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Tarek Mohammad Tawfik
Dermatology, Venereology and Andrology Department, Faculty of Medicine for Boys, Al-Azhar University, Cairo

Amr Mohammed Ahmed Mahmoud Ammar
Dermatology, Venereology and Andrology Department, Faculty of Medicine for Boys, Al-Azhar University, Cairo

Mohammed Radwan Abd Rabo
Dermatology, Venereology and Andrology Department, Faculty of Medicine for Boys, Al-Azhar University, Cairo, dr_amramar@yahoo.com

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ORIGINAL ARTICLE

Evaluation of Panoramic Trichoscopy as a Novel Method for Assessment of Response to Treatment in Diffuse Alopecia

Tarek Mohammad Tawfik, Amr Mohammed Ahmed Mahmoud Ammar, Mohammed Radwan Abd Rabo*

Dermatology, Venereology and Andrology Department, Faculty of Medicine for Boys, Al-Azhar University, Cairo, Egypt

Abstract

Background: **Trichoscopy is a valuable technique for diagnosing and monitoring individuals with hair loss. The method's present shortcoming is that only tiny areas of the scalp may be imaged. This might be challenging when attempting to assess vast regions, such as the whole hairline in individuals with frontal fibrosing alopecia (FFA), as well as when attempting to compare the exact same field of view in posterior examinations.**

Aim of the work: **Evaluation of Panoramic trichoscopy as novel method for assessment of response to treatment in diffuse alopecia.**

Patients and methods: **From August 2021 to January 2023, 60 patients with diffuse alopecia were enrolled in a prospective study at Al Hussein University Hospitals' dermatology clinic to investigate panoramic trichoscopy as a novel method for detecting treatment response in diffuse alopecia.**

Results: **The mean satisfaction percentage of all analyzed patients in the current study was 37 21.2%, with a minimum percentage of 10% and a maximum percentage of 60%. Twenty-three patients (38.3%) improved little, 26 patients (43.3%) improved significantly, and 11 patients (18.3%) improved moderately.**

Conclusion: **Panoramic trichoscopy is easy, tolerable and new diagnostic method, cost effective, saving time, effort, more easy and complaint for patient with diffuse alopecia.**

Keywords: Diffuse alopecia, Frontal fibrosing alopecia, Panoramic trichoscopy

1. Introduction

Trichoscopy is a valuable technique for diagnosing and monitoring people with hair loss. The method's present shortcoming is that only tiny areas of the scalp may be imaged.[1]

This might be challenging when attempting to assess vast regions, such as the whole hairline in individuals with frontal fibrosing alopecia (FFA), as well as when attempting to compare the exact same field of view in posterior examinations.[2]

In order to solve the matter, we demonstrate 'Panoramic Trichoscopy,' which involves attaching a dermatoscope to a mobile device's camera in 'panorama mode.'[1] Panoramic Trichoscopy allows for the visual matching of hair shafts in before and after photos, facilitating the investigation of disease activity symptoms and hair loss in patient follow-up.[3]

This technique was effectively utilized to examine the hairline in FFA, but it may also be applied in other locations, such as the brows and in patients with other kinds of hair loss.[2]

2. Patients and methods

From August 2021 to January 2023, a prospective study was conducted on 60 patients with diffuse alopecia who presented to the dermatology clinic at Al Hussein University Hospitals. The purpose of the study was to investigate panoramic trichoscopy as a

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* Corresponding author at:
E-mail address: drradwan27@gmail.com (M.R.A. Rabo).

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novel method for determining the response to treatment in diffuse alopecia.

In this study, patients were divided into two groups: There were two groups of sixty patients: Group (A) included 30 patients with hair loss that was not scarring, and Group (B) included thirty patients whose hair loss was scarring.

2.1. Criteria for inclusion

Between the ages of 5 and 60, both sexes, who have a subjective complaint of hair loss lasting no longer than 6 months.

2.2. Exclusion criteria

Patients who were taking any type of antihair loss medication, patients with endocrine disorders, patients taking systemic allopathic or alternative medications, and patients with other obvious hair and scalp disorders, either primary like trichotillomania, alopecia areata, or tinea capitis, or secondary like seborrheic dermatitis or psoriasis, were excluded.

