, $P < 0.001$), cadaverized hair ($P = 0.024$), exclamation mark hair ($P < 0.001$) in alopecia areata; diameter diversity more than 20% ($P < 0.001$) and thin hair ($P < 0.001$) in androgenetic alopecia; broken hair of different lengths ($P < 0.001$), frayed hair ($P < 0.001$), split ends ($P < 0.001$) in trichotillomania; comma hair ($P < 0.001$) in tinea capitis and arborizing blood vessels in discoid lupus erythematosus ($P = 0.012$). **Limitations:** The small number of patients in some types of alopecia was a limiting factor. **Conclusions:** Trichoscopy is useful in the differential diagnosis of alopecia. Among the various trichoscopic findings, those of diagnostic value were identified.

Key words: Alopecia, cicatricial, dermoscopy

INTRODUCTION

Alopecia is a common, distressing condition that is sometimes difficult to diagnose and treat. Trichoscopy shows much promise in the diagnosis and assessment of response to treatment in various types of alopecia. This study was conducted to assess the utility of trichoscopy in distinguishing the various types of alopecia and to identify signs of diagnostic value.

METHODS

Consecutive patients with alopecia attending the dermatology out-patient department at the All India Institute of Medical Sciences, New Delhi, between September 2012 and March 2014 were studied. Ethical clearance was obtained from the Institutional Ethics Committee. For this study, alopecia was defined as

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visible thinning or loss of hair from the scalp. Patients who did not consent, uncooperative children and patients with active secondary bacterial infection in the alopecic patch were excluded. Two dermatologists independently assessed each patient clinically as well as with a hand lens (×4), recorded the history and examination findings on a proforma and made a diagnosis. When there was a doubt in the diagnosis, the patient was labeled as "difficult case" and a biopsy was performed. Skin biopsies were performed in all cases of cicatricial alopecia. Hair shaft microscopy (in hair shaft disorders), trichogram (in telogen effluvium) and hormonal profile (in female pattern hair loss) were performed when indicated. Standard textbook criteria were followed while making a diagnosis. Trichoscopy was performed with a non-polarized Heine delta 20 mini dermoscope (10× magnification) using liquid paraffin as the contact medium. The center and periphery of the alopecic patch were examined by trichoscopy and photographs taken using an 8MP Samsung S2 camera (3264 × 2448 pixels, autofocus, LED flash) without and with 4x magnification.

A STATA version 12.1 (Stata corp. 2011. Stata Stastistical Software. Release 12. College station, TX: StataCorp LP) software package was used for statistical analysis. Since the number of patients in each group was small, the Fisher's exact test for categorical data was used for comparative analysis. $P < 0.05$ was considered significant. The analysis of hair shaft diameter diversity in androgenetic alopecia and diffuse hair loss was done manually. The number of thick and thin hair were counted in each trichoscopic field and the percentage of thin hair was calculated.

RESULTS

The calculation of sample size was complicated by the fact that all types of alopecia were included and the overall prevalence of alopecia in our population was not known. A convenient sample size of 100 was arbitrarily adopted. A total of 120 patients were recruited including 57 men and 63 women. The mean age at presentation was 24.9 years (range: 1–60 years). Ninety patients had non-cicatricial alopecia and the remaining 30 had cicatricial alopecia. The demographic and trichoscopic findings of each type of alopecia are shown in Table 1.

The most common trichoscopic findings were yellow dots (76 patients, 63.3%) and thin hair (49 patients, 40.8%). In patients with alopecia areata, the most frequent findings were yellow dots (87.5%), black dots (79%) and exclamation mark hair (70.9%) [Figure 1]. The mean diameter diversity was 57.7% (SD 23.2) in androgenetic alopecia and 29.4 (SD 21.94) in female pattern hair loss. The most common finding in telogen effluvium (TE) was thin hair which was seen in 70% of patients. Short tip regrowing hair was seen in only 1 patient. The patient with chronic telogen effluvium showed yellow dots, some coiled hair and a honeycomb pigment network. Thin hair were not seen, in contrast to acute telogen effluvium. The most common trichoscopic findings in trichotillomania were broken hair of different lengths (100%) and black dots (90%) [Figure 1]. Comma hair (85.7%) and cadaverized hair (85.7%) were the most common trichoscopic findings in tinea capitis [Figure 2].

