Original Article

Access this article online

Website: www.ijtrichology.com

DOI: 10.4103/ijt.ijt_1_19

Quick Response Code:

Trichoscopic Patterns of Nonscarring Alopecia's

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ABSTRACT

Background: Hair loss (alopecia) is a common problem and is a major cause of psychological stress and anxiety among affected individuals. It is of utmost importance to diagnose these cases at the earliest and treat them accordingly. Trichoscopy provides a noninvasive option that can be used for early diagnosis and monitoring the progression of the hair disorders. **Aims and Objectives:** To perform trichoscopy and document the findings in patients with nonscarring alopecia's. **Materials and Methods:** A total of 100 cases satisfying the inclusion criteria were screened for general physical examination and scalp examination including hair shaft and root, and tests for hair anchorage and fragility were also done. The lesions were examined through dermoscope, photographs were taken, and findings were documented. **Results:** Among the total of 100 cases screened, 57 were female and 43 were male. The mean age of the study group was 26 ± 14.8 years. Females were affected by alopecia areata (AA) and female pattern hair loss (29.8%) equally, whereas males were most commonly affected by AA (41.8%). The common trichoscopic follicular features noted were broken hair (48%), black dots (48%), single hair follicle unit (45%), short vellus hair (44%), upright hair (41%), and yellow dots (40%). The common interfollicular features seen were honeycomb pigmentation (26%) and arborizing red lines (12%). **Conclusion:** The emergence of newer hair signs on trichoscopic studies aids in identification and has a definitive role in the diagnosis of clinically difficult cases, so it is recommended to use trichoscopy in the routine examination of nonscarring alopecia's.

Key words: Black dots, broken hair, nonscarring alopecia, trichoscopy

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Submitted: 04-Jan-2019
Revised: 20-Jun-2020
Accepted: 19-Jul-2020
Published: 14-Aug-2020

INTRODUCTION

Hair is an important structure of the body that contributes to the physical appearance of an individual.[1] Hair loss (alopecia) is a common problem and is a major cause of psychological stress and anxiety among affected individuals. These alopecias can be broadly classified as scarring and nonscarring. They can also be classified as hair shaft disorders characterized by increased fragility.[2] It is of utmost importance to diagnose these cases at the earliest and treat them accordingly.[3]

The methods most commonly used to diagnose hair loss disorders include visual inspection, hair pull test, and biopsy, which is an invasive method. The need of noninvasive methods is growing in clinical practice and thereby dermatoscopy.[2]

"Dermatoscopy," also popularly known as "dermoscopy," is a noninvasive technology used to visualize subsurface features including epidermis, dermoepidermal junction, and superficial dermis that are not visible to the naked eye.[4]

In 2006, Lidia Rudnicka and Malgorzata Olszewska *et al.* coined the term "Trichoscopy" for dermoscopy of hair and the scalp.[5] Trichoscopy aids in identifying both hair shaft and hair opening disorders without the need to perform

How to cite this article: Govindarajulu SM, Srinivas RT, Kuppuswamy SK, Prem P. Trichoscopic patterns of nonscarring alopecia's. Int J Trichol 2020;12:99-106.

hair sampling.[6] It helps in avoiding unnecessary biopsies and also aids in choosing an ideal biopsy site.[5]

Trichoscopy helps in the differentiation of cicatricial from noncicatricial alopecia's and also aids in the diagnosis of patchy hair loss conditions such as tinea capitis, that requires immediate medication without waiting for culture reports which would otherwise take days to reveal results. Thereby trichoscopy serves as a reliable noninvasive diagnostic tool for quick evaluation and follow-up with images.[6]

This study has been undertaken to aid the diagnosis, treatment, and follow-up of nonscarring alopecias.

Aims and objectives

To perform trichoscopy and document the findings in patients with nonscarring alopecias.

MATERIALS AND METHODS

The present study was an observational study carried out in the Department of Dermatology at R.L Jalappa Hospital attached to Sri Devaraj Urs Medical College, Tamaka, Kolar, for a duration of 1½ year after obtaining ethical clearance from the Institutional Ethics Committee. All patients presenting with nonscarring alopecias were included. A total of 100 cases with hair loss were screened, and a detailed history of the patient including name, age, sex, history of presenting illness, hair grooming pattern, habits and tics, nail changes, other skin changes, systemic disease, family history of similar complaints and drug intake was taken. A written informed consent was taken from the patients and in children from parents or guardian. General physical examination, scalp examination including hair shaft and root, and tests for hair anchorage and fragility were done in all cases. The lesions were examined directly through the dermoscope Dermlite DL3N with ×10 magnification using both polarized and nonpolarized mode. Then, the dermoscopic photographs were taken with the help of an adaptor attached to iPhone 8 camera with a ×12 zoom.