2.3. Methods

2.3.1. The following treatments were administered to each patient in the study

Careful history study, including both a general and a specific one. Examination by tricoscopy: One day prior to the procedure, all subjects were asked to shampoo their hair. They were approached to try not to oil or shading their hair. Using a comb with fine teeth, a straight cut was made at the middle of the scalp. The 'Panoramic Trichoscopy' was made by attaching a handheld dermatoscope to a smartphone (Redmi Note 10 Pro) and choosing 'Panorama mode' or something similar with the camera app on the phone dermalight 3gen. Start 'scanning' the area of alopecia by tying the hair back into a ponytail and holding the hairline with a flexible comb in order to get the best image of the condition. To avoid the formation of visual artifacts, the hand must move steadily and continuously.

Long-standing case of AA and AGA it's beyond the scope of our study not included in patients and methods.

2.4. Outcome

Accuracy detection regarding imagine method and evaluate of improvement was done by tow blind dermatologist not participating in the study, and detection of patient satisfaction regarding improving and follow-up.

2.5. Ethical considerations

All the participants were requested to sign a written informed consent regarding the procedure according to the study protocol. Al-Azhar University Ethical Committee approved the protocol of the study.

2.6. Statistical method

Statistical Program for the Social Sciences (SPSS) version 24 was used to analyze the data. Mean standard deviation was used for quantitative data. Frequency and percentage were used to describe qualitative data. Average (mean): the sum of values divided by the number of values, or the central value of a discrete set of numbers. Deviation from the mean (DM): is a measure of a set of values' dispersion. A low standard deviation (SD) indicates that the values tend to be close to the set's mean, whereas a high SD indicates that the values cover a wider range.

2.6.1. These tests were carried out

MW: Mann Whitney *U* test when comparing two means (for data with an abnormal distribution). Test of Chi-square: was utilized for non-parametric data comparisons. *P* value (probability): A *P* value less than or equal to 0.05 was thought to be significant, a *P* value greater than or equal to 0.001 was thought to be highly significant, and so on.

3. Results

The age and sex of each patient studied is shown in this table. In terms of age, all of the patients who were studied had a mean age of 29.01 12.3 years, with a minimum age of 5 and a maximum age of 60. As respect sex, there were 53 females (88.3%) and 7 guys (11.7%) in the concentrated on patients (Table 1).

The clinical types of alopecia in all of the patients who were studied are described in this table. In the study, 15 patients (25%) had cicatricle alopecia, while 45 patients (75%) had noncicatricial alopecia. Six patients (40%) with Cicatricial alopecia were LPP, while nine patients (60%) were FFA. 26 patients

Table 1. Description of age and sex in all studied patients.

	Studied patients ($N = 60$)
Sex	
Female	53 (88.3%)
Male	7 (11.7%)
Age (years)	
Mean ± SD	29.02 ± 12.3
Min–Max	5–60

Table 2. Description of clinical types and sub-types of alopecia in all studied patients.

	Studied patients ($N = 60$)
Alopecia type	
Cicatricial	15 (25%)
NonCicatricial	45 (75%)
Cicatricial sub-types	
LPP	6 (40%)
FFA	9 (60%)
Noncicatricial sub-types	
AGA	26 (57.8%)
AA	11 (24.4%)
TE	6 (13.3%)
AAI	1 (2.2%)
Traction alopecia	1 (2.2%)

(57.8%) with noncicatricial alopecia had AGA, 11 patients (24.4%) had AA, 6 patients (13.3%) had TE, 22% had AAI, and 2% had traction alopecia.

From this table we can conclude we had a good discrepancy between clinical types of our patients, representing most of types known (Table 2).

Testing between panoramic and classic methods had an obvious difference, for the panoramic imaging mean % of accuracy 73.7 19.4 SD, while for the classic method mean % of accuracy was 58.1%, 17.8% SD so the accuracy percentages of panoramic imaged patients 73.7 (19.4%) and classic imaged patients 58.1 (17.8%) are highly statistically significant (*P* value 0.001) (Table 3).

Compliance of patient between classical and panoramic imaging had a major difference as well, when comparing patients who had their images taken in a traditional manner mean % of compliance was (50,3%SD 9.01%), however, he compliance rate for panoramic imaged patients is significantly higher with mean % of compliance 77.7%, SD 10.9% (*P* value 0.001) than for classic imaged patients. Also demonstrates a highly statistically significant difference in compliance with regard to imaging method (*P* value 0.001). It was tolerable in 24 patients and neutral in 36 patients (60%) in classic imaged patients, while it was easy in 36 patients (60%) in panoramic imaged patients (Table 4).

