Topical 15% Lactic Acid Solution versus Topical Betamethasone Valerate lotion in Treatment of Multiple patchy alopecia aerate.

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ORIGINAL ARTICLE

Topical 15% Lactic Acid Solution Versus Topical Betamethasone Valerate Lotion in the Treatment of Multiple Patchy Alopecia Areata

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Abstract

Background: Alopecia areata (AA) is a kind of alopecia that affects the retinal pigment epithelium, nails, and hair follicles sporadically. It is a kind of hair loss that does not leave scars and often manifests as rounded patches. AA can be treated using various methods, including topical, systemic, and injectable ones.

Aim: The major aim of this research is to evaluate the efficacy of topical lactic acid 15% solution versus topical betamethasone valerate lotion in the management of multiple patchy AA.

Patients and methods: In all, 50 patients were included, after consenting each of them and split into two equal groups. Group A (topical 15% lactic acid group) includes 25 patients presented with multiple patches of AA, who were treated with topical 15% lactic acid, applied on patches using wood stick by the patient himself three times weekly for 12 weeks. Group B (betamethasone valerate lotion group) includes 25 patients who presented with multiple patches of AA and were treated with betamethasone valerate lotion which was applied twice daily for 12 weeks by the patient himself.

Results: Topical betamethasone valerate lotion is advised to be used in the treatment of multiple patchy AA. The current research may add to the body of knowledge and provide some insight for future studies that will have a bigger sample size, evaluate side effects, and have a longer follow-up time to review their results.

Conclusion: From our study, we can conclude that topical betamethasone valerate lotion is better and more effective than topical lactic acid 15% solution in the management of multiple patchy AA.

Keywords: Alopecia areata, Betamethasone valerate lotion, Lactic acid

1. Introduction

The common skin condition known as alopecia areata (AA) is characterized by a sudden start of nonscarring hair loss in a clearly defined region. Any area that may support hair may be impacted, particularly the scalp. Although the precise cause of AA is unclear, it is possible that genetic, immunologic, infectious, emotionally stressful, fundamentally aberrant melanocytes or keratinocytes, and neurological factors are involved.[1]

Clinically, the first lesion often presents as a smooth, completely bald area that is bounded. Exclamation mark hairs, which indicate active illness, may be found near its edge, where hairs that seem normal may also be easily retrieved. The pull test may show disease activity along the patch's edges when it is positive.[2]

Treatment for AA is difficult.[3] There is a shortage of evidence-based information on different AA therapy approaches. Topical corticosteroids are regarded as standard therapy for the management of localized AA among the numerous therapeutic alternatives.[4]

Other forms of therapy for AA include nonspecific irritants (such as anthralin, onion, garlic, and

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phenol), immune inhibitors (such as topical steroids and PUVA), immune enhancers (such as inducing contact dermatitis with DNCB), and other therapies like minoxidil, herbs, vitamin supplements, heat therapy, and electrotherapy.[5,6]

In our department, the use of lactic acid as a peeling agent to treat melasma has increased significantly in recent years. In addition, it reduces the skin's wrinkles, roughness, and splotchy pigmentation. It may aid in the repigmentation of vitiligo patches due to its antioxidant effects. Icthyosis, follicular hyperkeratosis, seborrheic keratosis, actinic keratosis, and verrucae vulgaris are all treated with it to reduce dry skin. Irritation and sun sensitivity are the alpha hydroxy acids' two main adverse effects. Signs of irritation include redness, burning, itching, discomfort, and potential scarring.[7]

2. Patients and methods

The protocol and all related documentation were approved for ethical and research purposes by the Council of the Dermatology Department at Al-Azhar University before the start of the study and any adherence to local regulations. From February 2022 to February 2023, Al-Azhar University Hospitals' outpatient clinic, Dermatology Department, Faculty of Medicine, undertook this double-blinded comparative clinical investigation.

2.1. Inclusion criteria

Inclusion criteria include individuals age from 18 to 40 years, of both sexes, with multiple patches of AA, and individuals who have AA who have not received any therapy in the last 3 months.