A two-step procedure for dermoscopic classification of alopecia was used:

1. The lesions were first identified as nonscarring alopecia on the basis of the algorithm in Figure 1[7]
2. The patients were further evaluated in accordance with the checklist of dermoscopic features present in Table 1.[8]

In all cases where diagnosis was doubtful and suspected clinically, it was further confirmed by dermoscopic examination. A routine hemogram including complete blood count with peripheral smear was done in all cases of diffuse hair loss. Special investigations such as KOH mount and fungal culture were done in suspected cases of tinea capitis for confirmation. There was one case of clinically suspected syphilitic alopecia which was further confirmed by VDRL titers.

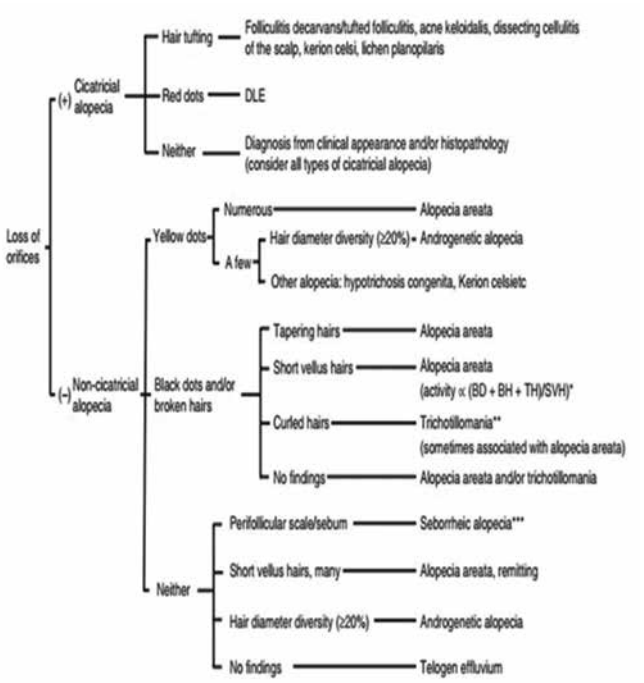

Figure 1: Algorithmic method for trichoscopic diagnosis of common hair loss diseases[7]

Table 1: Checklist of dermoscopic features[8]

Follicular features	Interfollicular features	Follicular and interfollicular features
YD	Red dots	Epidermal scale
BD (cadaverized hair)	Arborizing red lines	Pustule
Tapering (exclamation mark) hair	Honeycomb pigment pattern	
Broken hair	Pink white appearance	
Short vellus hair	Dirty dots	
Coudability	Crust formation	
Comma/corkscrew hair		
HDD		
Empty follicles		
Peripilar sign		
Absence of follicular openings		
Tufted hair		
White dots		
Follicular hyperkeratosis		
Pilli torti		
Trichorrhexis nodosa		

HDD – Hair diameter diversity

Statistical methods used for data analysis

Data were entered into Microsoft excel data sheet and were analyzed using SPSS 22 version (IBM SPSS Statistics for

Windows, version XX (IBM Corp., Armonk, N.Y., USA) software. Categorical data were represented in the form of frequencies and proportions. Chi-square was used as test of significance. Continuous data were represented as mean and standard deviation. MS Excel and MS Word were used to obtain various types of graph such as bar diagram and pie diagram. *P* value (probability that the result is true) <0.05 was considered statistically significant after assuming all the rules of statistical tests.

Sample size calculation

Sample size was estimated by using the proportion of yellow dots (YD) in alopecia areata (AA) (common cause) of nonscarring alopecia's detected by trichoscopy as 63.7% in patients with AA.[9]

RESULTS

A maximum of 42% cases out of total 100 patients screened were in the age group of 21–30 years, and the minimum of 2% cases were above 60 years and the mean age was 26 ± 14.8 years. The study included 100 patients with a diagnosis of alopecia (57 females and 43 males). The female patients were affected more by AA (29.8%) and female pattern hair loss (FPHL) (29.8%), whereas the male patients were most commonly affected by AA (41.8%).

