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Original Article

Correlation of Trichoscopic Findings with Disease Severity in Androgenetic Alopecia

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ABSTRACT

Objective: To study the trichoscopic findings of androgenetic alopecia and correlate them with disease severity in tertiary care hospital.

Place and Duration of Study: Department of Dermatology, PNS Shifa Hospital, Karachi, Pakistan, from Jun to Dec 2022.

Study design: Cross-sectional study.

Methodology: In all, 150 individuals between ages of 18 and 70, of either gender, were enrolled in the study with androgenetic alopecia clinically diagnosed by consultant dermatologist. A thorough physical, systemic, & dermatological examination was performed on each patient. In males with androgenetic alopecia,severity of hair loss was assessed using the Hamilton-Norwood scale, while in females with androgenetic alopecia, Ludwig stages were used. Using a handheld dermatoscope (HEINE DELTA 20T) at 10x magnification, trichoscopic examination was performed.

Results: The mean age of the patient was 32.7± 11.3 years. The majority in our study, 25(26.3%) of 95 male AGA cases, fell into H-N Grade III. 26(47.2%) of the 55 female AGA patients were in Ludwig stage I, which was most prevalent stage in our study. All of variables, with exception of the brown & white peripilar signs, showed a positive connection between trichoscopic findings & disease severity in male AGA. All trichoscopic results were found to be positively correlated with disease severity in female AGA.

Conclusion: Trichoscopy is a useful, practical, easy-to-use equipment for clinical setup since it can aid in early diagnosis of AGA by seeing changes in hair follicle diameter. It also helps in determining how severe condition is. According to this study, scalp biopsies are not necessary when trichoscopy is used to diagnose androgenetic alopecia.

Keywords: Dermatoscope, Female Androgenetic Alopecia, Hair Loss, Male Androgenetic Alopecia, Non-Scarring Alopecia, Scalp Disorders, Trichoscopy.

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INTRODUCTION

Androgen-related hair loss, known as androgenetic alopecia (AGA), occurs in people who are genetically prone to it. Up to 80% of men & less than 42% of women have the disease.[1] The hallmark of AGA is progressive shrinkage of hair follicle, which is brought on by a change in dynamics of the hair cycle & results in conversion of terminal hair follicle to vellus hair.[2] The density of visible scalp hair gradually decreases as a result. The clinical appearance of AGA can differ across men & women.[3] Female androgenetic alopecia (FAGA) differs from male androgenetic alopecia (MAGA) by having more diffuse thinning of the crown area with an intact frontal hairline. MAGA is defined by its usual bitemporal hair recession & balding vertex.[4]

Males and females can be diagnosed with hair disorders using clinical inspection methods, pull test, trichogram, biopsy, & screening blood tests. Sensitivity and invasiveness all differ among them.[5] Trichoscopy of the scalp is a new noninvasive procedure that uses a manual or video dermatoscope with lenses that have magnifications ranging from 10-1000 to help in diagnosis of hair & scalp disorders.[6,7] A working magnification of 10 to 100-fold is typical.[8] The fundamental idea behind dermatoscopy is to illuminate lesion & then magnify it to see any fine details. The perifollicular epidermis, cutaneous micro vessels, hair shafts, & hair follicle openings can all be seen using trichoscopy.[9,10] Trichoscopy enables examination of inherited & congenital hair disorders. According to more recent evidence, the use of trichoscopy in clinical assessment of AGA enhances diagnostic capability beyond straightforward clinical inspection.

Trichoscopy has been shown in the present study to be of the utmost assistance in the diagnosis of androgenetic alopecia, and it eliminates the need for

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skin biopsy for the diagnosis of common causes of non-scarring alopecia. Hence, the study aims to correlate trichoscopic findings of androgenetic alopecia with disease severity to reinforce its validity.

METHODOLOGY

After receiving clearance from the PNS Shifa Hospital's ethical council (ERB NO. ERB/2022/DERMA/34) for study's protocol, the study was conducted in Department of Dermatology, PNS Shifa Hospital, Karachi, Pakistan, from Jun to Dec 2022. After getting written informed consent, 150 patients from dermatology outpatient department who were of either gender & were in 18–70 age range were added to study. The approach of purposive sampling was applied. Using prevalence of AGA in females, which is 42%,1 the Openepi calculator calculated sample size to be 150 with a margin of error of 8% & 95% confidence level.

