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EVALUATION AND PROGNOSTICATION OF TRICHOSCOPIC FINDINGS IN PATIENTS WITH ALOPECIA AREATA (AA) BEFORE AND AFTER APPLICATION OF DIPHENYLCYCLOPROPENONE (DPCP).

Dermatology

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ABSTRACT

Background: Alopecia areata (AA) is a chronic inflammatory disease of hair follicles, causing non-scarring alopecia. Trichoscopy is a noninvasive and inexpensive diagnostic procedure used increasingly in dermatology and hence can be used to evaluate findings in alopecia areata.

Aims And Objectives:

- To evaluate the clinical and trichoscopic findings of patients with AA.
- To identify prognostic factors in diphenylcyclopropenone (DPCP) response rate.

Materials And Methods: Sixteen patients with AA were included, and baseline hair loss was calculated based on the severity of alopecia tool (SALT) score. Trichoscopic findings of AA were evaluated at baseline before DPCP and at the end of 12 th week after DPCP application. **Results:** Men (M: F=4.3:1) with a mean age of 33.6 years were commonly affected with a mean duration of 9.9 months in this study. Most of the patients had localized type with three patches over the scalp and a SALT subclass of S1. The mean regrowth was 82.56 %. Trichoscopic findings like black dots, depigmented vellus hairs, broken hairs, depigmented terminal hair, and exclamation mark hairs decreased whereas pigmented vellus hairs increased after the 12th week. **Limitations:** Insufficient sample size **Conclusion:** Black dots, depigmented vellus hairs, broken hairs, and exclamatory mark hairs are considered to be bad prognostic factors and were found to be reduced with DPCP in our study whereas the significant increase of pigmented vellus hairs which is a good prognostic factor was noted after DPCP when compared to baseline. This study concludes that trichoscopy is an invaluable tool in diagnosing AA and assessing the treatment response to DPCP.

KEYWORDS

Alopecia areata, DPCP, trichoscopy

INTRODUCTION

Alopecia areata (AA) is a chronic, inflammatory, autoimmune disease that can affect the scalp and other hair-bearing sites of the body causing nonscarring hair loss.[1] The AA prevalence is approximately 0.1%–0.2% in the general population with the lifetime risk of 1.7% for an individual.[2] It is a relatively common condition. It does not pose a threat to life, but it causes psychological stress and impacts on the quality of life.[3]The incidence is equal in both genders; extensive cases, however, are predominant in men.[4,5]

Ikeda classified alopecia areata into common type, atopic type, autoimmune type and pre-hypertensive type.[6]

Clinically, alopecia areata may be classified into:

- **Based on extent:** Patchy alopecia, alopecia totalis, alopecia universalis, out of which patchy AA is the commonest type.[7]
- **Based on pattern:** sisaipho, Reticular, ophiasis.
- **New variants:** Acute and diffuse total alopecia
- **Un usual patterns:** Perinevoid alopecia, Linear alopecia areata[8]

While the various types of treatment have been investigated, the definite cure for AA has not been established yet. Corticosteroids (topical, local injections, and systemic) are the most popular and efficacious treatments for AA, but long-term application often leads to skin atrophy.[9] Other methods for treatment include whole body photochemotherapy with UV-A, cryotherapy, excimer laser, pulsed infrared diode laser, hypnotherapy, tattooing and use of wigs or hair pieces.[6]

Dinitrochlorobenzene (DNCB), squaric acid dibutyl ester (SADBE), and diphencyprone (DPCP), the preferred choice, are the three main sensitizers. Due to its potential for mutation, DNCB is prohibited, and SADBE, which is unstable in acetone, is only used in patients who do not respond to DPCP sensitization.

