RESEARCH PAPER

Association of Trichoscopic Findings with SALT Severity Scores in Alopecia Areata: A Cross-Sectional Study

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ABSTRACT

Background: Alopecia areata (AA) is a common autoimmune disorder with significant psychosocial impact. Trichoscopy is a valuable non-invasive tool for diagnosis and monitoring, but data on the correlation between trichoscopic findings and disease severity assessed by the Severity of Alopecia Tool (SALT) score remain limited, particularly in South Asian populations. Therefore, aim of the study to evaluate the association between trichoscopic findings and SALT severity scores in patients with alopecia areata.

Methods: This cross-sectional study was conducted at the Department of Dermatology and Venereology, Bangladesh Medical University, Dhaka, from October 2023 to August 2025. Sixty-two patients with clinically and trichoscopically confirmed alopecia areata were recruited. Disease severity was assessed using the SALT score. Trichoscopic examination was performed using a polarized dermoscope (DermLite DL5). The presence of yellow dots, black dots, broken hairs, exclamation mark hairs, and short vellus hairs was recorded. Data were analyzed using SPSS version 26, with chi-square tests for associations ($p < 0.05$ considered significant).

Results: The mean age of participants was 23.3 ± 13.2 years, with male predominance (69.4%). Multiple patchy alopecia areata was the most common subtype (66.1%). According to SALT grading, 59.7% had mild disease (S1). The most frequent trichoscopic findings were broken hairs (85.5%) and black dots (74.2%). Significant associations were observed between SALT severity and yellow dots ($p < 0.001$), black dots ($p = 0.003$), and broken hairs ($p < 0.001$). Yellow dots were more common in severe disease (S3–S5), while black dots and broken hairs predominated in mild cases (S1). Yellow dots and broken hairs also showed significant associations with the multiple patchy subtype ($p < 0.001$ and $p = 0.005$, respectively).

Conclusion: Specific trichoscopic features correlate significantly with disease severity in alopecia areata. Trichoscopy may serve as a useful non-invasive tool for assessing severity and guiding management in clinical practice. Larger longitudinal studies are recommended to validate these findings.

Keywords: Alopecia areata, Trichoscopy, SALT score, Yellow dots, Black dots, Bangladesh

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INTRODUCTION

Alopecia areata (AA) is a prevalent chronic autoimmune disorder characterized by non-scarring hair loss due to T-lymphocyte-mediated immune attack on anagen-stage hair follicles [1,2]. It represents one of the most common causes of patchy alopecia worldwide. Global epidemiological data indicate that AA affects approximately 2% of the general population, with a lifetime incidence approaching 2.1% [3,4]. Recent analyses from the Global Burden of Disease (GBD) Study 2021 revealed a substantial rise in absolute case numbers, increasing from 20.43 million in 1990 to 30.89 million in 2021, although age-standardized incidence rates showed a modest decline [5,6]. The disease exhibits a bimodal age distribution, with peak onset in the second to fourth decades of life, and affects both sexes, though some studies report a slight female predominance in severe forms [7,8]. Beyond physical hair loss, AA significantly impairs psychosocial well-being, leading to anxiety, depression, social withdrawal, and diminished quality of life, particularly among adolescents and young adults [9,10].

In low- and middle-income countries (LMICs), the burden of AA is increasingly recognized as a public health concern. Population growth, urbanization, environmental stressors, and limited healthcare access contribute to higher disease impact in these regions [11,12]. Studies from Asia and Africa suggest that AA accounts for 1–2% of dermatology outpatient visits, often presenting with more extensive disease due to delayed diagnosis and treatment [13]. Regional variations influenced by genetic susceptibility, nutritional deficiencies, infections, and socioeconomic factors have been documented, with higher disability-adjusted life years (DALYs) observed in areas with lower sociodemographic index (SDI) [6,12]. In South Asia, where dermatological disorders constitute a large proportion of healthcare demand, AA remains relatively understudied despite its visible and stigmatizing nature [12,13].