All patients with lichen planopilaris showed a trichoscopic loss of follicles; other findings included white areas (87.5%), honeycomb pigment network (68.7%) and blue gray dots in a targetoid pattern (56.3%) [Figure 3]. Eight (88.9%) of 9 patients with discoid lupus erythematosus had loss of follicles; white areas were seen in 77.7%, arborizing red loops in 55.6% and follicular plugging, red dots and peripilar erythema in 44.4% each [Figure 4]. Trichoscopic findings in folliculitis decalvans included loss of follicles, honeycomb pigment network, white areas, amorphous white areas and arborizing vessels. Patients with morphea (en coup de sabre) had loss of follicles, white dots, thin hairs and white areas. Trichoscopic findings in pseudopelade of Brocq included cadaverized hair, thin hair, white dots, loss of follicles and white areas.

In the patient with monilethrix, beading of scalp and trunk hair was observed by trichoscopy. This patient also demonstrated the "regularly bended ribbon sign" and yellow dots. The patient with trichorrhexis nodosa showed acute angle turns on dermoscopy corresponding to the node. No specific trichoscopic features were seen in the patient with congenital hypotrichosis.

Comparative analysis of trichoscopic findings
There was substantial overlap in the trichoscopic findings of the various alopecias. We attempted to isolate those features that were significantly associated with a particular diagnosis. Comparisons were made

Type of alopecia	Number of patients	Male:female	Median age (years)	Median duration of illness (months)	The most common trichoscopic findings in each group
Alopecia areata	24	11:13	18	3	Yellow dots (87.5%), black dots (79.2%), exclamation mark hair (70.8%), vellus hair (50%), thin hair (37.5%)
Androgenetic alopecia (male)	22	22:0	25.5	30	Yellow dots (100%), diameter diversity>20% (95.1%), thin hair (90.9%), vellus hair (40.9%), honeycomb pigment network (40.9%), peripilar sign (9%)
Female pattern hair loss	9	9:0	28	60	Diameter diversity>20% (88.9%), thin hair (66.7%), yellow dots (44.5%), vellus hair (22.2%), honeycomb pigment network (11.1%), peripilar sign (11.1%)
Telogen effluvium	10	2:8	28	1	Thin hair (70%), yellow dots (30%), yellow brown dots (10%), short tip regrowing hair (10%), peripilar erythema (10%)
Lichen planopilaris	16	7:9	25.5	21	Loss of follicles (100%), white dots (87.5%), honeycomb pigment network (68.7%), blue grey dots in targetoid pattern (56.3%), yellow dots (50%), peripilar scaling (37.5%), blue grey dots in speckled pattern (25%), crust formation (12.5%), peripilar erythema (12.5%), peripilar casts (6.2%), cadaverized hair (6.2%), amorphous yellow hair (6.2%), tubular yellow scaling (6.2%)
DLE	9	5:4	37	270	Loss of follicles (88.9%), white areas (77.8%), arborizing red loops (55.6%), peripilar erythema (44.4%), follicular plugging (44.4%), red dots (44.4%), honeycomb pigment network (33.3%), peripilar scaling (33.3%), interfollicular red loops (33.3%), crust formation (22.2%), blue grey dots (22.2%), tubular scaling (11.1%), coiled hair (11.1%)
Tinea capitis	7	2:5	9	2	Comma hair (85.7%), cadaverized hair (85.7%), coiled hair (57.1%), hemorrhagic spots (42.9%), honeycomb pigment network (42.9%), yellow dots (28.6%), black dots (28.6%), thin hair (28.6%), white areas (28.6%), loss of follicles (28.6%), corkscrew hair (14.3%), broken hair (14.3%), frayed hair (14.3%), split ends (14.3%), peripilar erythema (14.3%), peripilar scaling (14.3%)
Trichotillomania	10	3:7	18	60	Broken hair (100%), black dots (90%), split ends (80%), frayed hair (70%), cadaverized hair (70%), follicular hemorrhage (60%), yellow dots (50%), coiled hair (30%), thin hair (20%), honeycomb pigment network (10%)
Others		Folliculitis decalvans (2), morphea (1), pseudopelade of Brocq (1), unclassified scarring alopecia (1), monilethrix (2), trichorrhexis nodosa (1), trichorrhexis invaginata (1), congenital hypotrichosis (2), congenital triangular alopecia (1)			

