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Role of microneedling in treatment of alopecia areata

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Abstract

Background: Alopecia areata (AA) is a hair follicles-related autoimmune illness that produces non-cicatricial alopecia in both the scalp and non-scalp regions. Corticosteroids are beneficial both topically and intralesionally, however injections can be unpleasant in large lesions.

Objectives: The goal of this research is to assess the efficiency of microneedling in alopecia areata.

Methods: The research involved 20 participants with alopecia areata. Their ages varied from 11 to 45 years.

Results: Improvement was observed clinically in the majority of patients, with a rise in hair density and growth in afflicted regions. This began around one month and ended about three months following the final therapy session.

Keywords: Alopecia areata, microneedling, treatment

Introduction

Alopecia areata is considered to be an organ-specific autoimmune disease mediated by T cells directed to the hair follicles, although the exact etiology is yet unclear^[1].

Lymphocytic infiltration ('swarm of bees') can be seen in the peribulbar and lower third of the follicles. Scarring is absent at all stages, which is a distinctive finding. Without therapy, 50% will completely recover within a year; however, 7-10% will acquire a severe chronic form of the disease^[2].

There is an excess treatment method demonstrates a lack of a single, safe, and consistently successful technique. (Topical, intralesional, and systemic) corticosteroids, topical irritants and systemic immunotherapy, minoxidil, azathioprine, sulfasalazine, cyclosporine, prostaglandin analogues, and combination treatment that utilize the best of each technique for treating AA^[3].

Microneedling is a process that involves creating micro-pores in the scalp to aid in the penetration and absorption of different substances. It is a potential method for the treatment of alopecia^[4].

The aim of this research was to assess the efficiency of microneedling in alopecia areata.

Methodology

The current research was done on twenty individuals with patchy alopecia areata who attended the out-case clinic of Dermatology, STDs and Andrology Department, Tanta University Hospitals, during the period from October 2022 to June 2024.

Inclusion criteria

1. Patients with patchy lesions (maximum of 2 patches) who did not get therapy within 3 months before to the trial.
2. Patients with acute onset, stationary course, and maximum 6 months duration of the AA.
3. Both genders
4. Patients who accepted to join the study

Exclusion criteria

1. Extensive types (AT & AU).
2. Infected scalp.

3. Pregnant and breastfeeding women.
4. Patients with chronic hepatic or hematological problems, as well as those who are immune impaired.

Prior to procedure, all cases underwent to full history taking, scalp examination (site, number of AA lesions, size, severity assessment by Severity of Alopecia Tool score (SALT score) ^[5], photography and dermoscopic examination before and at the final therapy visit.

Microneedling therapy sessions were done once weekly for 8 successive sessions. Then followed up every 4 weeks for 12 weeks.

Microneedling therapy sessions

Equipment

Microneedling was conducted with a microneedling pen (Ultima A6) with disposable 36 micro-needles set to 1.5 mm in length and maximum piston stroke speed.

Technique

70% alcohol was used to disinfect the scalp then the derma pen was placed to the scalp with light pressure perpendicularly for three seconds in a stamp-like manner over the afflicted region until slight erythema appeared, which was regarded the procedure's endpoint. This approach was performed weekly for a maximum of 8 sessions.

Evaluation of the clinical efficacy of Microneedling in alopecia areata

After 12th week of the last therapy session, the effectiveness of therapy was evaluated based on the absolute change in the SALT score and the percentage of regrowth determined from the change in baseline SALT score.

Absolute change in SALT score = SALT score at baseline - SALT score after 12 weeks. Percent scalp hair regrowth based on SALT score = $100 \times (\text{Baseline SALT score} - \text{SALT score at 12 weeks}) / \text{Baseline SALT score}$. ^[5]

Assessment of percentage hair regrowth was graded into following 5 grades:

- A0 = no change or further loss of hairs
- A1 = 1-24% regrowth
- A2 = 25-49% regrowth
- A3 = 50-74% regrowth
- A4 = 75-100% regrowth ^[6]

Non-contact polarized dermoscopy (DermLite HUD dermoscopy, 3Gen, USA) was connected with digital camera with a resolution of 64 mega pixels to detect changes at the final visit compared to that before treatment,

Cases' content

At the final appointment, patients were asked to assess their content in comparison to their pre-therapy status using a scale ranging from not contented to very contented ^[7].

Adverse effects

The treated lesions were carefully examined for any adverse responses that emerged throughout the course of the trial.

Statistical analysis

Data were entered into a computer and processed with the IBM SPSS software program version 20.0. (IBM Corp; Armonk, NY). Categorical data were presented as percentages and numbers.

Results

Demographic and clinical data of the studied cases (Table 1):

- **Sex and age:** It consisted of 20 patients, half of them were male and half female. The participants varied in age from 11 to 45 years old, with a mean of 23.95 ± 9.77 .
- **Occupation:** There were 8 patients (40%) not working, 7 patients (35%) students and 5 patients (25%) working.
- **Present history:** The disease duration varied from 1 to 6 months, with a mean of 4.15 ± 1.60 .
- **Past and family history:** Approximately 15% of patients had a +ve family history of AA, whereas 85% had a -ve one. There were 4 patients (20%) had a history of AA attacks, while 16 (80%) did not.