2.2. Exclusion criteria

Exclusion criteria included those with alopecia totalis, women who are pregnant or nursing, those who have chronic hepatic or hematological conditions, those who are immunocompromised, and those who have an allergy to study drugs.

2.3. Sampling method 'randomization'

A total of 50 patients were enrolled, after consenting each of them, and split into two equal groups. Group A (topical 15% lactic acid group) includes 25 patients presented with multiple patches of AA who were treated with topical 15% lactic acid, applied on patches using a wood stick by the patient himself three times weekly for 12 weeks. Group B (betamethasone valerate lotion group) includes 25 patients who presented with multiple patches of AA, who were treated with betamethasone valerate lotion. The betamethasone valerate in lotion form was applied twice daily for 12 weeks by the patient himself.

Systematic random sampling and patients who fulfilled the inclusion criteria were randomly assigned to either group. A randomization table was used to place the matching letter, which indicated the assigned group, in each of the 50 opaque envelopes that were serially numbered. Then, every envelope was sealed and placed in a single box. MedCalc, version 13, was used to create a computer-generated randomization sheet for the randomization process.

2.4. Physical examination

A positive pull test result at the edge of a plaque typically indicates that the disease is active, and further hair loss can be anticipated. Smooth, slightly erythematous (peach color) or normal-colored alopecic patches are characteristic, exclamation point hairs are pathognomonic but not always found, and exclamation point hairs, or hairs tapered near the proximal end are pathognomonic but not always found. Further supporting the diagnosis are hair loss on other hair-bearing areas, appearance of one or more round to oval denuded patches, absence of epidermal changes linked to the hair loss, and AA, which is categorized based on its pattern. Most typically, localized and patchy hair loss occurs.

2.5. Dermoscopy

According to histopathological correlation, the existence of yellow dots, which occasionally appear in cases of advanced male-pattern hair loss, has been stated to be a specific feature of AA and to be present in 95% of patients, regardless of their disease stages. Yellow dots are absent in cases of female-pattern hair loss, scarring alopecia, or other types of AA. Last but not least, other dermoscopic symptoms including black spots, tapering hairs, damaged hairs, and clustered small vellus hairs have been recorded.

2.6. Statistical analysis

The Statistical Software for Social Sciences, version 23.0 (SPSS Inc., Chicago, Illinois, USA) was used to evaluate the recorded data. When the distribution of the quantitative data was parametric (normal), it was shown as mean ± SD and ranges; however, when the distribution was non-normal, it

was shown as median and interquartile range. Qualitative factors were also shown as percentages and numbers. With the aid of the Kolmogorov–Smirnov and Shapiro–Wilk tests, data were examined for normalcy.

3. Result

To compare the effectiveness of topical lactic acid 15% solution and topical betamethasone valerate lotion in the treatment of multiple patchy AA, we conducted a study involving 50 patients, who were divided into two equal groups using the same inclusion and exclusion criteria: the lactic acid group ($n = 25$) and the betamethasone group ($n = 25$). The research included participants ranging in age from 18 to 40 years (average age: 30.24 ± 6.96 years). There were 30 (60%) female patients and 20 (40%) male patients among all patients.

There is no statistically substantial variation between the lactic acid group and the betamethasone group according to demographic data, about age 'years' and sex with P value more than 0.05 (Table 1, Figs. 1 and 2).

There is a reduction in the size of the patches (cm^3) over the follow-up periods in the two groups but the betamethasone group is better than the lactic acid group at 3 months, with a P value of 0.026 (Table 2, Fig. 3).

The lactic acid group was compared at baseline of patch size with the mean $\pm$ SD at each measurement point: at the 1st month, 2 nd month, and at the 3rd month. Initially, the size was 3.68 ± 0.85 compared with the follow-up measurements of 2.38 ± 0.61, 1.60 ± 0.88, and 0.96 ± 0.37, respectively. There was highly statistically significant reduction in patch sizes in the follow-up compared with the baseline with P value less than 0.001 (Table 3, Fig. 4).

