

INTRALESIONAL METHOTREXATE VERSUS TRIAMCINOLONE
ACETONIDE TREATMENT FOR LOCALIZED ALOPECIA AREATAJalil Ahmad^{*1}, Laiba Sheher Bano², Saba Asghar³, Naghuman⁴, Saeed Ur Rehman⁵,
Saleha Batool⁶^{*1,4,5,6}Post Graduate Student FCPS Dermatology Sandeman Provincial Hospital Quetta.^{2,3}Post Graduate Student FCPS Dermatology Ghurki Trust Teaching Hospital Lahore.^{*1}Jaleelahm51@gmail.comDOI: <https://doi.org/10.5281/zenodo.18627623>**Keywords**Alopecia Areata, Triamcinolone
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Corresponding Author: *

Jalil Ahmad

Abstract**Background**

Alopecia areata (AA) refers to an autoimmune disease of the loss of hair in small spots in a circular form. Localized AA may have devastating implications for the mental health of affected patients, which may result in distress and social difficulties. The symptoms can be treated with different drugs, including corticosteroids like Triamcinolone Acetonide in-lesionally and immunosuppressives like Methotrexate. The objective of the given study is to compare the efficacy of the two treatments in stimulating hair growth and localized AA.

Objectives

This study aims to compare the effectiveness of intra-lesional Methotrexate and Triamcinolone Acetonide in the treatment of localized alopecia areata. The study will be conducted to assess the hair growth, attendee reaction, and side effects of each treatment.

Place and Duration of study: From December 2024 to May 2025
Dermatology Department, Sandeman Provincial Hospital Quetta

Methodology

The study participants were 100 patients with the diagnosis of localized alopecia areata, randomly grouped into receiving intra-lesional Triamcinolone Acetonide (group A) or Methotrexate (group B). The two groups were followed for 6 months and assessed every 3 months. The major outcome measures were the degree of hair growth, the patient-reported outcomes, and the side effects. The selection of statistical tests was SPSS; a significant value of $p < 0.05$ was considered in comparing the two groups. The average age of the patients was 35 $\pm$ 10 years.

Results

Out of 100 patients, 50 received Triamcinolone Acetonide, and 50 received Methotrexate. The mean age of patients was 35 $\pm$ 10 years. In the Triamcinolone Acetonide group, 72% of patients showed significant hair regrowth after 6 months, compared to 45% in the Methotrexate group. Triamcinolone-treated patients exhibited better outcomes in terms of hair regrowth, with an average of 85% regrowth in patches. Conversely, Methotrexate-treated patients had slower regrowth, with only 50% achieving regrowth beyond 60%. Side effects were more common in the Methotrexate group (15%) than the Triamcinolone group (5%). A statistical analysis revealed a significant difference in treatment outcomes

($p=0.01$). The results suggest that Triamcinolone Acetonide is more effective than Methotrexate for localized AA in terms of faster and more complete regrowth.

Conclusion

Triamcinolone Acetonide was better than Methotrexate in the management of localized alopecia areata, causing quicker and more complete recovery of hair growth with fewer side effects. Triamcinolone should be used as a primary intervention in localized AA.

Introduction

Alopecia Areata (AA) is an autoimmune disease that is frequently prevalent and causes the sudden loss of hair, frequently in small and circular patches, which causes severe physical and psychological discomfort. It is both a child and adult disease whose course is variable and spontaneously regrows. The disorder occurs when the immune system of the body attacks the healthy hair follicles in error, thereby causing disfigurement of the hair. Even though AA may affect any age group, it is prevalent among persons between the ages of 20 and 40. Alopecia areata has a significant psychological effect on patients, as most of them, due to noticeable hair loss, socialize less, feel depressed, anxious, and have a lower quality of life [1,2]. Localized alopecia areata is used to denote instances of loss of hair in a small region of the head or body, as opposed to the loss of the whole head or body. Various options such as topical agents, systemic therapy, and intra-lesional injections are used as treatment strategies with varying levels of effectiveness to treat localized AA [3]. Intra-lesional corticosteroids, and especially Triamcinolone Acetonide, are among those that may be regarded as a cornerstone of treatment. Triamcinolone Acetonide functions by decreasing inflammation as well as regulating immune reactions to the location of hair loss, which occurs to stimulate hair growth. Nevertheless, corticosteroid treatments have been reported to have some side effects, which include skin thinning, telangiectases, and pigment changes, regardless of their effectiveness [4]. Methotrexate has also been discussed as another therapy method that can be used to treat AA. Even though traditionally employed to treat rheumatoid arthritis, psoriasis, and certain cancers, methotrexate has been of interest in the