DLE: Discoid lupus erythematosus

between scarring and non-scarring groups as a whole and also among specific diagnostic groups which were easily confused clinically. The statistically significant findings in each group are shown in Table 2.

Diagnostic utility of trichoscopy

The clinical diagnosis was made with ease in 99 of the 120 cases as all the investigators agreed on a single diagnosis based on the clinical picture. In the remaining 21 cases in which the investigators were unable to reach a single diagnosis, trichoscopy helped to narrow down the differentials in 19 (90.5%) of these patients to reach the correct final diagnosis [Table 3]. In the other 2, trichoscopy did not add to the diagnostic process and other investigations such as biopsy and hair microscopy were necessary for confirmation of diagnosis.

DISCUSSION

Our study focused on identifying the role of trichoscopy in alopecia. The findings in each group were in accordance with those already described in the literature [Table 1].

In the largest trichoscopic study of 300 Asian patients with alopecia areata published by Inui *et al.*,[1] black dots, yellow dots and short vellus hair correlated with the severity of disease while black dots, tapering hair, broken hair and short vellus hair correlated with disease activity. They noted that yellow dots and short vellus hair were the most sensitive diagnostic markers whereas black dots, tapering hair and broken hair were the most specific markers. Our findings were similar, although the sensitivity of each feature was
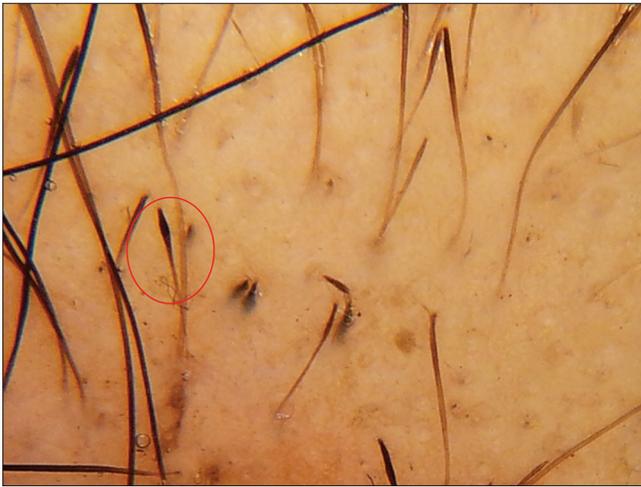
Figure 1a: Alopecia areata. Red circle showing exclamation mark hair

Figure 1b: Alopecia areata. Regrowing pigtail hair seen within yellow circle
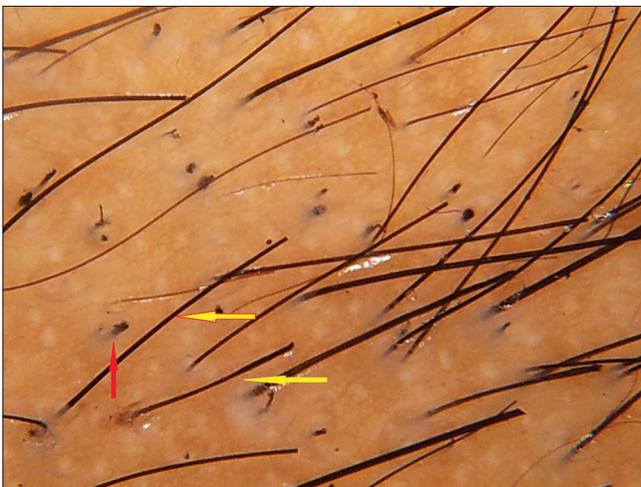