The level of satisfaction experienced by each and every one of the patients who were examined is depicted in this table. The overall percentage of patients who were studied who were satisfied was 37 21.2%, ranging from a minimum of 10% to a maximum of 60%. 23 patients (38.3%) had slight improvement, 26 patients (43.3%) had critical improvement and 11 patients (18.3%) had moderate improvement.

Table 5 shows the description of patient satisfaction in all studied patients. The mean satisfaction % of all studied patients was 37 ± 21.2% with minimum percentage of 10% and maximum percentage of 60%. 23 patients (38.3%) had slight improvement, 26 patients (43.3%) had significant improvement and 11 patients (18.3%) had moderate improvement (Figs. 1–3).

4. Discussion

The most prevalent complaint in dermatology clinics is hair loss. Clinical examination, pull test, and potassium hydroxide (KOH) examination are commonly used to make a diagnosis, but currently, trichoscopy (hair and scalp dermoscopy) is a unique, rapid, and noninvasive diagnostic technique for hair diseases, as well as for monitoring medication efficacy.[4]

Alopecia areata, telogen effluvium, and androgenic alopecia are the most frequent causes of hair loss in adults. Trichoscopy has been demonstrated to be effective in assessing and differentiating these instances. Yellow spots, short vellus hair, black dots, broken hairs, and exclamation mark hairs are the main trichoscopic signs of alopecia areata.[5]

Androgenic alopecia trichoscopy is distinguished by hair diameter variability, which represents hair shrinkage, and an increased ratio of vellus hairs to all hairs in androgen-dependent scalp areas.[6]

The method's present shortcoming is that only tiny areas of the scalp may be imaged. This might be challenging when attempting to assess vast regions, such as the whole hairline in individuals with frontal fibrosing alopecia (FFA), as well as when attempting to compare the exact same field of view in posterior examinations.[1] To address this issue, we suggest 'Panoramic Trichoscopy,' which involves attaching a dermatoscope to a smartphone camera in 'panorama mode.'

The purpose of this study was to investigate panoramic trichoscopy as a novel approach for assessing therapy response in widespread alopecia.

Sixty patients were divided into two groups, the first of which consisted of: included thirty patients

Table 3. Comparison of accuracy as regard imaging method in the studied patients.

	Imaging method		Stat. test	*P* value
	Panoramic ($N = 60$)	Classic ($N = 60$)		
Accuracy (%) Mean ± SD	73.7 ± 19.4	58.1 ± 17.8	**MW = 507**	**<0.001 HS**

MW, Mann Whitney *U* test.

Table 4. Comparison of compliance as regard imaging method in the studied patients.

	Imaging method		Stat. test	*P* value
	Panoramic ($N = 60$)	Classic ($N = 60$)		
Compliance (%) Mean ± SD	77.7 ± 10.9	50.3 ± 9.01	**MW = 129.5**	**<0.001 HS**
Compliance				
easy	36 (60%)	0 (0%)	**$X^2 = 62.4$**	**<0.001 HS**
Neutral	24 (40%)	36 (60%)		
Tolerable	0 (0%)	24 (40%)		

Table 5. Description of Patient satisfaction in all studied patients.

	Studied patients ($N = 60$)
Patient satisfaction (%)	
Mean ± SD	37 ± 21.2
Min–Max	10–60
Patient satisfaction	
Slight improvement	23 (38.3%)
Significant improvement	26 (43.3%)
Moderate improvement	11 (18.3%)

whose hair loss was not scarring. Second group: included thirty patients whose hair loss was scarring.

According to the age and sex of all of the patients in the current study. In terms of age, all of the patients who were studied had a mean age of 29.01 12.3 years, with a minimum age of 5 and a maximum age of 60.53 of the patients studied were female (88.3%) and 7 were male (11.7%).

The findings of Hofny et al.[7] who wanted to see how trichoscopy affected the diagnosis, clinical severity, and quality of life (QoL) of noncicatricial alopecia (alopecia areata, androgenic alopecia, and telogen effluvium). Their average age was 23.66 8.01 years, according to their report. There were 39 women (70.9%) and 16 men (29.1%).