Happle et al. first described the use of DPCP in the treatment of AA in 1983, and numerous studies have demonstrated its effectiveness.[3,9] Due to its low cost, stability in solution, and non-mutagenic qualities, DPCP is currently the preferred topical sensitizer and is regarded as the most effective topical immunotherapy for the treatment of AA.[9]

It is known that the application of a primary sensitizer causes dermatitis, with consequent deviation of the perifollicular lymphocytes involved in the pathogenesis of AA to the epidermis. This results in the alteration of the perifollicular relationship between $CD4^+$ / $CD8^+$ lymphocytes, causing apoptosis of autoreactive T-lymphocytes, and the modulation of proinflammatory cytokines.[3] Side effects of DPCP include persistent dermatitis, blistering, spread of contact eczema, lymph node enlargement, pigment changes, and secondary infection.[9]

Dermoscopy is a noninvasive tool that allows in vivo evaluation of microstructures of the epidermis, the dermoepidermal junction, and the papillary dermis otherwise not visible to the naked eye.[6] It can aid to make the diagnosis in clinically doubtful cases with advanced diagnostic accuracy, predicts the course of the disease and scalp biopsy can be avoided.[10]

It can be used to analyse various features such as hair thickness, number of hairs in one pilosebaceous unit, or terminal to vellus hair ratio of scalp and hair.[11] Moreover, it is a valuable tool for evaluating the treatment response photographically at each follow-up.[12]

Trichoscopic findings in AA may differ depending on disease activity, severity and duration of the disease. Black dots, dystrophic and fractured hair, exclamation mark hair (EMH) are the most specific findings in AA and are indicative of abrupt anagen alterations and correlate with strong and ongoing disease activity. While yellow dots may be observed in all stages of both acute and chronic alopecia areata,

short re-growing hair indicate a better prognosis.[13,14]

Hair growth is indicated by upright regrowing hair, pigtail hair and vellus hair.[15]

Need For The Study

- Dermoscopy is a noninvasive diagnostic procedure used increasingly in dermatological practice not only for evaluation of pigmented skin lesions but also for hair disorders.[16]
- Several studies have reported that various trichoscopic characteristics, such as black dots, "exclamation-mark" hairs, broken hairs, yellow dots, and clustered short vellus hairs, are useful clinical indicators for AA in areas of hair loss.[16]
- Although trichoscopic findings of AA are described in the literature, studies evaluating DPCP in AA using trichoscopy are limited. Hence, this study was undertaken.

MATERIALS AND METHODS

The present study is a prospective analytical study conducted over a period of three months. A total of 16 patients were enrolled into the study and baseline hair loss was calculated based on the Severity of ALopecia Tool (SALT) score.[19] Trichoscopic findings of AA were evaluated at baseline before DPCP and at the end of 12th week after DPCP application with hand held dermoscope Dermlite DL4. Patients were evaluated with respect to age, sex, duration, number, and morphology of lesions. The data was entered in MS Excel sheet.

Inclusion Criteria

1. The subjects with a clinical finding of AA were included in this study.
2. Subject agrees to comply with protocol requirements and attend all required study visits and is considered to be a good study subject.

Exclusion Criteria

1. Pregnant and lactating women
2. Subject has current controlled or uncontrolled bacterial, viral (with the exception of herpes simplex), fungal, atypical, or opportunistic infection(s).
3. Immunosuppression (history of transplantation, chemotherapy, splenectomy, HIV).
4. Previous history of usage of other immunomodulatory drugs for the same in the previous one and half months
5. Systemic immunosuppressive agents within the past 3 months.
6. Previous treatment with DPCP.
7. Use of light treatments, Anthralin in the preceding 6 weeks.
8. Use of minoxidil in the preceding 4 weeks.

METHODOLOGY

DPCP sensitization was performed with a 2% solution of DPCP applied to an area of 5× 5 cm on one side of the scalp. Two weeks following sensitization, treatment was started by weekly ipsilateral applications of incremental concentrations of DPCP (between 0.001% and 2%) adjusted to the patient's reactivity to the contact allergen. The aim was to maintain mild contact eczema and itch for about 48 hours after application. Patients were instructed to avoid direct sun exposure of the scalp and not to wash the scalp for 48 hours after each application.

The severity of AA was evaluated in each patient at the time of dermoscopic examination based on Severity of ALopecia Tool (SALT) scoring.[19] The scalp is divided into the following four parts:1. Vertex: 40% (0.4) of scalp surface area. 2. Right profile of scalp: 18% (0.18) of scalp surface area 3. Left profile of scalp: 18% (0.18) of scalp surface area 4. Posterior aspect of scalp: 24% (0.24) of scalp surface area. Percentage of hair loss in each area is the percentage hair loss multiplied by percentage surface area of the scalp in that area. Summing the products of each area will give the SALT score. The patients were divided into five groups according to disease severity: S0- no hair loss; S1- < 25% hair loss; S2- 26%–50% hair loss; S3- 51%–75% hair loss; S4 -76%–99% hair loss; and S5- total scalp hair loss. Percent scalp hair regrowth based on SALT score. A0 = no change, A1 = 1-24% regrowth, A2 = 25-49% regrowth, A3 = 50-74% regrowth, A4 = 75-99% regrowth, A5 = 100% regrowth.