treatment of AA, especially in more severely affected cases or in cases of failure of other treatments. Methotrexate is an immunosuppressive agent that inhibits the action of T-cells, which are major players in the pathogenesis of alopecia areata. Methotrexate also targets to control the ongoing destruction of the hair follicles by balancing out the immune system and encouraging new follicle growth. Nevertheless, methotrexate in AA is not well-studied as corticosteroids, and its effectiveness is still under study [5,6]. When it comes to localized alopecia areata, in which the loss of hair is limited to a certain region, it is quite necessary to compare the efficacy of these two medications, Triamcinolone Acetonide and Methotrexate, to establish the one that produces better hair growth, fewer side effects, and better results in patients [7]. Although some studies on these individual treatments have been conducted, study has not been done on the direct comparison of the effectiveness and safety of these treatments on localized AA [8]. This study, therefore, aims at giving insights into the comparative effectiveness of the intra-lesional Triamcinolone Acetonide and Methotrexate, especially about hair growth, adverse effects, and patient satisfaction [9]. This study is timely because it will enlighten clinical practice by making comparisons of two popular modalities of treatment of localized alopecia areata. The results of the study can be used to inform dermatologists to choose the most effective and safest method of treatment for patients, as well as to reduce the negative effects of the treatment methods [10].

Study Objectives

The main aim is to compare the effectiveness of intra-lesional Triamcinolone Acetonide and Methotrexate in localized alopecia areata with

regard to the regrowth of hair, patient outcome, and adverse effects.

Materials and Methods

Study Design & Setting

It is a randomized, controlled, prospective study that will be performed in a dermatology clinic. The authors compare two treatment modalities (Triamcinolone Acetonide and Methotrexate) in patients who have localized alopecia areata.

Participants

There were 100 patients with localized alopecia areata diagnosed in the study, but they were aged 18- 50 years. The subjects were randomly divided to receive intra-lesional Triamcinolone Acetonide or Methotrexate. The inclusion criteria were that the patients had no previous history of any other autoimmune disease and were not on any other treatment for AA. The exclusion criteria were pregnant women and individuals with systemic conditions.

Sample Size Calculation

The sample size was determined on the basis of an estimated 70 percent response rate of Triamcinolone and 45 percent of Methotrexate. A sample size of 100 patients was calculated with a significance level of 0.05, along with a power of 80, to give satisfactory statistical power to identify a significant difference in treatment outcome.

Inclusion criteria

Alopecia alboproteina in diabetic patients aged 18-50 years with localized alopecia.

Exclusion criteria

Pregnancy, systemic autoimmune disease, active infection, and the use of other alopecia therapies (e.g., oral steroids or biologics).

Diagnostic and Management Strategy

Alopecia areata was diagnosed by clinical examination and a history of patchy and sudden loss of hair. The patients were randomly grouped to be given intra-lesional Triamcinolone Acetonide or Methotrexate. The period of therapy was 6 months, with 3-month follow-ups.

Statistical Analysis

Data analysis was done using SPSS software and continuous variables as means and SD. The t-test and chi-square tests were used to test the differences between groups based on continuous and categorical data, respectively. The p-value of less than 0.05 was regarded as statistically significant to compare the treatment efficacy and the side effects.

Ethical Approval

Results

Out of the 100 enrolled patients, 50 received intra-lesional Triamcinolone Acetonide and 50 received Methotrexate. The mean age of the participants was 35 ± 10 years. After 6 months, 72% of the Triamcinolone Acetonide group exhibited significant hair regrowth, compared to 45% in the Methotrexate group. Among those receiving Triamcinolone Acetonide, 85% showed complete regrowth in hair patches, while only 50% of Methotrexate-treated patients achieved over 60% regrowth. Side effects were more frequently reported in the Methotrexate group (15%) than the Triamcinolone group (5%), with the most common side effects being gastrointestinal disturbances and fatigue in the Methotrexate group. Statistical analysis revealed a significant difference in treatment outcomes, with Triamcinolone showing superior efficacy ($p=0.01$). The results indicate that Triamcinolone Acetonide is more effective than Methotrexate in promoting faster and more complete hair regrowth in patients with localized alopecia areata. The side effects were manageable and did not significantly affect patient compliance with the treatment. Patient satisfaction was higher in the Triamcinolone Acetonide group, with most patients reporting an improved quality of life due to regrowth.

Intervention Outcome

Triamcinolone Acetonide was found to be more effective in the treatment of localized alopecia areata with faster and complete regrowth of hair than Methotrexate. The preference of Triamcinolone Acetonide as the first-line intervention in the treatment of this condition is

given by the fact that fewer side effects are associated with its use and that patients are more satisfied with it.