In addition, Pomsoong et al.'s findings were out of sync with ours[8] individuals whose objectives were to conduct a systematic review to comprehensively summarize all trichoscopic characteristics of Syphilitic alopecia (SA) and investigate the epidemiological, clinical, and trichoscopic findings, laboratory results, treatment, and outcomes of SA in Thai patients. They said that the majority of the patients were men.

Alessandrini et al. assert that[9] individuals whose objectives were to investigate the clinical, trichoscopic, histological, and therapeutic characteristics of diffuse alopecia areata (DAA) and alopecia areata incognita (AAI). They diagnosed AAI in 107 patients, of which only two were male and 105 were female (98.13%); the majority (97.19%) were Caucasians, and the average age was 40.55 years (range: 21–79).

Based on the clinical types of alopecia in all of the patients studied in this study. In the study, 15 patients (25%) had cicatricial alopecia, while 45 patients (75%) had noncicatricial alopecia. Six patients (40%) with Cicatricial alopecia were LPP, while nine patients (60%) were FFA.

26 patients (57.8%) with noncicatricial alopecia had androgenetic alopecia (AGA),[10] patients had androgenetic alopecia (AA), 6 patients had traction alopecia (TE), and 1 patient had traction alopecia (2.2%).

Saqib and co. In their study,[11] reported that the most common clinical diagnosis was Female pattern hair loss (FPHL), followed by AA, telogen effluvium (TE), trichotillomania (TTM), traction alopecia (TA), and tinea capitis. The most prevalent diagnosis among scarring alopecias was pseudopelade of Brocq (PoB), followed by folliculitis decalvans (FD), lichen planopilaris (LPP), and discoid lupus erythematosus (DLE).

Hofny et al.[7] reported 41 (74.5%) patients with alopecia areata, three (5.5%) patients with alopecia totalis, and 11 (20.0%) patients with ophiasis pattern in their research.

Hair shaft diameter diversity, or anisotrichosis, is the most prevalent characteristic in FPHL and represents disease-induced hair miniaturization.[10]

All patients of FPHL had hair shaft diameter variability greater than 20% in the frontal scalp. There were also[12] thin hair and single-hair follicular units. Hypopigmented and nonmedullated vellus hair, a hallmark of extreme miniaturization, was seen in 98.3% of FPHL patients.[13]

The lack of follicles was found in the majority of cicatricial alopecias, perifollicular scaling (PS) and perifollicular white macules were observed in all cases, and perifollicular erythema (PE) was observed in all instances except one case of PoB. LPP-specific findings included perifollicular and interfollicular blue-gray spots, peripilar cast, white dots, and honeycomb pigmentation.[14,15]

Yellow spots and honeycomb pigmentation were shown to be distinct to PoB, whereas polytrichia (tufted hair) was found to be particular to folliculitis decalvans. DLE-specific findings included keratotic follicular plugs, branching vessels, and white spots.[16,17]