Figure 1c:Trichotillomania. Black dots (red arrow), broken hair of different lengths (yellow arrow)
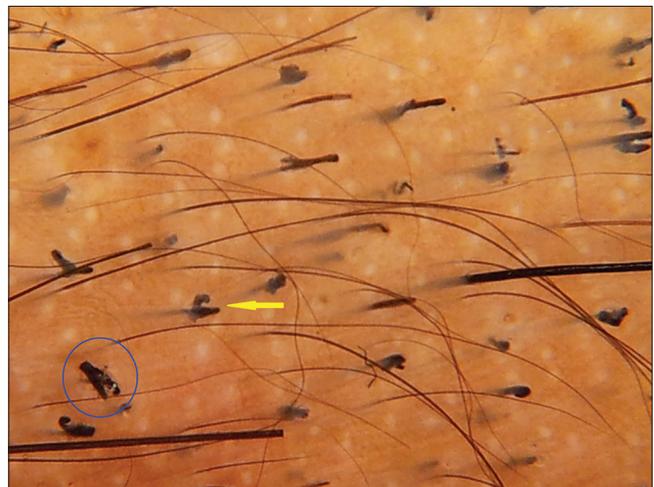

Figure 1d: Trichotillomania: Frayed hair (blue circle) and v shaped hair (yellow arrow)

not measured. Yellow dots appeared whitish rather than yellow in our patients, possibly due to a decreased appreciation of the yellow hue on a dark scalp.

In androgenetic alopecia, yellow dots, hair shaft diameter diversity and thin hair were the prominent features. Inui *et al.*[2] evaluated 50 Asian men with androgenetic alopecia and found hair shaft diameter variation of more than 20% in all the patients. Peripilar sign was positive in 66.6% compared to 9% in our study, possibly owing to the difficulty in identifying this feature in dark skin. Female pattern hair loss was diagnosed based on hair shaft diameter variation >20%. We found diameter diversity to be less prominent in female pattern hair loss patients compared to androgenetic alopecia. Although thin hair were the most prominent feature in telogen effluvium,

there was a paucity of specific findings; these findings were similar to those of Kowalska-Oledzka *et al.*[3], who observed reduced terminal hair, increased vellus hair and empty follicles in the frontal area in female pattern hair loss and early regrowth of terminal hair and some vellus hair in telogen effluvium to be the prominent findings. Radowska *et al.* formulated major and minor trichoscopic criteria for diagnosis based on trichoscopic findings in 131 female patients.[4] We did not apply these criteria in our patients as we used a trichoscope with lower magnification as compared to the one used in their study.

All the trichoscopic features described in trichotillomania: black dots, hair broken off either close to the hair follicles or at different distances from them, fraying of hair, longitudinally split hair,

coiled hair and stretching of the shaft, decreased hair density, empty follicular ostia and some yellow dots that may or may not contain black dots and

Table 2: Comparative analysis between different types of alopecia

Groups compared	Significant findings with *P* values (*P*<0.05)
Non-scarring versus scarring alopecia	Black dots, exclamation mark hair, vellus hair, diameter diversity, yellow dots and thin hair favor non-scarring alopecia (*P*<0.001) Honeycomb pigment network, peripilar erythema and scales, white areas, red dots, simple or arborizing red loops and crust favor scarring alopecia
Alopecia areata versus androgenetic alopecia	Black dots (Fishers exact test, *P*<0.001), cadaverized hair (*P*=0.024), exclamation mark hair (*P*<0.001) favor alopecia areata Diameter diversity more than 20% (*P*<0.001) and thin hair (*P*<0.001) favor androgenetic alopecia
Alopecia areata versus trichotillomania	Broken hair of different lengths (*P*<0.001), frayed hair (*P*<0.001), split ends (*P*<0.001) in favor trichotillomania
Alopecia areata versus tinea capitis	Exclamation mark hair (*P*=0.035) in favor of alopecia areata Comma hair (*P*<0.001) favors tinea capitis
Androgenetic alopecia versus FPHL	Yellow dots (*P*=0.006) favor androgenetic alopecia
FPHL versus telogen effluvium	None of the dermoscopic findings showed a statistically significant difference
Lichen planopilaris versus DLE	Arborizing blood vessels favor DLE (*P*=0.012)