In Bangladesh, epidemiological data on AA are particularly scarce. Hospital-based studies from tertiary centers in Dhaka report that AA comprises a notable fraction of alopecia cases, with male predominance and frequent multiple patchy presentations [11]. Local environmental and genetic factors, including high prevalence of micronutrient deficiencies and infections, may modify disease expression and severity in this population [11]. However, most existing research from Bangladesh is limited to basic demographic descriptions, lacking detailed clinicopathological correlations using standardized tools such as trichoscopy and the Severity of Alopecia Tool (SALT) score.

Trichoscopy has revolutionized the non-invasive diagnosis and monitoring of hair disorders. Characteristic trichoscopic features of AA include yellow dots (representing follicular plugging with keratin and sebum), black dots (broken hair shafts within follicles), broken hairs, exclamation mark hairs, and short vellus hairs [18,19]. These findings not only aid in diagnosis but may also reflect disease activity and severity. The SALT score, which quantifies scalp hair loss by dividing the scalp into four topographic areas, remains the gold standard for objective severity assessment [20]. Several international studies have investigated the relationship between trichoscopic patterns and SALT scores, yielding variable results. While many reports associate yellow dots with severe disease and black dots or broken hairs with milder forms, others have failed to demonstrate consistent correlations [14,16,17,21–23]. Most of these studies originate from high-income countries or large Indian tertiary centers, with minimal representation from Bangladesh or similar resource-constrained South Asian settings [12,13].

Despite the growing global recognition of trichoscopy as a valuable tool in alopecia areata, there remains a significant research gap in understanding the association between trichoscopic findings and disease severity assessed by SALT score in the Bangladeshi population. Therefore, the present cross-sectional study aimed to evaluate the association of trichoscopic features with SALT severity scores and clinical subtypes among patients with alopecia areata attending a tertiary dermatology department in Dhaka, Bangladesh.

MATERIALS AND METHODS

Study Design and Setting

This cross-sectional observational study was conducted in the Department of Dermatology and Venereology at Bangladesh Medical University (BMU), Dhaka, Bangladesh, from October 2023 to August 2025. The study aimed to evaluate the association between trichoscopic findings and disease severity, as measured by the Severity of Alopecia Tool (SALT) score, in patients with alopecia areata.

Inclusion and Exclusion Criteria

Patients of all ages and both sexes with confirmed alopecia areata based on clinical and trichoscopic evaluation were included if they provided written informed consent (or parental/guardian consent for minors). Patients were excluded if they had received any topical or systemic treatment for alopecia areata within the previous 2 months, had coexisting androgenetic alopecia or other non-scarring alopecias, active scalp infections or inflammatory scalp disorders, or suspected or confirmed alopecia universalis.

Sample Size

The required sample size was calculated using the single population proportion formula, assuming a 3.8% prevalence of alopecia areata, a 95% confidence level, and a 5% margin of error. This yielded a minimum sample of 57 participants. Allowing for a 10% non-response rate, the final target sample size was 62 patients. Eligible participants were recruited using consecutive sampling.

Clinical Assessment

Demographic and clinical data, including age, sex, duration of disease, clinical subtype of alopecia areata, and sites of scalp involvement, were recorded using a standardized case record form. Disease severity was assessed using the Severity of Alopecia Tool (SALT) score. The scalp was divided into four regions—vertex (40%), right profile (18%), left profile (18%), and posterior scalp (24%)—and the percentage of hair loss in each region was multiplied by the respective weighting factor and summed to obtain the total SALT score. Patients were categorized into S1 (<25% hair loss), S2 (25–49%), S3 (50–74%), S4 (75–99%), and S5 (100% hair loss).

Trichoscopic Examination

Trichoscopy was performed using a handheld polarized dermoscope (DermLite DL5, 3Gen Inc., USA). The dermoscope lens was disinfected before each examination according to standard infection control protocols. Affected scalp areas were examined systematically under ×10 magnification, and representative images were captured with a smartphone adapter and stored digitally for subsequent evaluation. The presence or absence of the following trichoscopic features was recorded: yellow dots, black dots, broken hairs, exclamation mark hairs, and short vellus hairs.