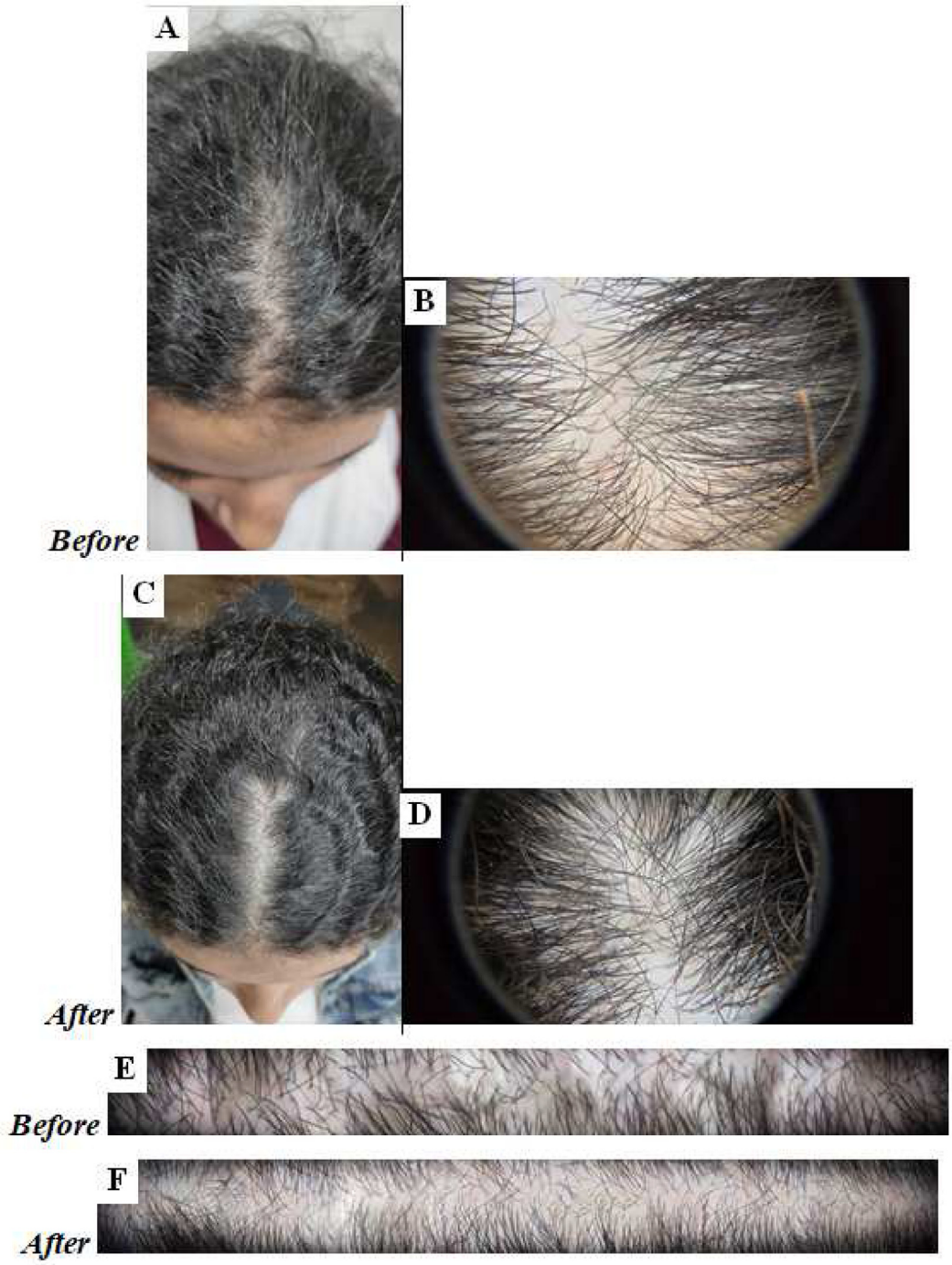

*Fig. 1. **A:** Clinical photo of a female patient 24 years old complaining of diffused hair loss of 1 year duration. **B:** Dermoscopic photo of the same patient 2 cm behind the anterior hair line before the treatment shows increased hair shaft diversity, increased vellus hair. **C:** Clinical photo of the same patient after treatment shows moderate improvement. **D:** Dermoscopic photo of patient after treatment shows increase the diameter of hair shaft, decrease of hair shaft diversity, decrease of vellus hair, appearance of upright regrowing hair. **E:** Panoramic trichoscopy of the same patient before the treatment shows the same features of AGA in the form of increase of hair shaft diversity, increase of vellus hair but in the whole field. **F:** Panoramic trichoscopy of patient after treatment shows increase of hair shaft thickening, decrease of vellus hair but in the whole field.*

Tosti et al.[18] addressed the function of trichoscopy in AAI for the first time, documenting the presence of diffuse yellow spots in 95% of patients. Another trichoscopic characteristic of AAI is the presence of short regrowing hair. (0.2–0.4 mm). Finally, they discovered exclamation point hair, black dots, and dystrophic hair in a tiny number of individuals, validating AAI as a variation of typical AA.