DLE: Discoid lupus erythematosus, FPHL: Female pattern hair loss

areas with signs of scratching and bleeding were all observed in our patients.[5] The non-inflammatory type of tinea capitis demonstrated more signs as compared to the inflammatory type. Comma hair was the most common feature, as described in previous reports.[6,7]

In cicatricial alopecias, loss of follicles was appreciated in all except one patient who had early discoid lupus erythematosus. The 2 major diagnostic groups, namely lichen planopilaris and discoid lupus erythematosus showed some distinct trichoscopic features. Blue gray dots were seen in both groups, though they were seen in a targetoid pattern in over 50% of patients with lichen planopilaris, as reported previously.[8] Peripilar erythema, crusting and scaling were seen in lichen planopilaris but vascular features described by Shim *et al.* were not seen in our patients owing to hyperpigmentation.[9] We found vascular features such as simple and arborizing vessels to be a major feature of discoid lupus erythematosus. The other findings reported in discoid lupus erythematosus such as loss of follicles, scattered dark-brown discoloration of the skin, large yellow dots, perifollicular whitish halo, follicular keratotic plugs and telangiectasias were all observed.[10,11] Follicular red dots, recently described by Tosti *et al.* in 5 patients of discoid lupus erythematosus were not specifically seen in

Table 3: Utility of trichoscopy

Provisional clinical diagnosis	Number of patients	Dermoscopic diagnosis	Other investigations	Final diagnosis	Was dermoscopy useful?
FPHL/CTE	8	FPHL in 7 patients CTE in 1 patient	Hormonal analysis, USG abdomen, hemoglobin, thyroid function test, scalp biopsy	FPHL in 7 CTE in 1	Yes: Demonstration of diameter diversity more than 20% in FPHL
AA/TTM	1	Alopecia areata	Scalp biopsy: Suggestive of alopecia areata	Alopecia areata	Yes
AA/TTM	1	TTM	Scalp biopsy: Diagnostic of trichotillomania	TTM	Yes
FPHL/constitutional decrease in density	1	Constitutional decrease in hair density	Biopsy: No miniaturization	Constitutional decrease in hair density	Yes: Confirmed only after biopsy
Hair shaft disorders	4	Trichorrhexis nodosa - 2 Congenital hypotrichosis - 2	Hair mount	Trichorrhexis nodosa - 2 Congenital hypotrichosis - 2	Yes: Acute angle bend in trichorrhexis nodosa, absence of specific dermoscopic findings in congenital hypotrichosis
Congenital triangular alopecia/AA	1	CTA	Patient refused scalp biopsy	CTA	Yes: Absence of any feature of alopecia areata
Cicatricial alopecias	5	LPP - 2 DLE - 1 Nonspecific scarring alopecias - 1	Biopsy: None were diagnostic Final diagnosis based on clinical image plus suggestive clinical findings	LPP – 3 DLE- 1 Nonspecific scarring alopecias - 1	Yes (in 3 patients) Not useful in one patient of LPP and another patient where exact cause could not be found

FPHL: Female pattern hair loss, CTE: Chronic telogen effluvium, AA: Alopecia areata, TTM: Trichotillomania, CTA: Congenital triangular alopecia, LPP: Lichen planopilaris, DLE: Discoid lupus erythematosus