Those patients who satisfied inclusion and exclusion criteria were included and hair regrowth with DPCP was assessed, using trichoscopy, at baseline and 12th week. The study was approved by the institutional ethics committee.

RESULTS

The study includes (n=16) 13 males (81.3%) and 3 females (18.8%) (M: F = 4.3:1). The mean age group was 33.62 +/- 10.94 years. The mean age of onset was 32.79 +/- 10.75 years. The mean duration of symptoms was 9.9 +/- 6.36 months. Among these patients, two patients (12.5%) had hypothyroidism, one patient had vitiligo (6.25%) and one patient had diabetes (6.25%).

The most common area involved was scalp (62.5%) followed by beard (31.25%), and moustache (6.25%). The most common type of alopecia was localised for 13 (81.25%) followed by diffuse (2, 12.5%) and universalis (1, 6.25%). The mean SALT score at baseline for males was 3 +/- 1.24 and at 12 th week was 0.96+/-0.49.

The most common dermoscopic feature at 1st week was black dots in 14 (87.50%) followed by depigmented regrowing vellus hair in 11 (68.75%). The most common dermoscopic features at 12 th week was pigmented regrowing vellus hair in 15 (93.75%). Nail changes were seen in six patients (37.5%).

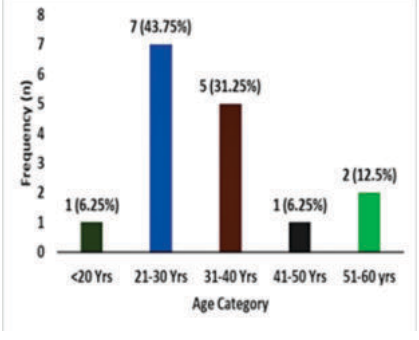
After DPCP application, the number of exclamation mark hairs reduced by 100%, depigmented regrowing vellus hairs decreased by 50%, broken hairs by 60-100 % depending on severity, black dots by 85%. The mean hair regrowth was 82.56 +/- 30.63 with DPCP.

The mean hair regrowth at 12 th week for males was 86.23(22.32). The most common side effects were erythema (9, 56.25%), scaling (3, 18.75%), eczema (2, 12.5%), itching (2, 12.5%).

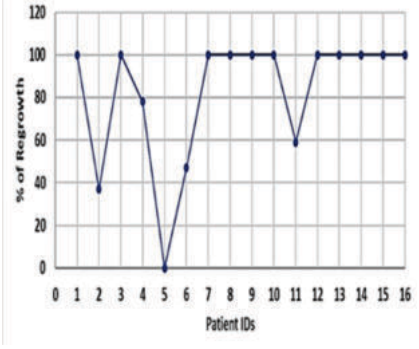
As severity of salt score increased rate of hair regrowth decreased. Good hair regrowth was observed in patients of hair loss less than 8 months mean duration. Cent percent regrowth was observed in 75% of patients with salt score S1.

Table 1: Trichoscopic features at baseline and 12th week

Trichoscopic features	1st week	12th week	% of trichoscopic features in 1st week	% of trichoscopic features in last week
Depig reg vellous hairs	11	2	68.75%	12.50%
black dots	14	2	87.50%	12.50%
pig reg vellous hairs	7	15	43.75%	93.75%
broken hairs	4	1	25.00%	6.25%
Exclamation mark hair	1	0	6.25%	0%
Depigmented terminal hairs	3	1	18.75%	6.25%