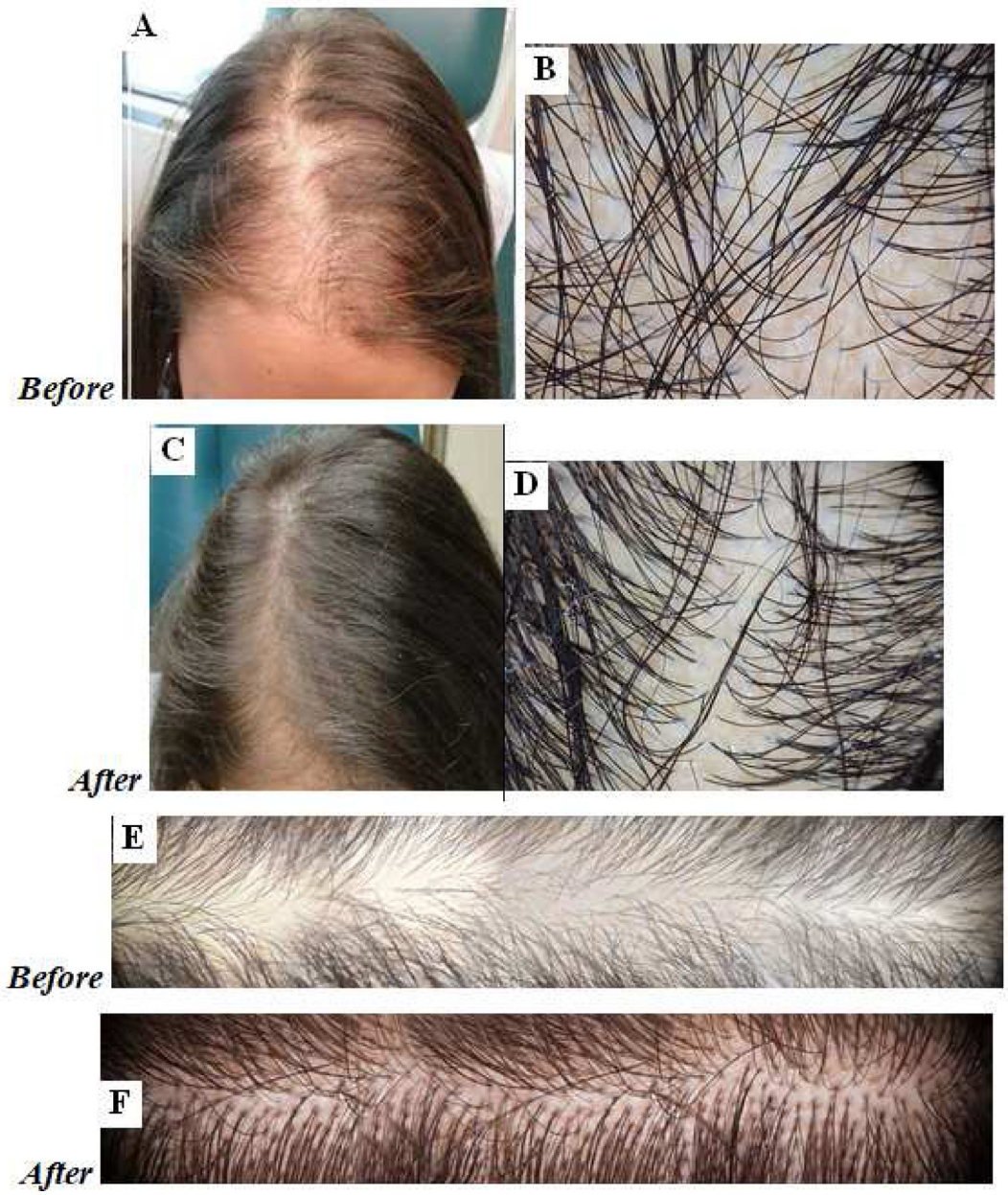

Fig. 2. ***A:*** *Clinical photo of a female patient 34 years old complaining of diffused hair loss 1 year duration.* ***B:*** *Dermoscopic photo of the same patient 2 cm behind the anterior hair line before the treatment shows increase hair shaft diversity, increase vellus hair.* ***C:*** *Clinical photo of the same patient after treatment shows moderate improvement.* ***D:*** *Dermoscopic photo of patient after treatment shows increase the diameter of hair shaft, decrease of hair shaft diversity, decrease of vellus hair, appearance of upright regrowing hair.* ***E:*** *Panoramic trichoscopy of the same patient before the treatment shows the same features of AGA in the form of increase of hair shaft diversity, increase of vellus hair but in the whole field.* ***F:*** *Panoramic trichoscopy of patient after treatment shows increase of hair shaft thickening, decrease of vellus hair but in the whole field.*

The trichoscopic combination of yellow spots and/or short hairs in regrowth has a diagnostic sensitivity for AAI of 96%, according to Inui et al.[19]

To the best of our knowledge, no study has examined panoramic trichoscopy as a novel tool for assessing therapy response in diffuse alopecia in contrast to standard dermoscopy.