Each patient got thorough systemic, dermatological, & general physical exams. Clinical evidence served as the basis for the AGA diagnosis. The clinical staging of male AGA was done using Hamilton-Norwood grading system, while female AGA was graded using Ludwig staging system on the basis of the pattern and progression of hair loss. Individuals with any type of scalp condition, including scalp psoriasis, trichotillomania, alopecia areata, and non-scarring alopecia, were not allowed to participate in the study. Patients on hormonal replacement therapy, breastfeeding mothers, and pregnant people were also eliminated.

Each patient underwent a trichoscopic evaluation utilizing a handheld dermatoscope (HEINE DELTA 20T) at 10x magnification. The clinical and dermoscopic images were kept in an iPhone 13 Promax, and trichoscopic disease patterns were noted. To prevent diversification, just one person captured trichoscopy images. The choice of the trichoscopic factors used in the evaluation procedure was made based on the knowledge and information found in the literature.

Fields examined on trichoscope: Male androgenetic alopecia: Vertex, frontal, and temporal hairline hair loss regions, as well as the genetically spared occipital area, were inspected and photographed for examination.

Female androgenetic alopecia: Images were taken of the frontal, temporal, crown, and occipital regions after observations were made.

Parameters seen in trichoscopic examination are: The characteristic of AGA is hair shaft thickness heterogeneity (HSTH), which is greater than 20% in males (MAGA) and greater than 10% in females (FAGA), The emergent hair shaft has a brown halo known as the brown peripilar sign (BPPS), White peripilar sign (WPPS): A white halo at the follicular ostium that is bigger in size, Yellow dots: Yellow dots are best seen in polarized light and are either spherical or polycyclic. It shows an empty hair follicle, Focal atrichia: Areas of scalp with no hair at all, Scalp honeycomb pigmentation (SHCP): These ridges are associated with melanotic skin.

SPSS version 26 was used to enter and evaluate the data. For quantitative variables like age and duration of baldness, mean and standard deviation were calculated. For categorical factors including gender, stage of hair loss, and trichoscopic findings, frequencies and percentages were determined. The connection between trichoscopic observations in androgenetic alopecia and disease severity was evaluated using the chi-square test. At p-value < 0.05, the statistical test was deemed statistically significant.

RESULTS

In present study a total 150 AGA patients were included. The mean age of the patient was 32.7±11.3 years with mean duration of baldness was 7± 5 months. Out of 150 AGA cases, 95(63.3%) were male and 55(36.6%) were female. Out of 95 male AGA cases, 25(26.3%) cases were in H-N Grade III, which was the highest in this study. Among 55 female AGA cases, 26(47.2%) cases were in Ludwig stage I, which was the most frequent in our study, shown in Table-I.

Table-I: Demographic Details of the Patients (n=150)

Demographics	Group A (n=35)
Age (Mean + SD)	32.7± 11.3 years
Duration of Baldness(Mean + SD)	7.0± 5.7 months
Gender n (%)	
Male	95(63.3%)
Female	55(36.7%)
Grade of Baldness (Male) n (%)(n=95)	
HN-Grade-I	15(15.7%)
HN-Grade-II	24(25.2%)
HN-Grade-III	25(26.3%)
HN-Grade-IV	16(16.8%)
HN-Grade-V	13(13.6%)
HN-Grade-IV	02(2.1%)
Grade of Baldness (female-Ludwig stage) n (%)(n=55)	
Grade-I	26(47.2%)
Grade-II	24(43.6%)
Grade-III	05(9%)

**HN = Hamilton-Norwood grade*

The frequency of trichoscopic findings found in our study is shown in Table-II

Table-II: Trichoscopic Findings in Androgenetic Alopecia

Trichoscopic Findings in Androgenetic Alopecia	n(%)
HSTH	143(95.3%)
BPPS	24(16.0%)
WPPS	11(7.3%)
Yellow Dots	57(38.0%)
Focal Atrichia	98(65.3%)
Scalp Honeycomb Pigmentation	33(22.0%)

Among male AGA, HSTH was common in Hamilton-Norwood grade H-N 2, and the rest of the findings were most frequent in H-N 3. A positive correlation between trichoscopic findings with respect to disease severity was seen in all of the variables except WPPS and BPPS, shown in Table-III

Among female AGA patients, HSTH was common in Ludwig grade I, and the rest of the findings were higher in grade II female AGA patients. A positive correlation between trichoscopic findings and disease severity was observed, as shown in Table-IV.

DISCUSSION

Hamilton-Norwood grades were used to assign grades to male AGA. 25(26.3%) of the 95 MAGA cases were in H-N Grade III, which was the greatest percentage in males in our study. Out of the fifty-four female AGA cases, 26(47.2%) and 24(43.6%) were Ludwig stage I and grade II, respectively. The pattern of hair loss in female AGA was graded according to Ludwig's classification.