The betamethasone group was compared at baseline for patch size with the mean $\pm$ SD at each measurement pointsfirst month, second month, and at the third month. Initially it was 4.16 ± 1.21 compared with the follow-up measurements of 2.80 ± 0.86, 1.56 ± 0.88, and 0.70 ± 0.43, respectively.
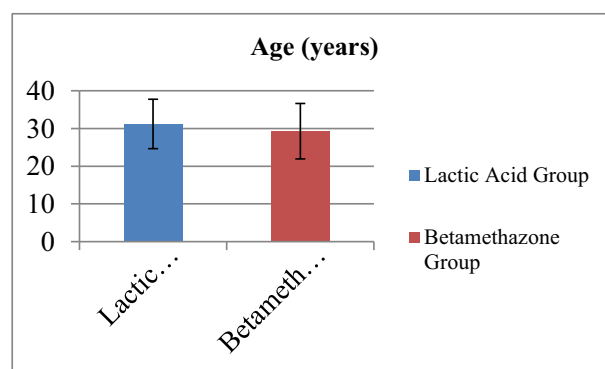

Fig. 1. Comparison between groups according to age 'years.'

There was a highly statistically significant reduction in patch size in follow-up compared with baseline with P value less than 0.001 (Table 4, Fig. 5).

There was a statistically significant higher median score value of hair regrowth in the betamethasone group of 4 (4–4) compared with 4 (2–4) for the lactic acid group, with P value of 0.037 (Table 5).

There was a statistically substantial variation between the lactic acid group and the betamethasone group regarding the regrowth score of hair with a P value of 0.048 (Table 6, Fig. 6).

There was a statistically substantial rise in the frequency of hair regrowth score (>75%) in the betamethasone group with 22 (88%) patients
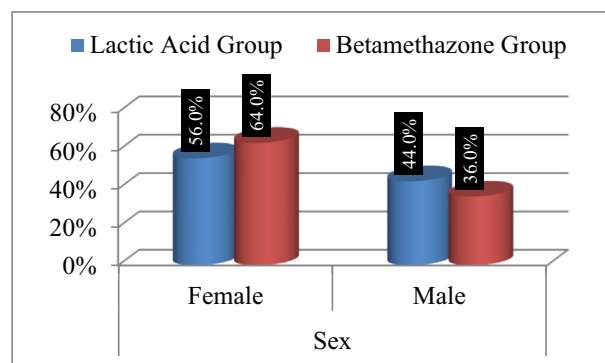

Fig. 2. Comparison between groups according to sex.

Table 1. Comparison between groups regarding demographic data.

Demographic data	Lactic acid group ($N = 25$)	Betamethasone group ($N = 25$)	Test value	P value
Age (years)				
Mean $\pm$ SD	31.20 ± 6.55	29.28 ± 7.35	0.975	0.334
Range	19–40	18–40		
Sex [n (%)]				
Female	14 (56.0)	16 (64.0)	0.333	0.564
Male	11 (44.0)	9 (36.0)		

Using: t, independent sample t-test for mean $\pm$ SD; using: χ^2, χ^2 test for n (%).
P value more than 0.05 is insignificant.

Table 2. Comparison between groups according to the size of patches measured in cm^3.

Patches size (cm³)	Lactic acid group (N = 25)	Betamethasone group (N = 25)	Test value	P value
At baseline				
Mean ± SD	3.68 ± 0.85	4.16 ± 1.21	−1.618	0.112
Range	2–5	2–7		
At the 1st month				
Mean ± SD	2.38 ± 0.61	2.80 ± 0.86	−1.994	0.056
Range	1.5–3.75	1.2–4.2		
At the 2 nd month				
Mean ± SD	1.60 ± 0.68	1.56 ± 0.78	0.171	0.865
Range	0.81–4	0.6–3.75		
At the 3rd month				
Mean ± SD	0.96 ± 0.37	0.70 ± 0.43	2.292	0.026[a]
Range	0.21–3	0.15–2.5		

Using t, independent sample t-test for mean ± SD.
P value more than 0.05 is insignificant.
[a] P value less than 0.05 is significant.

compared with 16 (64%) patients for the lactic acid group with a P value of 0.048 (Table 7, Fig. 7).