We discovered that there was a very statistically significant (*P* value 0.001) improvement in accuracy in panoramic imaged patients (73.7 19.4%) when compared to traditional imaged patients (58.1 17.8%) in our research.

We also discovered a highly statistically significant (*P* value 0.001) improvement in compliance in panoramic imaged patients (77.7 10.9%) over conventional imaged individuals (50.3 9.01%).

According to the patient compliance scale, it was easy in 36 patients (60%) and neutral in 24 patients

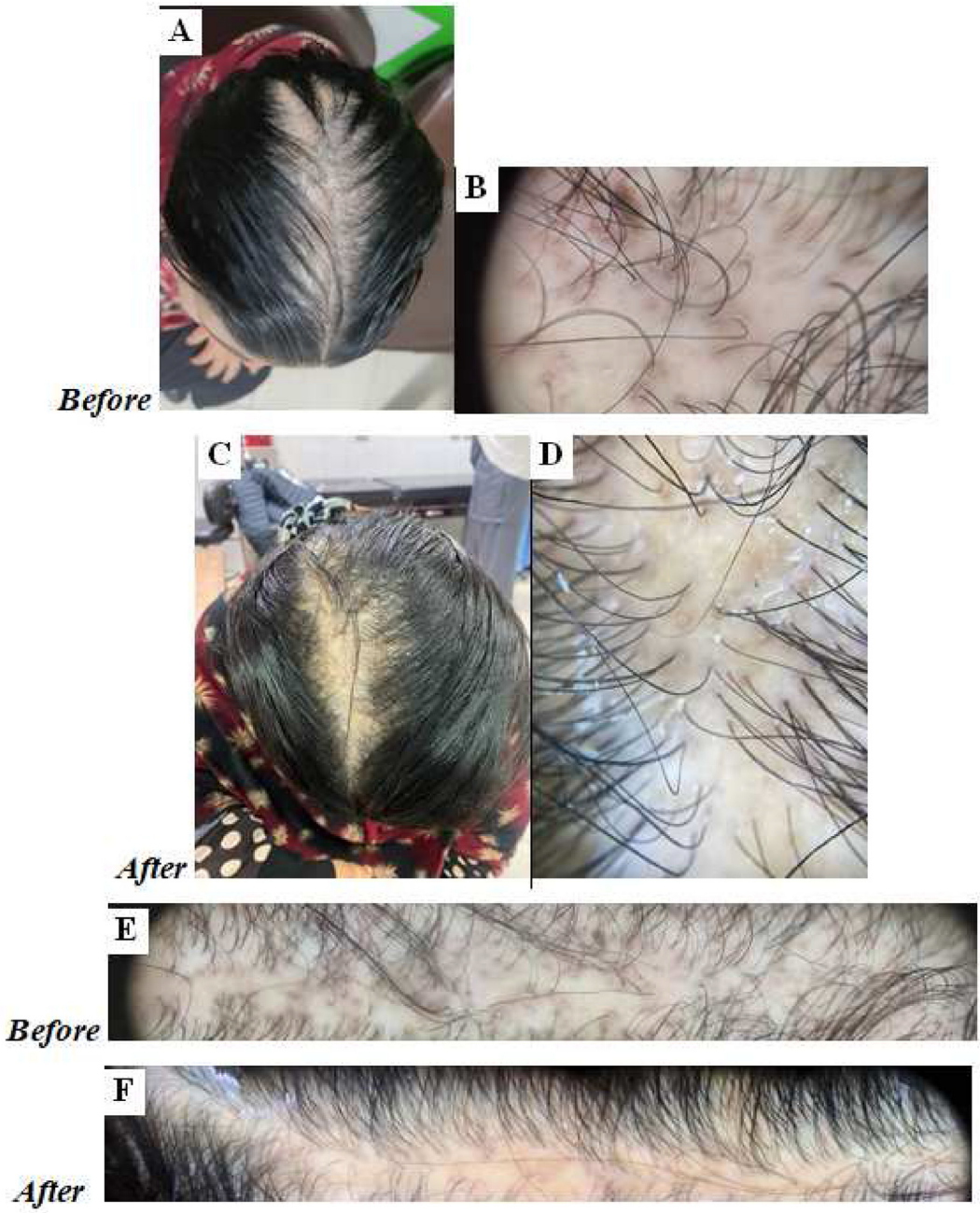

Fig. 3. ***A:*** *Clinical photo of a female patient 42 years old presented with diffused hair loss 5 years duration.* ***B:*** *Dermoscopic photo before treatment shows peri follicular scaling and hair casts with elongated linear blood vessels.* ***C:*** *Clinical photo after 1 month treatment shows mild improvement.* ***D:*** *Dermoscopic photo of the patient after month treatment shows decrease of peri follicular scaling.* ***E:*** *Panoramic trichoscopy before the treatment shows the sam features of dermoscopic photo (B) but in the whole field.* ***F:*** *Panoramic trichoscopy of the patient after treatment shows the sam dermoscopic features (D) but in the whole field.*

(60%) in panoramic imaged patients, whereas it was neutral in 36 patients (60%) and bearable in 24 patients (60%). In terms of imaging technique, there was a very statistically significant difference (*P* value 0.001).

In our investigation, there was 85% agreement between trichoscopic and histological diagnosis (Kappa coefficient: 0.858; 95% CI: 0.711–1.00). The sensitivity and specificity of trichoscopy for FPHL were estimated and found to be high, as well as the diagnostic accuracy. Trichoscopy had a 100% sensitivity and specificity for telogen effluvium (TE), as well as a strong positive predictive value (PPV) and negative predictive value (NPV)·(NPV).[20]

This contrasted with a research by Kowalska-Oledzka et al.,[21] which found a lower sensitivity of 85%. The sensitivity, specificity, and diagnostic accuracy were all high for all scarring alopecias.[22]

In a recent research, trichoscopy was shown to be superior to the standard trichogram for the assessment of early female AGA, with 75% sensitivity and 61.54% specificity.[23]

Perifollicular pigmentation (PFP) was identified as a trichoscopic finding of AGA that was characterized as a typical feature of the scalp in healthy people under the age of 25.[24]