Trichoscopic features

Trichoscopic features of various alopecias are summarized in Table 2.

In the present study of the total 100 patients examined, the most common trichoscopic follicular features were broken hair (BH) (48 patients, 48%), black dots (BD) (48 patients, 48%), single hair follicle units (45 patients, 45%) followed by short vellus hair (44 patients, 44%), upright hair (41 patients, 41%) and YD (40 patients, 40%) and most common interfollicular features were honeycomb pigment pattern (26 patients, 26%) followed by arborizing red lines (12 patients, 12%).

Thirty-five (35%) out of 100 cases were diagnosed to have AA, in which BH (93.5%) was most common trichoscopic finding closely followed by BD (88.4%) and YD (60%) [Figures 2 and 3].

Androgenetic alopecia was seen in 31% out of 100 cases, of which FPHL was seen in 17% of cases and male pattern hair loss was seen in 14% of cases. The most common trichoscopic findings of FPHL include hair diameter diversity (HDD) (100%), short vellus hair (94.1%), and honey comb pigment pattern (64.7%), whereas the most common findings of male pattern hair loss included HDD (100%), short vellus hair (100%), and honey comb pigment pattern (85.7%) [Figure 4].

Seventeen (17%) cases of telogen effluvium was presented in this study of which trichoscopic findings includes upright hair and single hair follicle unit in all cases followed by empty follicles in 88.2% cases. Tinea capitis was seen in seven (7%) cases out of total hundred cases, the findings of which included comma hair, corkscrew hair and BH in 100% cases followed by Morse code hair and I hair in 42.8% cases [Figure 5]. Five cases of total hundred cases were diagnosed as trichotillomania, which typically showed the presence of v hair (100%), trichoptilosis (100%), BH (100%) followed by peripilar hemorrhage (80%) and BD (80%) [Figure 6]. Three patients presented with anagen effluvium. The most common dermoscopic findings included YD (100%), BD (100%) and empty follicles (100%). There was one case of temporal triangular alopecia which showed the presence of white hair, diversity of diameter, vellus hair surrounded by terminal hair, empty follicles and white dots. One case of AA had VDRL positive titers (1:32) suspecting syphilitic alopecia which on trichoscopy showed the presence of focal atrichia, YD and BD [Figure 7].

DISCUSSION

Nonscarring alopecia's is a common condition that affect male and female patients which may in turn lead to social withdrawal, depression, anxiety and stress.[9] Trichoscopy can help in early diagnosis and prompt treatment of the affected individuals. The trichoscopic patterns observed consistently with certain alopecia's can be used for their diagnosis, monitoring the disease activity and thereby overcomes the need to take unnecessary biopsy.[9]

The age of the patient has an important role in the interpretation of alopecia's. There are certain alopecia's which are known to occur in particular age groups.[8] The mean age was 26 years in this study which is consistent with mean age of 24.9 years in other study.[10] In this study of 100 patients, 57% were females and 43% were males similar to other study wherein 56% were females and 44% were males.[8]

Trichoscopic features of nonscarring alopecia's

Trichoscopy of AA: YD findings in AA patients were consistent with other studies.[8,11,12] YD are considered to

Table 2: Trichoscopic features of various alopecia's

Type of alopecia	Number of patients	The most common trichoscopic findings in each alopecia
AA	35	Broken hair (93.5%), BD (88.4%), YD (60%), exclamation mark hair (80%), short vellus hair (37.1%), pig tail hair (34.2%)
FPHL	17	HDD (100%), short vellus hair (94.1%), honey comb pigment pattern (64.7%), peripilar sign (58.8%), YD (41.1%), white dots (41.2%)
Male pattern hair loss	14	Short vellus hair (100%), HDD (100%), honey comb pigment pattern (85.7%), peripilar sign (57.1%), white dots (57.1%), YD (21.4%)
Telogen effluvium	17	Upright hair (100%), single hair follicle unit (100%), empty follicles (88.2%), YD (35.2%)
Tinea capitis	7	Comma hair (100%), corkscrew hair (100%), broken hair (100%), Morse code hair (42.8%), I hair (42.8%), zig zag hair (14.2%)
Trichotillomania	5	V hair (100%), trichoptilosis (100%), broken hair (100%), peripilar hemorrhage (80%), BD (80%), coiled hair (60%), flame hair (20%)
Anagen effluvium	3	YD (100%), BD (100%), empty follicles (100%)
Temporal triangular alopecia	1	White hair, diversity of diameter, vellus hair surrounded by terminal hair, empty follicles, white dots
Syphilitic alopecia	1	Focal atrichia, YD, BD