Graph 1: Frequency of age distribution



Graph 2: Percentage of regrowth of hair after DPCP

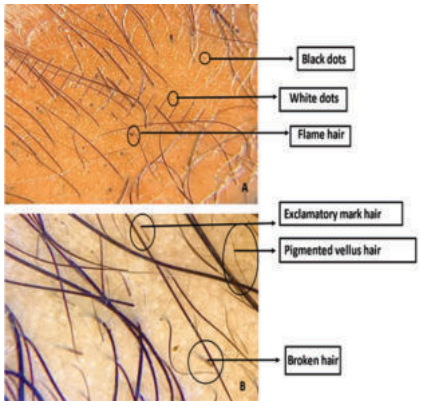


Figure 1: A, B – Dermoscopic Features Of Aa

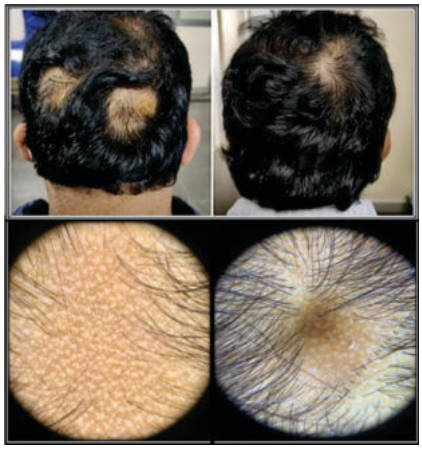


Figure 2: Good response to DPCP in a patient with multiple patches of AA (clinical and trichoscopic images at 1st and 12th week)

DISCUSSION

Alopecia areata is a relatively common condition. It does not pose a threat to life, but it causes psychological stress and impacts on the quality of life. Its treatment is determined by the patient's age and the condition's degree of involvement.[4]

Factors associated with worse response to topical immunotherapy were, early age at disease onset, prolonged duration of hair loss, personal history of atopy, nail involvement, and other associated autoimmune disorders. The main factor associated with recurrence was abrupt withdrawal from therapy.[4] where as in our study they were found to be increased severity of alopecia, duration and other associated comorbidities.

The mean age was 25.4 ± 15.4 years in Abedini R eta al study where as the mean age of onset was 32.79 years in our study.[2] The most common gender involved in our study was males (81.3%) where as it was females (72%) in Chiang KS et al study.[9]

The biggest groups according to SALT were S1, with 8 patients having less than 25% of their scalp affected, and S5, with 9 patients displaying alopecia totalis in Nowicka et al study [20] whereas Patchy type of alopecia areata was seen in 13 (81.25%) followed by diffuse (12.5%) followed by totalis (6.25%).

The most common dermoscopic findings before DPCP were black dots (87.50%), depigmented regrowing vellus hair (68.75%) where as the frequency of five dermoscopic features at 1st week is including: BD in 39 (95.10%), YD in 30 (73.2%), SVH in 30 (73.2%), BH in 23 (56%), and TH in 7 (17%) of cases in Abedini R et al study.[2] The most common dermoscopic finding after DPCP were pigmented regrowing vellus hair (93.75%) in our study

As severity of salt score increased rate of hair regrowth with DPCP was found to be less. Cent percent regrowth of hair was seen in 68.75% in our study where as the complete regrowth rate was 32.3% in Lee S et al study.[22] and the highest efficacy of DPCP was reported by Tosti et al with 77% complete hair regrowth in patients with mild AA in Tosti et al study.[22] Significant increase of pigmented vellus hairs which is a good prognostic factor was noted after DPCP when compared to baseline in our study as well as in Mahmoudi H et al study.[17]

The most common side effects are erythema for 9 patients (56.25%) followed by scaling for 3 patients (18.75%) followed by eczema for 2 patients (12.5%) followed by itching for 2 patients (12.5%) in our study where as the most frequent adverse events are severe inflammation at the site of application, enlarged neck lymph nodes, and hyper- and hypopigmentation in nowicka et al study[20] and side effects following sensitization were seen in 19 of 27 patients (70.4%): occipital lymphadenopathy in 40.7% (11 of 27 patients), severe eczema/blister formation in 22.2% (6 of 27 patients), and hyperpigmentation in 18.5% (5 of 27 patients) in Aghaei S et al study.[23] Black dots, depigmented vellus hairs, broken hairs and exclamatory mark hairs were considered to be bad prognostic factors and were found to be reduced with DPCP in our study.

This study concludes that trichoscopy is an invaluable tool in diagnosing AA and assessing the treatment response to DPCP.

Limitations

1. Insufficient sample size
2. Long term follow-up and relapse were not noted in this study

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