Study Procedure

Patients who fulfilled the eligibility criteria were sequentially recruited after obtaining written informed consent. Following clinical confirmation of alopecia areata, demographic and clinical data were collected. Disease severity was then assessed using the SALT scoring system. Trichoscopic examination was subsequently performed, and the relevant trichoscopic findings were documented. All data were recorded in a structured case record form and entered into a database for analysis.

Statistical Analysis

Data were analyzed using IBM SPSS Statistics for Windows, version 26.0 (IBM Corp., Armonk, NY, USA). Continuous variables are presented as mean ± standard deviation (SD), and categorical variables as frequencies and percentages. The association between trichoscopic findings and SALT severity grades was evaluated using the chi-square test or Fisher's exact test, as appropriate. A two-tailed *p*-value <0.05 was considered statistically significant.

Ethical Considerations

The study protocol was approved by the Institutional Review Board (IRB) of Bangladesh Medical University (Approval No. BSMMU/2024/90). Written informed consent was obtained from all adult participants and from parents or legal guardians of participants under 18 years of age. The study was conducted in accordance with the Declaration of Helsinki, and patient confidentiality and data anonymity were strictly maintained.

RESULTS

Table 1. Baseline Demographic and Clinical Characteristics of Patients with Alopecia Areata (N = 62).

Characteristics	Frequency (%)
Age (years), mean ± SD	23.3 ± 13.2
Age group (years)	
2–10	11 (17.7)
11–20	20 (32.3)
21–30	14 (22.6)
31–40	10 (16.1)
>40	7 (11.3)
Sex	
Male	43 (69.4)
Female	19 (30.6)
Disease duration	
<6 months	27 (43.5)
≥6 months	35 (56.5)
Duration (months), mean ± SD	15.4 ± 23.1
Clinical subtype	
Localized patchy AA	15 (24.2)
Multiple patchy AA	41 (66.1)
Alopecia totalis	4 (6.5)
Ophiasis	1 (1.6)
Sisaipho	1 (1.6)

A total of 62 patients with alopecia areata were included in this study. The mean age was 23.3 ± 13.2 years (range, 2–55 years), with 50.0% of participants aged 20 years or younger. Males constituted 69.4% (n=43) and females 30.6% (n=19). The mean disease duration was 15.4 ± 23.1 months (range, 1–120 months), and 56.5% of patients had disease duration of ≥6 months. The most common clinical subtype was multiple patchy alopecia areata (66.1%, n=41), followed by localized patchy alopecia areata (24.2%, n=15), alopecia totalis (6.5%, n=4), ophiasis (1.6%, n=1), and sisaipho (1.6%, n=1) (Table 1).

Table 2. Distribution of SALT Severity Grades and Trichoscopic Findings (N = 62).

Characteristics	Frequency (%)
SALT severity grade	
S1 (<25% hair loss)	37 (59.7)
S2 (25–49% hair loss)	10 (16.1)
S3 (50–74% hair loss)	6 (9.7)
S4 (75–99% hair loss)	4 (6.5)

S5 (100% hair loss)	5 (8.1)
Trichoscopic findings	
Broken hairs	53 (85.5)
Black dots	46 (74.2)
Yellow dots	15 (24.2)
Short vellus hairs	14 (22.6)
Exclamation mark hairs	10 (16.1)

Distribution of SALT severity grades and trichoscopic findings is summarized in Table 2. The majority of patients had mild disease: S1 (59.7%, n=37), S2 (16.1%, n=10), S3 (9.7%, n=6), S4 (6.5%, n=4), and S5 (8.1%, n=5). Broken hairs were the most frequent trichoscopic feature (85.5%, n=53), followed by black dots (74.2%, n=46), yellow dots (24.2%, n=15), short vellus hairs (22.6%, n=14), and exclamation mark hairs (16.1%, n=10) (Table 2).