YD – Yellow dots; AA – Alopecia areata; FPHL – Female pattern hair loss

be the most sensitive dermoscopic feature of AA. These are marked by distinctive yellow to yellow-pink, round or polycyclic dots that vary in size and are uniform in color.[12] The trichoscopic findings of YD in AA vary depending on type of dermoscope equipment used and also as an account of different shampooing habits between European, Asian and Latin American populations. The highest prevalence of YD was seen in dark-skinned patients as per Fitzpatrick's skin Type V ranging from 6 to 100% with a mean value of 72% with a handheld dermoscope. In white-skinned individuals of Fitzpatrick's phototype I–III, YD were seen in 81% with hand held dermoscope. These YD in individuals with yellowish skin and those belonging to Fitzpatrick's phototype IV ranged from 40 to 65% with a mean value of 60% with a dermoscope.[13]

The BD in this study are higher than the other studies.[8,11,12] This is because BD are due to changes in hair color and cuticle resistance. The cuticle of Asian's fail under extension stress as large pieces while maintaining their original shape. In contrast to that, Caucasian hair cuticles tend to collapse into small fragments, these factors result in higher percentage of BD in Asians of 40%–78% with a mean value of 57% versus 29%–57% BD in Caucasians with a mean value of 49%. The highest BD proportion was found in dark skinned patients such as Egyptian, Turkish and Indians of range between 0% and 63% with a mean value of 61%, these findings are in accordance to our study in which the proportion of BD is 88.4%.[13]

More BH are seen in this study when compared to other studies.[8,11,12] BH are found to be more in patients with acute AA with active hair loss. The proportion of BH on an average is around 0%–71% with a mean value of 49% in patients with AA which is in accordance to our study where BH was seen in 93.5% cases, suggesting more patients had increased activity of hair loss.[13] Though findings of short vellus hair in present study are in contrast to other studies,[8,11,12] however in dark skinned individuals it is seen in 34%–94% with a mean value of 59%, which is in accordance to our study which reported short vellus hair in 37.1% cases.[13] Short vellus hair is common in remitting phase and long-standing cases of AA. The proportion of short vellus hair in AA is found to be 34%–100% with a mean value of 61% in patients in a study.[13] This percentage difference in the proportion of short vellus hair is due to difference in skin phototypes. The short vellus hair vary according to the skin phototype and are more prevalent in white-or yellowish-skinned phototype of I–IV as compared to dark skin phototype V of Fitzpatrick's scale populations.[13]

Exclamation mark hair in this study are higher than the other studies.[8,11,12] The number of exclamation mark hair are usually high in progressive, nonprogressive and acute form of AA which accounts for their higher proportion. The proportion of exclamation mark hair was found to be 80% in our study indicative of both acute form of disease and long standing nonprogressive disease.[13]

The findings of pig tail hair in this study is consistent with other study.[11] Pig tail hair are short and seen in first few weeks. These are regrowing, regularly coiled hair with tapered ends. They indicate hair regrowth and not a frequent finding with a mean value of just 21% in few earlier studies.[13]

The largest trichoscopic study on AA concluded that BD, YD correlated with the severity of disease whereas tapering hair (TH), BH correlated with disease activity.