H-N Grade III 25 cases (26.3%) and Grade II 24 cases (25%) made up the majority of the 95 MAGA cases in our investigation. These findings are consistent with those made by Sehgal[14] *et al.*, Grover[15] *et al.*, in the Indian community, and Paik *et al.*, in the Korean population.[16] Nonetheless, Grade II was followed by Grade I (22.12%) and Grade III (21.78%) in a research by Krupa *et al.*, among the Indian population[17]. Grade IV was the most prevalent type in the Chinese study by Wang *et al.*[18] In contrast, we found in our study that individuals with AGA of either gender most frequently have HSTH, which has been previously described as a characteristic of AGA.[19] Ozlem *et al,*[20] and Kibar *et al,*[21] observed similar findings and stated that HSTH was the most prevalent finding in their investigations. Galliker *et al.*, researched 89 individuals with FPHL and found that HSTH was present in 64(72%) of early and 89(100%) of advanced FAGA.[22]

In our study, BPPS is observed in 16(16.8%) of MAGA and 8(14.5%) of FAGA. Inui *et al.*,[23] earlier Asian study identified 66% and 20% of male and female cases, respectively. In contrast, Hu *et al* study in China found that 44.0% of MAGA and 44.5% of FAGA were present.[11] Study by Zhang et al., also confirmed that FAGA had a 31.7% incidence.[13]

Table-III: Trichoscopic Findings in H-N Grades of Male Androgenetic Alopecia (n=95)

Trichoscop ic Findings in Androgenetic Alopecia	H-n 1 (n=15)	H-n 2 (n=24)	H-n 3 (n=25)	H-n 4 (n=16)	H-n 5 (n=13)	H-n 6 (n=02)	*p*-value
HSTH	10(66.6%)	24(100.0%)	24(96.0%)	16(100.0%)	13(100.0%)	02(100.0%)	< 0.001
BPPS	02(13.3%)	04 (16.6%)	08(32.0%)	02(12.5%)	00(0.0%)	00(0.0%)	0.146
WPPS	00(0.0%)	00(0%)	03(12.0%)	00(0.0%)	00(0.0%)	00(0.0%)	0.103
Yellow Dots	00(0.0%)	07(29.2%)	10(40.0%)	14(87.5%)	10(76.9%)	00(0.0%)	< 0.001
Focal Atrichia	03(20.0%)	17(70.8%)	24(96.0%)	16(100.0%)	12(92.3%)	02(100.0%)	< 0.001
Scalp Honeycomb Pigmentation	00 (0.0%)	01 (4.1%)	12 (48.0%)	06 (37.5%)	08 (61.5%)	00 (0.0%)	< 0.001

**HSTH = hair shaft thickness heterogeneity*
BPPS = brown peripilar sign
WPPS = White peripilar sign

Table-IV: Trichoscopic Findings in H-N Grades of Female Androgenetic Alopecia (n=55)

Trichoscopic Findings in Androgenetic Alopecia	Grade-I (n=26)	Grade-II (n=24)	Grade-III (n=05)	*p*-value
HSTH	26(100.0%)	22(91.6%)	04(80.0%)	< 0.001
BPPS	00(0.0%)	08(33.3%)	00(0.0%)	0.007
WPPS	00(0.0%)	08(33.3%)	00(0.0%)	<0.001
Yellow Dots	04(15.3%)	08(33.3%)	04(80.0%)	0.005
Focal Atrichia	02(7.6%)	18(75.0%)	04(80.0%)	<0.001
Scalp Honeycomb Pigmentation	00(0.0%)	06(25.0%)	00(0.0%)	0.034

In our study, WPPS was observed in 8(14.5%) of the females in Ludwig Stages II and 3(3.1%) of the MAGA cases in H-N Grade-III. In contrast to our findings, a Chinese study by Hu *et al.,* found that 15.0% of female and 20.7% of male AGA patients had WPPS. They discovered it in 72.4% of students in H-N Grade VII, 65% in Grade VI, and 37% in Grade V. It was noted in 26.7% of FAGA patients with advanced stages in another study conducted by Zhang *et al.*[13] In the advanced stages of AGA, we surmise that this symptom was associated with perifollicular fibrosis.[12]