Table 3. Association Between Trichoscopic Findings and SALT Severity Scores (N = 62)

SALT grade	**Yellow dots, n (%)**	**Black dots, n (%)**	**Broken hairs, n (%)**	**Exclamation mark hairs, n (%)**	**Short vellus hairs, n (%)**
S1 (<25 %)	0 (0.0)	30 (65.2)	36 (67.9)	6 (60.0)	10 (71.4)
S2 (25–49%)	1 (6.7)	8 (17.4)	10 (18.9)	2 (20.0)	3 (21.4)
S3 (50–74%)	5 (33.3)	6 (13.0)	5 (9.4)	1 (10.0)	1 (7.1)
S4 (75–99%)	4 (26.7)	1 (2.2)	1 (1.9)	0 (0.0)	0 (0.0)
S5 (100%)	5 (33.3)	1 (2.2)	1 (1.9)	1 (10.0)	0 (0.0)
Total positive, n	**15**	**46**	**53**	**10**	**14**
***p*-value**	**<0.001**	**0.003**	**<0.001**	**0.919**	**0.481**

SALT severity was significantly associated with the presence of yellow dots, black dots, and broken hairs. Yellow dots were predominantly observed in patients with severe alopecia areata: 14 of 15 patients (93.3%) with yellow dots had SALT grades S3–S5 ($p < 0.001$). In contrast, black dots and broken hairs were more frequently observed in lower SALT grades. Among patients with black dots, 30 (65.2%) had S1 disease, while 36 (67.9%) of those with broken hairs had S1 disease. The associations were statistically significant for black dots ($p = 0.003$) and broken hairs ($p < 0.001$). No significant associations were found between SALT severity and exclamation mark hairs ($p = 0.919$) or short vellus hairs ($p = 0.481$) (Table 3).

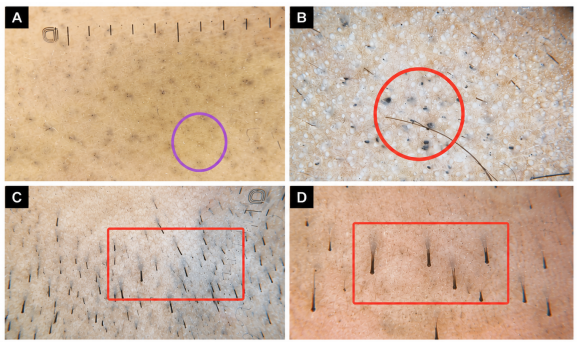

Figure 1: Representative trichoscopic findings in alopecia areata. (A) Yellow dots (purple circles) appearing as yellowish follicular openings filled with keratin and sebum. (B) Black dots (red circles) representing pigmented hair shaft residues. (C) Broken hairs (red boxes) showing fractured hair shafts of varying lengths. (D) Exclamation mark hairs (red boxes) characterized by proximal tapering. All images were captured using a polarized dermoscope (DermLite DL5, 3Gen Inc., USA).

Table 4. Association Between Trichoscopic Findings and Clinical Type of Alopecia Areata (N = 62).

Trichoscopic Finding	**Localized Patchy AAn (%)**	**Multiple Patchy AAn (%)**	**Alopecia Totalisn (%)**	**Ophiasisn (%)**	**Sisaiphon (%)**	***p*-value ***
Yellow dots (n=15)	0 (0.0)	10 (66.7)	4 (26.7)	0 (0.0)	1 (6.7)	<0.001
Black dots (n=46)	12 (26.1)	31 (67.4)	1 (2.2)	1 (2.2)	1 (2.2)	0.195
Broken hairs (n=53)	15 (28.3)	35 (66.0)	1 (1.9)	1 (1.9)	1 (1.9)	0.005
Exclamation mark hairs (n=10)	3 (30.0)	7 (70.0)	0 (0.0)	0 (0.0)	0 (0.0)	0.853
Short vellus hairs (n=14)	3 (21.4)	11 (78.6)	0 (0.0)	0 (0.0)	0 (0.0)	0.693