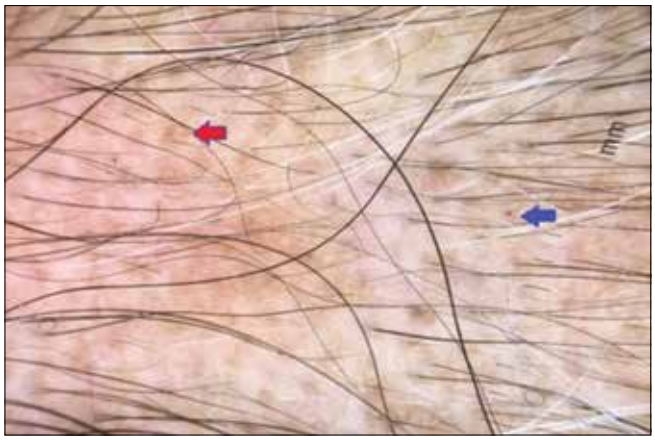

Figure 2: Dermoscopic picture of alopecia areata: Red arrow denotes yellow dots and blue arrow denotes black dot

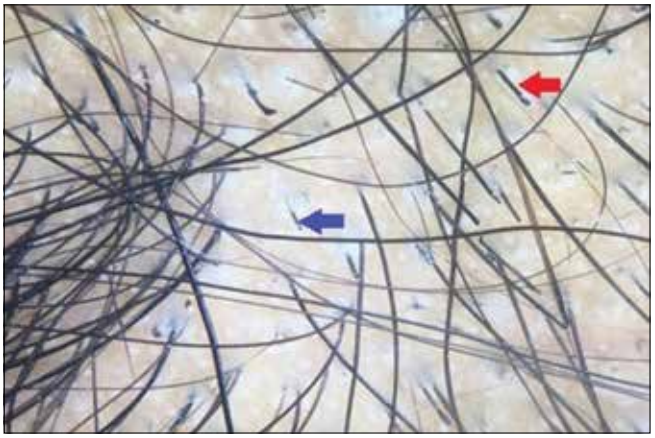

Figure 3: Dermoscopic picture of alopecia areata: Blue arrow denotes broken hair and red arrow denotes exclamation mark hair

Figure 4: Dermoscopic picture of androgenetic alopecia: Blue arrow denotes short vellus hair, red circle denotes hair diameter diversity

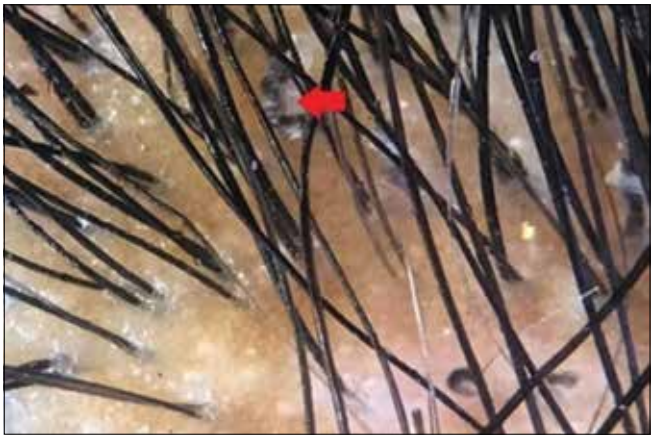

Figure 5: Dermoscopic picture of tinea captis: Red arrow denotes corkscrew hair

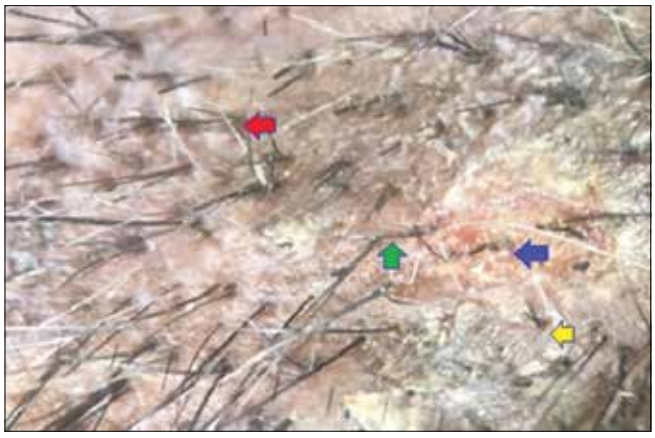

Figure 6: Dermoscopic picture trichotillomania: Red arrow denotes trichoptillosis, green arrow denotes kinking of hair, blue arrow denotes peripilar hemorrhage, yellow arrow denotes v hair