Therapy assessment

- **Regarding the SALT score:** SALT score before treatment was S1 in 19 patients (95%) and S2 in 1 patient (5%). It was ranging between (1.20 - 32.0) with a mean of 6.25 ± 6.95 . While at the last treatment visit, SALT score was S0 in 10 patients (50%) and S1 in 10 patients (50%). It was ranging between (0 - 8.40) with a mean of 1.56 ± 2.37 . Percentage of improvement was (73.84%). (Table 2)
- **Regarding global assessment of hair regrowth (Global score):** 55% of patients after therapy showed hair regrowth of A4, 25% of A3, 15% of A2 and 5% of A0. (Table 3)
- **Regarding cases' content:** There were 11 cases (55% very contented), 5 cases (25% contented), 3 cases (15% slightly contented, and one case 5% uncontented). (Table 3)
- **Regarding possible adverse effects:** no considerable complains or side effects of the treatment as severe pain, infection, ulceration, recurrence or any allergic manifestations at each session or at follow up were detected except momentary pain and burning sensation due to microneedling technique.
- **Dermoscopic results:** showed significant recovery of the examined patches following microneedling therapy. The quantity of black, yellow dots, and exclamation marks was significantly reduced while (broken and vellus hair) were showed no significant difference after therapy ($P < 0.05^*$) and highly significant increase in number of terminal hairs after therapy ($P < 0.001^*$). (Table 4)

Table 1: Demographic and clinical data of the studied cases (n=20)

	No. (%)
Sex	
Male	10 (50.0%)
Female	10 (50.0%)
Age	
Min. - Max.	11.0 - 45.0
Mean $\pm$ SD.	23.95 $\pm$ 9.77
Median (IQR)	22. (17.0 - 30.0)
Occupation	
Not working	8 (40.0%)
Student	7 (35.0%)
Working	6 (30.0%)
Duration (months)	
Min. - Max.	1.0 - 6.0
Mean $\pm$ SD.	4.15 $\pm$ 1.60
Median (IQR)	4.50(3.0 - 5.50)
Past history	
No	16 (80.0%)
Yes	4 (20.0%)
Family history	
No	17 (85.0%)
Yes	3 (15.0%)

IQR: Inter quartile range **SD:** Standard deviation

Table 2: Comparison between before and after treatment according to SALT score (n = 20)

SALT score (%)	Before	After	Test of sig.	P
S0	0(0.0%)	10 (50.0%)	MH=6.50*	0.001*
S1	19 (95.0%)	10 (50.0%)		
S2	1 (5.0%)	0(0.0%)		
Min. - Max.	1.20 - 32.0	0.0 - 8.40	Z=3.925*	<0.001*
Mean ± SD.	6.25 ± 6.95	1.56 ± 2.37		
Median (IQR)	3.80 (2.55 - 7.35)	0.12 (0.0 - 2.73)		
% of improvement				
Min. - Max.	15.0 - 100.0			
Mean ± SD.	73.84 ± 31.71			
Median (IQR)	80.63(71.43 - 100.0)			

IQR: Inter quartile range **SD:** Standard deviation

MH: Marginal Homogeneity Test **Z:** Wilcoxon signed ranks test

P: p value for comparing between before and after treatment

Table 3: Distribution of the studied cases according to global score and satisfaction score (n = 20)

	No (%)
Global score	
A0	1 (5.0%)
A1	0 (0.0%)
A2	3 (15.0%)
A3	5 (25.0%)
A4	11 (55.0%)
Satisfaction score	
Not satisfied	1 (5.0%)
Slightly satisfied	3 (15.0%)
Satisfied	5 (25.0%)
Very satisfied	11 (55.0%)

Table 4: Comparison between before and after treatment according to dermoscopic findings (n = 20)

Dermoscope	Before	After	MCN _p
YD			
No	2 (10.0%)	15 (75.0%)	0.001*
Yes	18 (90.0%)	5 (25.0%)	
BD			
No	7 (35.0%)	17 (85.0%)	0.013*
Yes	13 (65.0%)	3 (15.0%)	
EX M			
No	6 (30.0%)	16 (80.0%)	0.002*
Yes	14 (70.0%)	4 (20.0%)	
BH			
No	17 (85.0%)	18 (90.0%)	1.000
Yes	3 (15.0%)	2 (10.0%)	
VH			
No	8 (40.0%)	13 (65.0%)	0.063
Yes	12 (60.0%)	7 (35.0%)	
TH			
No	11 (55.0%)	0 (0.0%)	0.001*
Yes	9 (45.0%)	20 (100.0%)	