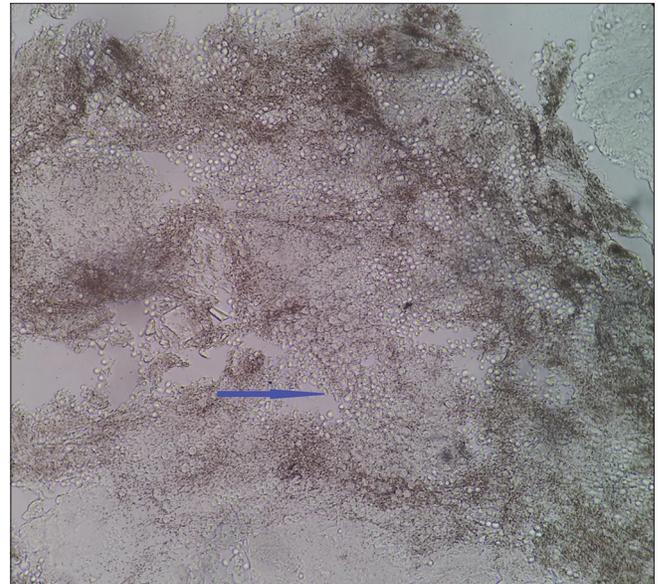**Figure 2a: Tinea capitis, comma hair**

Figure 2b: Tinea capitis, 10% KOH mount showing multiple spores

Figure 2c: Tinea capitis, coiled hair

Figure 2d: Tinea capitis, loop hair

Figure 3a: Lichen planopilaris, loss of follicles and peripilar blue grey pigmentation (yellow circle)
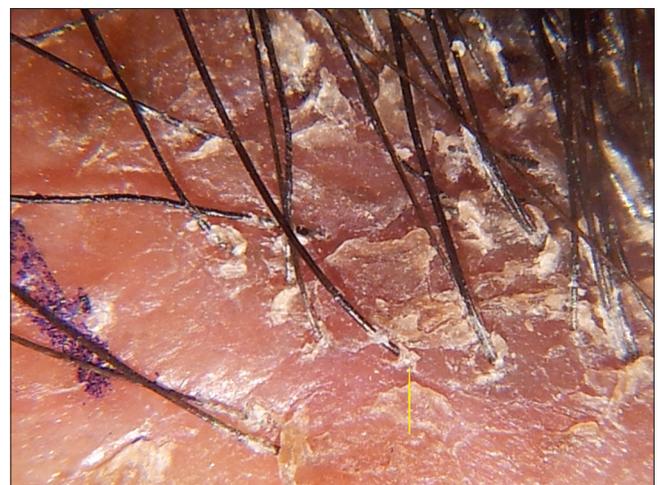

Figure 3b: Lichen planopilaris, Trichoscopy done without contact medium showing prominent peripilar scaling (yellow arrow)

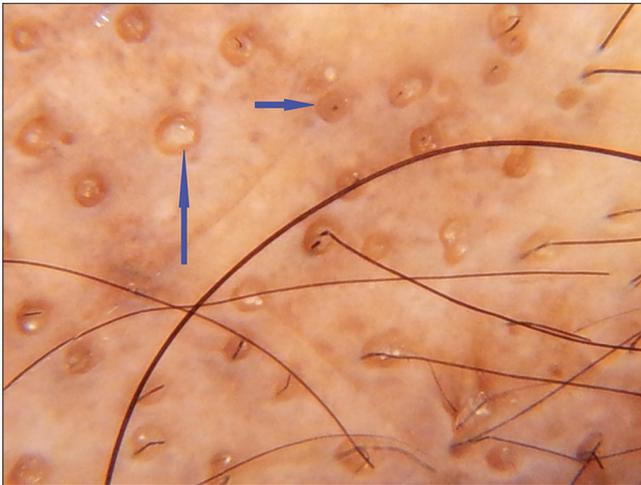our patients, though peripilar erythema was seen in almost half.[12]

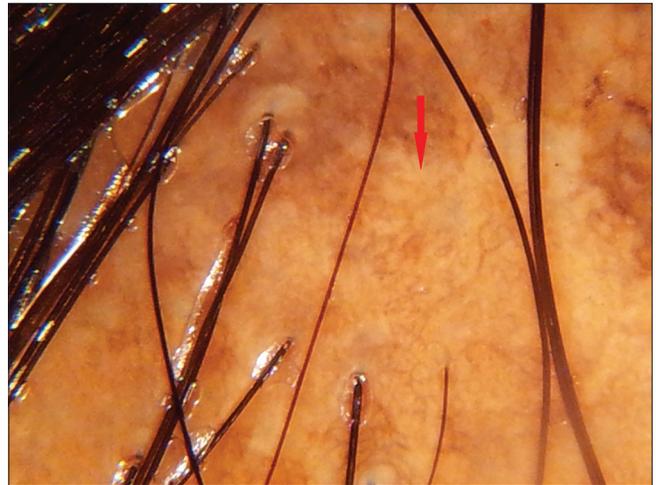**Figure 3c: Lichen planopilaris, follicular plugging (blue arrow)**