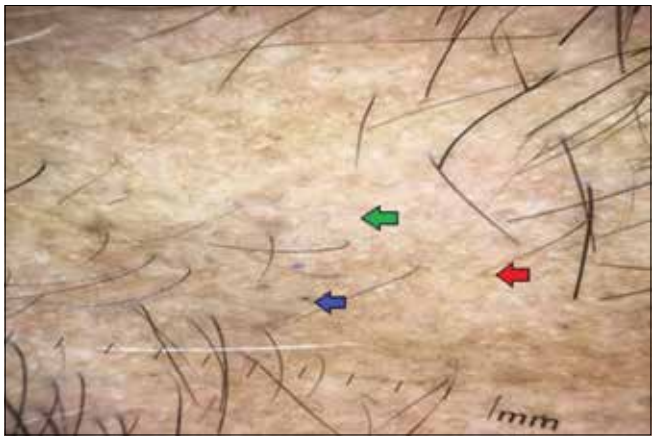

Figure 7: Dermoscopic findings of AA with positive VDRL titers suspecting syphilitic alopecia: Green arrow denotes focal atrichia, blue arrow denotes black dot, red arrow denotes yellow dot

They noted that YD and short vellus hair were the most sensitive diagnostic markers whereas BD, TH and BH were the most specific markers[9,14] [Table 3].

Trichoscopy of androgenetic alopecia: The findings of YD in androgenetic alopecia in this study are in contrast to the other studies.[10,15,16] YD in androgenetic alopecia are formed

Table 3: Comparative findings of alopecia areata with other studies

	Percentage findings in AA (in this study), *n*=35	Percentage findings in AA (in other studies)[11], *n*=50	Percentage findings in AA (in other studies)[8], *n*=49	Percentage findings in AA (in other studies)[12], *n*=126
YD	60	88	83.7	84.1
BD	88.4	58	63.3	48.4
Broken hair	93.5	56	57.1	9.5
Short vellus hair	37.1	66	46.9	62
Exclamation mark hair	80	26	42.9	30.9
Pig tail hair	34.2	14		

AA – Alopecia areata; YD – Yellow dots

by absence of terminal hair and intact sebaceous glands which produce sebum, which are seen commonly in patients with advanced alopecia. The percentage of YD is variable but is lesser than in AA which is in accordance to our study (<60%).[16] The HDD is seen in 100% of cases in this study which is in accordance to other studies.[10,15,16] A variation of more than 20% of HDD in males and more than 10% of HDD in females is considered significant.[16] The frequency of white dots was more when compared to other studies,[15,16] due to dark skin colour which makes them more prominent.[15] Peripilar sign is seen in all patients of alopecia with fair skin whereas these ratios are lower in Asian patients.[15] The findings of peripilar sign in this study is consistent with other studies[15,16] The proportion of honey comb pigment pattern in this study is higher than the other studies.[10,15,16] This pattern is seen in cases with long standing sun exposure and dark skin tone, which accounts for the higher proportion of honey comb pigment pattern in our study[15] [Table 4].

Trichoscopy of tinea capitis: The most specific feature of tinea capitis is comma hair, which is a common finding in all earlier studies.[10,17,18] The findings of corkscrew hair which is higher in this study is suggestive of endothrix variant of tinea capitis.[19] The presence of zigzag hair which is consistent with other studies is usually seen due to bend at the narrow paler parts of the infected hair shafts due to underlying structural weakness.[17,18,20] BH is considered an additional dermoscopic feature of tinea capitis but not the specific feature and is a common finding in the present study which is in contrast to other studies.[10,17,18] Morse code hair are irregularly interrupted hair with normally pigmented and paler narrowed intervals on dermoscope.[17] The findings of morse code hair in this study were consistent with other study.[17] Further studies have to be done to prove the association of morse code hair with tinea capitis.[17] I-hair are short BH with an accentuated distal end. This study is one among the few studies to describe I-hair[17] [Table 5].

Trichoscopy of trichotillomania: BD in trichotillomania in this study are similar to few other studies showing above 80% involvement whereas it is just 30% in another study.[10,21,22] These are not the specific features of trichotillomania, as they are also seen in conditions such as AA thereby accounting for the difference in the findings.[10] The characteristic features of Trichotillomania such as flame hair, v-hair, tulip hair, and hair powder, 'partially coiled' hair (hook hair) occurs due to manual pulling of hair. The flame hair leads to residue which is semi-transparent, wavy and cone shaped. The findings of flame hair in this study are similar to other studies.[10,21,22] BH and trichoptilosis are diagnostic of Trichotillomania. BH in trichotillomania are seen due to mechanical force used to pull the hair which results in transverse fracture with cuticle broken at different length with longitudinal splitting or fraying.[21] The traumatic hair pull results in characteristic peripilar hemorrhage. Peripilar hemorrhage is considered diagnostic for Trichotillomania which were seen in 80% cases in our study which was consistent with other study[10] [Table 6].