McN: McNemar test

p: p value for comparing between before and after treatment

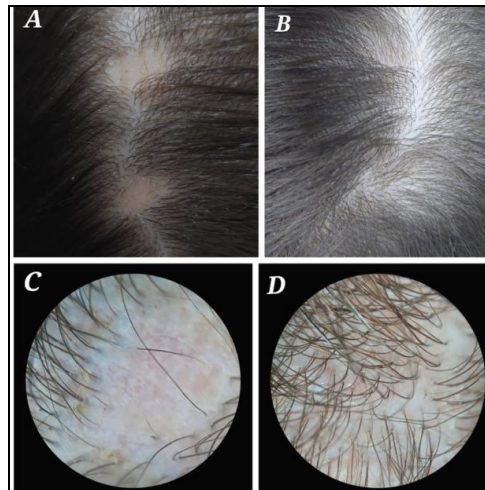
*: Statistically significant at $p \leq 0.05$ **Figures**

Fig (1): An 11-years old female patient with two patches of AA on the top of the scalp of 4 months duration treated with microneedling only. A. Before treatment, B. After treatment (3 months after the last therapy session) showed excellent response (A4), C. Dermoscopic picture before treatment showed exclamation mark, vellus hair and broken hair, D. Dermoscopic picture after treatment (3 months after the last therapy session) showed regrowing terminal hair with marked reduction of exclamation mark and vellus hair.

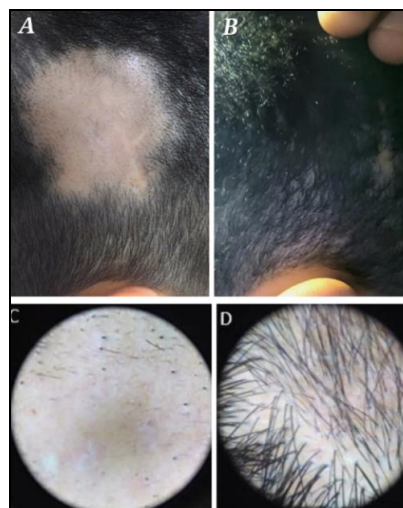


Fig (2): A 36-years old male patient with single patchy AA on the Rt side of the scalp of 6 months duration treated with microneedling only. A. Before treatment, B. After treatment (3 months after the last therapy session) showed excellent response (A4), C. Dermoscopic picture before treatment showed vellus hair and black dots, D. Dermoscopic picture after treatment (3 months after the last therapy session) showed appearance of regrowing terminal hairs, vellus hair with marked reduction of black dots.

Discussion

Alopecia areata is an autoimmune illness triggered by T lymphocytes that affects hair follicles. The illness process is mostly caused by peribulbar infiltration, which disrupts natural hair cycle. The follicular bulge which contains epithelial stem cells, is spared by the perifollicular inflammatory infiltrate. Unlike scarring alopecia, hair follicles remain intact despite inflammation^[8].

It is extremely difficult to objectively analyze the efficiency of alopecia areata therapy since spontaneous remission occurs unexpectedly, but hair may regrow spontaneously in instances when the affected area seems localized. However, it is vital to know that the available treatment alternatives are neither curative nor preventative^[9].

Recently, microneedling has been utilized to treat androgenic alopecia in addition to its common usage for acne scars. Based on its proposed mechanism of action, it activates stem cells and dermal papillae, which leads to the synthesis epidermal growth factors through platelet activation and skin wound healing^[10].

Our research evaluated the effectiveness and safety of microneedling in promoting hair growth in individuals with alopecia areata.

Upon completion of the research (3 months after the last therapy visit), cases had regrowth scores of A4 (regrowth 75%-100%) and A3 (regrowth 50%-74%) in 5% and 11% of cases, respectively. Thus, a therapeutic response occurred in 16% of patients (A3 + A4). Our findings align with those of Aboeldahab *et al.*,^[11] who discovered that the conclusion of their trial, 22.5% of patients treated with microneedling alone had a favorable therapeutic response (A3 + A4). In contrast, Giorgio *et al.*,^[12] did not notice hair regrowth in AA areas treated with microneedling solely, which is different from our findings. This disparity might be explained by inclusion of severe AA cases who were resistant to prior therapies as well as the limited sample size (9 individuals in microneedling group).

We used dermoscopic examination to corroborate our findings in this study rather than relying just on the clinical response evaluation. The current study showed that microneedling was efficient in treating AA as they notably reduced dermoscopic findings (black, yellow dots and exclamation marks) in addition improved hair growth (increased terminal hair number). The impact of microneedling on promoting terminal hair development in AA has been clarified by previous research. By stimulating stem cells, supplying growth factors, and boosting blood flow to the hair follicles, they propose that microneedling may encourage hair regeneration^[12].

Cases achieved good to excellent results when compared to their pre-therapy state. Additionally, our study found no adverse effects from microneedling, except for discomfort, burning, and bleeding at the site, which resolved on their own within a few hours. Almutlq and Bukhari.^[13] and El Sayed *et al.*,^[14] similarly found no significant side effects from microneedling in alopecia.

Conclusion

Microneedling is an encouraging appliance for promoting and accelerating hair regrowth in AA. Additional research with bigger populations and longer follow-up periods is necessary.

Conflict of Interest

Not available.

Financial Support

Not available.

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