In the current study, the mean satisfaction of all patients was 37 21.2%, with a minimum of 10% and a high of 60%. 23 patients (38.3%) improved little, 26 patients (43.3%) improved significantly, and 11 patients (18.3%) improved moderately.

According to Alessandrini et al.[9] research, both AAI and DAA are safe. In greater detail, 73.8% of patients with AAI improved after just 4 months of therapy, while 49 patients (52.4%) were already in remission after 8 months. Similarly, 68% of DAA patients improved after 4 months of medication, with 60% achieving remission after 8 months. As a result, high-potency topical steroids are used as treatment.

Yellow specks, black dots, broken hairs, tapering hairs, and clustered short vellus hairs were recognized as the most prevalent diagnostic signs for AA by Inui.[25] The most sensitive indicators were yellow spots and short vellus hairs.

Other research has found that severe instances of AA are linked with considerable QoL impairment. Trichoscopic examination found that the most diagnostic symptom was yellow spots, followed by short vellus hair, black dots, broken hairs, and exclamation marks.[26,27]

Tosti et al.[18] found identical trichoscopic characteristics in almost 95% of European cases, with yellow spots being the most distinguishing feature. On the contrary, trichoscopic indications of alopecia areata have been observed to be linked with disease severity.[28] In earlier research, Bapu et al.[29] discovered that the quantity of yellow dots per field of vision linked to the severity of alopecia areata.

The most notable sign in androgenic alopecia was hair diameter variety higher than 20% in all patients with peripilar sign, short vellus hair, and yellow spots, albeit at a lower percentage than in alopecia areata.[7]

Tosti and Torres[30] observed hair diameter variety as a result of hair follicle shrinking, which is a highly diagnostic marker of androgenic alopecia.

4.1. Conclusion

Panoramic trichoscopy is easy, tolerable and new diagnostic method, cost effective, saving time, effort, more easy and complaint for patient with diffuse alopecia.

Declarations

Consent for publication

Not applicable.

Availability of data & materials

Data & materials were available.

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No specific grant was given to this study by funding organizations in public, private, or not-for-profit sectors.

Conflicts of interest

Authors claim to have no conflicts of interest.

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