Trichoscopic findings also demonstrated significant associations with clinical subtypes of alopecia areata (Table 4). Yellow dots ($p < 0.001$) and broken hairs (p

= 0.005) were strongly correlated with disease subtype, being most prevalent in multiple patchy alopecia areata. Yellow dots were absent in localized patchy alopecia areata. No significant associations were observed between clinical subtype and black dots, exclamation mark hairs, or short vellus hairs (Table 4).

DISCUSSION

The present study demonstrated significant associations between specific trichoscopic findings and disease severity as measured by the SALT score in patients with alopecia areata. Yellow dots were strongly associated with higher SALT grades (S3–S5) ($p < 0.001$), whereas black dots ($p = 0.003$) and broken hairs ($p < 0.001$) were predominantly observed in patients with mild disease (S1). Exclamation mark hairs and short vellus hairs did not show significant correlations with disease severity. Additionally, yellow dots and broken hairs were significantly associated with the multiple patchy subtype of alopecia areata.

These findings align with several previous reports. Yellow dots, representing dilated follicular infundibula filled with keratin and sebum, are widely regarded as a marker of disease activity and chronicity. Their strong association with higher SALT scores in our study is consistent with observations by Badar et al. [14] and other researchers who reported higher prevalence of yellow dots in severe and long-standing AA. This feature likely reflects prolonged follicular inflammation and keratin plugging, which are more prominent in extensive disease. Conversely, the predominance of black dots and broken hairs in mild cases (S1) supports the view that these represent acute hair shaft damage in actively progressing but limited lesions, findings that mirror those reported by Inui et al. [15] and Sharma et al. [16].

Our results partially corroborate and partially differ from earlier studies. While some investigators have reported significant correlations between multiple trichoscopic features and SALT score [14,16], others found no consistent relationship, particularly for exclamation mark hairs and short vellus hairs [17,21,22]. The lack of association with exclamation mark hairs in our cohort may be attributed to the relatively small number of patients with this feature (16.1%) or differences in disease duration at the time of examination. Short vellus hairs, often considered a sign of disease recovery or miniaturization, also did not correlate with severity, which is in agreement with findings by Dias et al. [17].

The strong association of yellow dots and broken hairs with multiple patchy alopecia areata observed in this study highlights the clinical heterogeneity of the disease. Multiple patchy AA, being the most common subtype in our population (66.1%), may represent an intermediate disease state with higher inflammatory activity compared to localized forms. This pattern is consistent with reports from South Asian populations where multiple patch disease is frequently encountered [13,16].

The clinical implications of these findings are noteworthy. Trichoscopy offers a rapid, non-invasive method to assess disease severity and activity, which may guide treatment decisions in resource-limited settings. The presence of numerous yellow dots may indicate the need for more aggressive systemic therapy, while predominant black dots and broken hairs in mild cases may predict better response to topical or intralesional treatments.

Strengths and Limitations

This study has several strengths. It is among the first in Bangladesh to systematically investigate the relationship between trichoscopic findings and SALT score-assessed disease severity. The use of a standardized dermoscopic device with digital image documentation, strict adherence to inclusion and exclusion criteria, and consecutive patient recruitment enhanced the reliability of the results. The study addresses an important clinical gap in a South Asian population where such data are limited.

CONCLUSION

The severity of alopecia areata was substantially correlated with trichoscopic results. Higher SALT grades were more likely to have yellow dots, whereas moderate illness was more likely to have black dots and damaged hairs. This suggests that trichoscopy is a quick, non-invasive method of assessing severity. However, the small sample size and single-center cross-sectional design restrict generalisability and make it unable to assess changes due to time or therapy. To validate these correlations and ascertain the predictive significance of trichoscopic characteristics, larger multicenter longitudinal investigations are required.

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