4. Discussion

During this study, 50 patients were enrolled. After obtaining consent from each patient, they were split into two equal groups: group A was managed with topical 15% of lactic acid, applied on patches using a wood stick by the patient himself three times weekly for 12 weeks and group B was treated with betamethasone valerate lotion. The betamethasone valerate in lotion form was applied twice daily for 12 weeks by the patient himself. Follow-up was done every month by photography and dermoscopic finding. All participants and experimenters did not know who got a particular treatment.

Our study showed that between research groups, there were no statistically substantial variations in the demographic information including patient age and sex. We said that the numerous patchy AA were successfully treated with both trial drugs. In the lactic acid group, mean ± SD of patch size at baseline was 3.68 ± 0.85 cm^3 compared with 2.38 ± 0.61, 1.60 ± 0.88, and 0.96 ± 0.37 in the first, second, and third months, respectively.
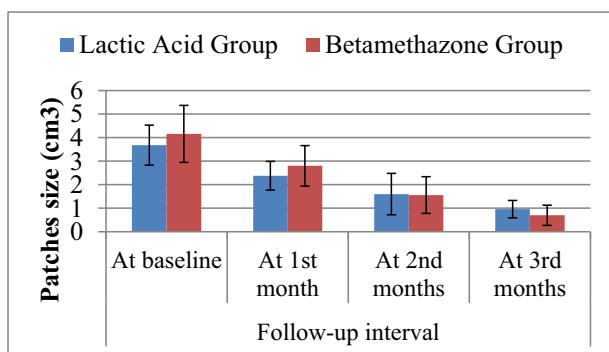

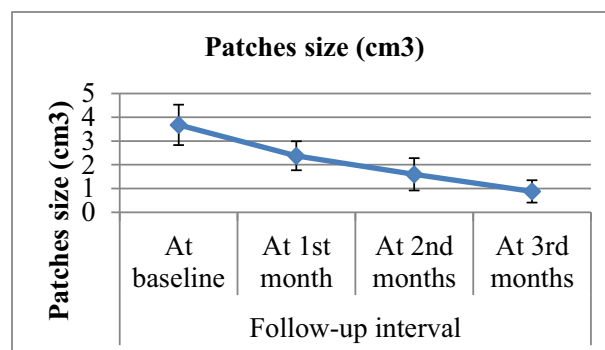Fig. 3. Comparison between groups according to follow-up interval.

Fig. 4. Comparison of the changes in patch size measured in cm^3 among the lactic acid group at each follow-up with the start of TTT.

Table 3. Comparison of the changes in patch size measured in cm^3 among the lactic acid group at each follow-up with the start of TTT.

Follow-up interval	Patch sizes (cm³) (N = 25)	Paired sample t-test		
		Mean difference±SE	t-test	P value
At baseline	3.68 ± 0.85			
At 1st month	2.38 ± 0.61	1.30 ± 0.09	13.904	<0.001[a]
At 2 nd month	1.60 ± 0.88	2.08 ± 0.21	9.792	<0.001[a]
At 3rd month	0.96 ± 0.37	2.72 ± 0.24	11.908	<0.001[a]

[a] P value less than 0.001 is highly significant.

Table 4. Comparison of the changes in patch size measured in cm^3 among the betamethasone group at each follow-up with the start of TTT.

Follow-up interval	Patch size (cm^3) ($N = 25$)	Paired sample t-test		
		Mean difference±SE	t-test	P value
At baseline	4.16 ± 1.21			
At 1st month	2.80 ± 0.86	1.36 ± 0.16	8.250	<0.001[a]
At 2 nd month	1.56 ± 0.88	2.60 ± 0.27	9.750	<0.001[a]
At 3rd month	0.70 ± 0.43	3.46 ± 0.28	12.310	<0.001[a]

[a] P value less than 0.001 is highly significant.