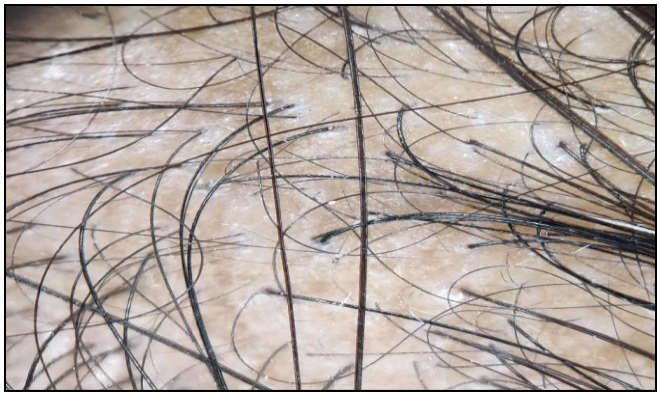

Figure-1: Showing variation in hair shaft thickness diameter, thin vellus hair, follicles containing single hair.

Oriol Yélamos *et al.,* reported in their study that yellow spots reflect the follicular infundibulum, which is enlarged with keratinocytes and sebum that are degenerating.[24] In contrast to the honeycomb pigment, they could appear light in darker skin tones. Although they can appear in androgenetic alopecia and other illnesses of the scalp, yellow spots are a defining feature of alopecia areata (AA).[24] In contrast to other dermatoses, where keratinolytic materials predominate, in androgenetic alopecia, yellow spots are visible in more advanced stages of the illness with a sebaceous component predominating over keratotic elements. They are less common than those observed in alopecia areata,[25] have variable size and distribution and are more frequently detected in the frontal than the occipital regions of AGA. Yellow spots are visible in 57(38%) of the AGA patients in the current investigation. It is more prevalent in patients in grades 3, 4, and 5 in both males and females, while it is somewhat more prevalent in patients in grades I to III in females. This has statistical importance. Yellow dots were present in 20.9% of patients reported by Hu et al.,11 and 20% in the study by Salahudeen *et al.*,[25]. Furthermore, studies by Innui *et al.*,[23] reported 23.3% of patients, and Kibar et al., reported 68% of patients.21 In the study by Ummiti *et al.,* 91.2%19 of the participants had yellow spots, and the reason for the disparity is assumed to be related to the study population's racial makeup.

In the current study, 33 participants (22%)—81.8% men and 18% women—had pigmentation in the shape of a honeycomb. There is a statistically significantly higher incidence of the honeycomb pattern of pigmentation in grades 2 and 3 for males and 1 for females. HCP has been reported in studies by Kibar *et al.*,[21] and Hu *et al.*,[11] in 37.3% and 32.6%, respectively. The disparity could be explained by racial differences and differences in solar exposure. However, a study conducted in India by Ummiti *et al.,* revealed a greater frequency of HCP i.e. 85.7%.[19]

Little, 4mm-diameter patches of the scalp that are devoid of growing hairs are known as focal atrichia. Zhang *et al.*,[13] asserted that there is a positive link between focal atrichia and stage of hair loss, arguing that it is a clinical signal to the diagnosis of female pattern hair loss, particularly the late-onset subtype. In the current investigation, 98 subjects (65.3%) had focal atrichia. Grade 2 females have a greater incidence than grade 1 & grade 3 females, which has been determined to be statistically significant. Focal atrichia is present in grade.[2,3,] and 4 considerably in a higher percent persons than in the early stages of AGA in males. The findings of the current investigation, which show a positive association between atrichia and later stages, thus signifying a strong association of trichoscopic findings with disease severity.

LIMITATIONS OF STUDY

The study's main limitations are a small sample size and a single-centered focus; as a result, the generalizability of the findings may be in doubt. For the purposes of comparing trichoscopic features, the normal population and cases of other types of hair loss were not included in the current study, which could have improved the study design.

More studies with larger sample sizes and better study designs should be conducted to obtain more significant and meaningful outcomes. It may also be planned for future studies to compare trichoscopic and histological findings with other types of non-scarring alopecia.

CONCLUSION

Trichoscopy is a useful, practical, easy-to-use equipment for clinical setup since it can aid in the early diagnosis of AGA by seeing changes in hair follicle diameter. It also helps in determining how severe a condition is. Depending on the correlation of trichoscopic findings with clinical severity, a severity scale based on trichoscopic findings can be made. By highlighting the differences in

trichoscopic features between patients who are "on treatment" and "off treatment," trichology also demonstrated its value in demonstrating a positive correlation between trichoscopic features and disease severity and in monitoring treatment response in AGA patients.

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Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

AA & NA: Data acquisition, data analysis, critical review, approval of the final version to be published.

SK & RB: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

OF & GY: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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