In this study, the findings of anagen effluvium due to chemotherapy induced alopecia on trichoscopy included YD, BD and empty follicles in all cases. The additional feature included pohl pinkus constriction hair which was seen in one case in this study, these are similar to the findings reported earlier.[23] Though trichoscopy has little role in diagnosis of telogen effluvium the findings of YD is consistent with other studies.[8,10]

The findings of temporal triangular alopecia in this study included diversity of diameter of hair, vellus hair and empty follicles which were in accordance to other studies.[24,25]

This study included one case of AA which had VDRL positive titers (1:32 dilutions) thereby suspecting syphilitic alopecia which on trichoscopy showed the presence of focal atrichia, YD and BD. No characteristic findings of syphilitic alopecia have been demonstrated on trichoscopy till date.[26] In few earlier case reports, findings described were in accordance to this study such as YD in the centre

Table 4: Comparative findings of androgenetic alopecia with other studies

	Percentage findings in AGA (in this study), *n*=31		Percentage findings in other study)[15], *n*=206		Percentage findings in other study)[16], *n*=950		Percentage findings in other study)[10], *n*=31	
	MPHL	FPHL	MPHL	FPHL	MPHL	FPHL	MPHL	FPHL
YD	21.4	41.1	28.4	18.7	20.1	24.1	100	44.5
HDD	100	100	100	100	100	100	95.1	88.9
White dots	57.1	41.2	28.6	8.2	27.3	24	-	-
Peripilar sign	57.1	58.8	46	64.9	44	44.5	9	11.1
Honey comb pigment	85.7	64.7	25.4	13.4	33.2	30.5	40.9	11.1

MPHL – Male pattern hair loss; FPHL – Female pattern hair loss; AGA – Androgenetic alopecia; YD – Yellow dots; HDD – Hair diameter diversity

Tale 5: Comparative findings of tinea capitis with other studies

	Percentage findings in tinea capitis (in this study), *n*=7	Percentage findings in tinea capitis (in other studies)[10], *n*=7	Percentage findings in tinea capitis (in other studies)[17], *n*=40	Percentage findings in tinea capitis (in other studies)[18], *n*=43
Comma hair	100	85.7	60	70
Corkscrew hair	100	14.3	20	30
Zig zag hair	14.2	-	30	20
Broken hair	100	14.3	17.5	25.6
Morse code hair	42.8	-	27.5	-
I hair	42.8	-	5	-

Table 6: Comparative findings of trichotillomania with other studies

	Percentage findings in TTM (in this study), *n*=5	Percentage findings in TTM (in other studies)[21], *n*=44	Percentage findings in TTM (in other studies)[10], *n*=10	Percentage findings in TTM (in other studies)[22], *n*=10
BD	80	100	90	30
Flame hair	20	25	-	30
V hair	100	-	80	30
Trichoptilosis	100	34	80	80
Coiled hair	60	39	-	80
Broken hair	100	-	100	30
Peripilar hemorrhage	80	-	60	30

TTM – Trichotillomania; BD – Black dots

of the alopecia patch with few BD at the periphery, focal atrichia and hypopigmentation of the hair shaft.[27] There are few case reports that have shown the presence of empty hair follicles, vellus hair, red-brown background and irregularly dilated capillaries with red blood cells extravasation.[28]

CONCLUSION

Trichoscopy serves as a valuable diagnostic tool in early diagnosis by avoiding biopsy and also helps in assessing the various stages and severity of nonscarring alopecias. In this study, trichoscopy helped us to reach a conclusive diagnosis of patients in whom the diagnosis was not clear, it was also supplemented by relevant investigations such as KOH and other blood investigations whenever indicated. With new hair signs being found on trichoscopic studies, it aids in identification and has a definitive role in the diagnosis of clinically difficult cases, so it is recommended to use trichoscopy in the routine examination of nonscarring alopecia's.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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