Qadir[8] analyzed the effectiveness and acceptability of patchy AA therapy with a topical 15% lactic acid solution. Inclusion criteria for the research were 29 participants with 59 AA patches. There were three groups created for the patches. The first group (22 patches) was treated with topical 15% lactic acid solution twice weekly. The second group (17 patches) was treated with a topical 15% lactic acid solution thrice weekly. The third group (20 patches) was randomly selected from patients with multiple patches; they were treated with tap water for comparison. They concluded that patchy AA may be effectively treated with a topical 15% lactic acid solution, which has few side effects and is a cost-effective treatment. Thrice weekly application of topical 15% lactic acid solution achieved a better rate of hair regrowth in a shorter period than twice weekly application.

In the betamethasone group, mean ± SD of the patch size at baseline was 4.16 ± 1.21 cm^3 compared with 2.80 ± 0.86, 1.56 ± 0.88, and 0.70 ± 0.43 in the first, second, and third month, respectively.
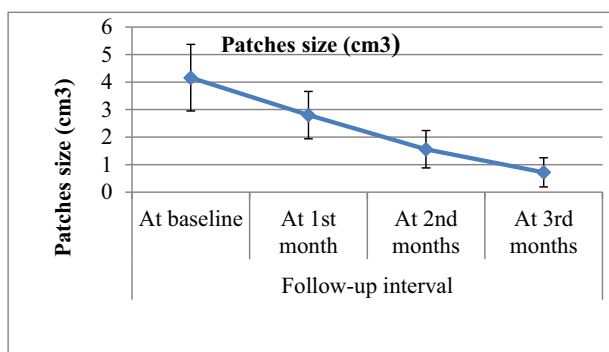

Fig. 5. Comparison of the changes of patch size measured in cm^3 among the betamethasone group at each follow-up with the start of TTT.
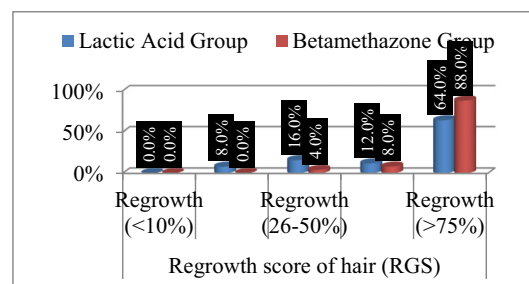

Fig. 6. Comparison between groups according to regrowth score of hair 'RGS.'

Table 5. Comparison between groups according to regrowth score of hair.

Regrowth score of hair	Lactic acid group ($N = 25$)	Betamethasone group ($N = 25$)	Test value	P value
Median (IQR)	4 (2—4)	4 (4—4)	−2.089	0.037[a]
Range	1—4	2—4		

IQR, interquartile range.
Using: U, Mann—Whitney test for nonparametric data 'median (IQR)'.
[a] P value less than 0.05 is significant.

Table 6. Comparison between groups according to regrowth score of hair.

Regrowth score of hair	Lactic acid group ($N = 25$)	Betamethasone group ($N = 25$)	Test value	P value
Regrowth (<10%)	0	0	6.947	0.048[a]
Regrowth (11—25%)	2 (8.0)	0		
Regrowth (26—50%)	4 (16.0)	1 (4.0)		
Regrowth (51—75%)	3 (12.0)	2 (8.0)		
Regrowth (>75%)	16 (64.0)	22 (88.0)		

Using: χ^2, χ^2 test for n (%) or Fisher's exact test, when appropriate.
[a] P value less than 0.05 is significant.

Table 7. Comparison between groups according to regrowth score of hair (>75%).

	Lactic acid group (N = 25)	Betamethasone group (N = 25)	Test value	P value
Regrowth score of hair (>75%)	16 (64.0)	22 (88.0)	6.947	0.048[a]

Using: $\chi^2$2, χ^2 test for n (%).
  [a] P value less than 0.05 is significant.

Devi et al.[9] examined the effectiveness of topical betamethasone with intralesional triamcinolone in the treatment of localized AA. Patients were divided into two treatment groups at random: group B got topical betamethasone valerate cream 0.1% twice daily and group A received intralesional triamcinolone acetonide (10 mg/ml). At the 12th week of follow-up, the final result was confirmed as hair growth, which was classified as effective. They found that topical betamethasone valerate was less effective in treating localized AA than intraregional triamcinolone, which was against us.