Figure 3d: Lichen planopilaris, Amorphous white areas (red arrow)
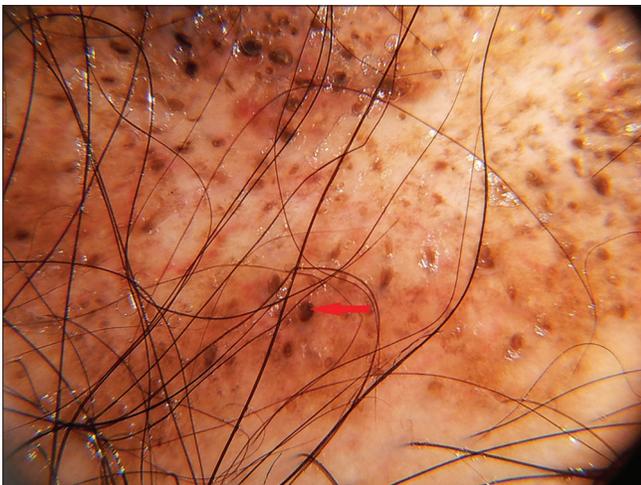

Figure 4a: Discoid lupus erythematosus, Follicular plugging (red arrows)

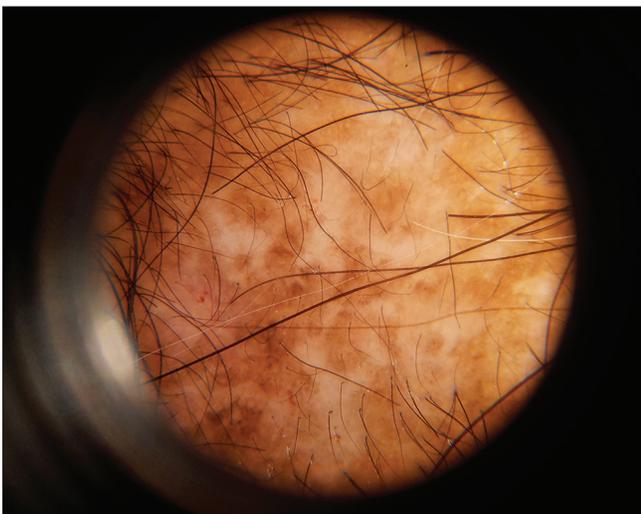**Figure 4b: Discoid lupus erythematosus, hyperpigmentation around the follicle (yellow arrow)**

Figure 4c: Discoid lupus erythematosus, amorphous white and brown areas are seen

Figure 4d: Discoid lupus erythematosus, hypopigmentation, background erythema with simple red lines and red loops. (blue arrows)

After a review of all articles published on trichoscopy of scalp disorders in 2012, Miteva *et al.* concluded that trichoscopy and videodermoscopy were very useful in differentiating non-scarring from scarring alopecia and alopecia areata from other patchy alopecias, as well as in diagnosing early androgenetic alopecia and tinea capitis.[13] In our study, trichoscopy helped to reach a conclusive diagnosis in 90% of the 21 patients in whom the diagnosis was not clear [Table 3]. Trichoscopy is a valuable investigation in patients with alopecia and has a definite role in the diagnosis of difficult cases.

Limitation

The limited number of patients in each group restricted our comparative analysis to only some types of alopecia. Some patients had been earlier treated elsewhere and treatment could have modified the trichoscopic findings. Biopsies were not performed in every patient as the diagnosis was evident clinically in many patients and an invasive procedure seemed unwarranted.

CONCLUSIONS

Trichoscopy helped to reach a conclusive diagnosis in 19 of the 21 patients in whom the diagnosis was not clear. We conclude that trichoscopy is a relevant investigation in patients with alopecia and has a definite role in the diagnosis of difficult cases.

Conflicts of interest
There are no conflicts of interest.

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