In Saleem et al.,[10] the efficacy of topical tacrolimus and betamethasone in treating patchy AA was contrasted with that of soft paraffin. In a non-randomized, open-label, intention-to-treat clinical study, 60 individuals with mild-to-moderate patchy AA were assessed. Tacrolimus, betamethasone, or soft paraffin were given to the patients ($n = 20$). The therapy was to be applied twice daily for 12 weeks to the afflicted regions for all three groups. They found that in individuals with mild-to-moderate patchy AA, betamethasone promoted hair growth more effectively than tacrolimus or soft paraffin.

Mancuso et al.[11] assessed the therapy of BVF in patients with mild-to-moderate AA for effectiveness, tolerability, and safety. In a parallel-group, investigator-blinded experiment, 61 patients (26 men and 35 women; average age 41 ± 13 years) with mild-to-moderate AA (hair loss 26%) were included. Betamethasone dipropionate lotion was given to 30 participants, whereas BVF was given to 31 patients. For 12 weeks straight, both therapies were administered twice daily to the troubled regions. They concluded that mild-to-moderate AA can be

Fig. 7. Comparison between groups according to hair regrowth score (>75%).

effective and well-tolerated with betamethasone valerate foam. It is necessary to conduct more studies to assess this novel formulation's effectiveness in treating AA in contrast to or in conjunction with intralesional corticosteroids.

When comparing both groups s regarding patch size and hair regrowth score, we found that betamethasone was statistically significantly better than lactic acid in reducing the size of patches in the third month (0.70 ± 0.43 vs. 0.96 ± 0.37 cm^3) achieving a hair regrowth score of hair of more than 75%: 22 (88.0%) patients versus 16 (64.0%) patients.

Recently, Elshahid et al.[12] compared the effectiveness of Jessner solution, which contains salicylic acid, lactic acid, resorcinol, and ethanol, to intralesional steroids in the treatment of AA. In all, 40 individuals with multifocal patchy AA participated in this research. Three patches were chosen at random for each patient and given three different treatments: one with an intralesional steroid, another with topical Jessner solution, and the third with sterile water. Three sessions were performed, each 3 weeks apart, and were monitored for 3 months. They dissented from our position and said that Jessner's idea may be a cutting-edge, workable, and well-tolerated form of therapy for AA sufferers.

Mahgoub et al.[13] reported that a substantial enhancement of density, texture, and hair repigmentation was seen in AA patients who used topical phenol at an 88% concentration. When compared with topical phenol, TCA 35% has recently been shown to enhance the quality and density of hair in AA.

In Qadir[8] reported that Jessner solution's component, topical 15% lactic acid solution, is an efficient, safe, and acceptable treatment for patchy AA with little adverse effects when used three times per week.

In Sharquie et al.[7] reported that when compared with triamcinolone acetonide injection in AA, the use of lactic acid 1% solution was shown to be more efficient and affordable.

In Mahasaksiri et al.[14] reported that innate and adaptive immunity interacts in the etiology of AA. In addition, CD8 cells have the propensity to infiltrate intrafollicular hair to obstruct the development cycle. CD4 and CD8 T cells are seen in the bulb and perifollicular milieu of afflicted hair follicles. The CD8 T cell pathway is activated by inflammatory
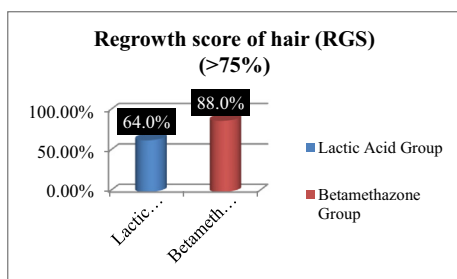
cytokines (Th1 mediated), which then have an impact on the progression of AA and the sudden halt of the hair growth cycle.

4.1. Conclusion

From our study, we can conclude that topical betamethasone valerate lotion is better and more effective than topical lactic acid 15% solution in the management of multiple patchy AA.

Conflicts of interest

There are no conflicts of interest.

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