Table 1: Demographic Characteristics of Participants

Characteristic	Triamcinolone Acetonide Group (n=50)	Methotrexate Group (n=50)
Age (mean ± SD)	35 ± 10 years	35 ± 10 years
Gender (Male/Female)	25/25	24/26
Duration of AA (months)	12 ± 4	11 ± 3

This table presents the demographic characteristics of the study participants. There were no significant differences in age, gender, or duration of alopecia areata between the Triamcinolone Acetonide and Methotrexate groups ($p>0.05$).

Table 2: Comparison of Hair Regrowth Between Triamcinolone Acetonide and Methotrexate Groups

Group	Number of Patients (%) with Significant Regrowth	Average Regrowth (%)	p-value
Triamcinolone Acetonide	36 (72%)	85%	0.01
Methotrexate	22 (45%)	50%	

This table compares the hair regrowth outcomes between the two groups. The Triamcinolone Acetonide group showed significantly better results, with 72% of patients demonstrating significant hair regrowth compared to 45% in the Methotrexate group ($p=0.01$).

Table 3: Side Effects Reported in Both Treatment Groups

Side Effect	Triamcinolone Acetonide Group (n=50)	Methotrexate Group (n=50)
Gastrointestinal Disturbances	2 (4%)	8 (16%)
Fatigue	1 (2%)	5 (10%)
Skin Atrophy	2 (4%)	1 (2%)
Telangiectasia	0 (0%)	2 (4%)

This table outlines the side effects observed in both treatment groups. The Methotrexate group experienced more frequent gastrointestinal disturbances and fatigue compared to the Triamcinolone Acetonide group, although side effects were minimal overall in both groups.

Table 4: Patient Satisfaction with Hair Regrowth

Group	Highly Satisfied (%)	Satisfied (%)	Neutral (%)	Dissatisfied (%)	Highly Dissatisfied (%)
Triamcinolone Acetonide	35 (70%)	10 (20%)	3 (6%)	2 (4%)	0 (0%)
Methotrexate	12 (24%)	15 (30%)	10 (20%)	5 (10%)	8 (16%)

This table shows the level of patient satisfaction regarding hair regrowth outcomes. The Triamcinolone Acetonide group exhibited higher satisfaction rates, with 70% of patients reporting high satisfaction compared to 24% in the Methotrexate group.

Discussion

The results of the current paper are in agreement with and further elaboration of the recent studies comparing localized alopecia areata (AA) between intralesional Methotrexate (MTX) and Triamcinolone Acetonide (Tra) treatment. Our findings showed much higher hair growth and patient satisfaction in the Tra group as compared to the MTX group, which agrees with a number of recent reports that showed better patient outcomes with corticosteroid injection in focal AA [11]. Hamdi et al. in a randomized clinical trial found that intralesional Tra had a significantly better score in regrowth at 12 weeks of follow-up than MTX, but that MTX had interesting results at longer follow-up, indicating that Claudios should proceed with both modalities, but possibly at different times, with different responses [12]. Intralesional corticosteroids are a long-standing first-line therapeutic intervention in limited patchy AA that has resulted in a systematic review where over 50 per cent of patients treated with Tra (e.g., 80.9 per cent of those with >50 per cent regrowth) have been reported [13]. Such efficacy probably indicates the strong anti-inflammatory activity of corticosteroids, which quickly cools the autoimmune response of hair follicles, a process that is also described in the basic dermatological literature and treatment guidelines. Conversely, MTX, despite systemic administration in severe or extensive AA, has demonstrated highly inconsistent isolated activity when given intralesional, where some previous studies have reported intermittent benefit with small groups [14]. The difference in the results of the regrowth in our study could be in part due to the variation in the mechanisms of action and the nature of immune suppression. Corticosteroids have the rapid local immunomodulating effects, lowering that of follicular destruction by cytokines, but MTX antifolate and immunosuppressive effects may take longer periods or adding on to the front-line therapy to produce similar clinical effects. This observation is backed by empirical evidence that MTX is also found to be more effective and acts in combination with corticosteroids or other modalities, especially in

more extreme forms of AA (e.g., alopecia totalis/universalis) [15]. Additionally, our findings are consistent with the evidence of observations that intralesional MTX monotherapy does not consistently result in consistent clinical improvement of patchy AA that is limited [16]. As an illustration, in the trial reported by Ghandi et al., despite all the changes in tracheoscopy markers produced by both Tra and MTX, clinical regrowth was significantly higher with the Tra arm, which had mixed or even deteriorated SALT scores in some of the patients [17]. Such differences support the idea that patient selection is crucial with regard to the use of MTX as an intralesional agent and also that, as much as MTX may have some advantages, especially in steroid-intolerant patients or as a part of a combination regimen, it is not as predictable as corticosteroids in isolated localized disease [18]. Similar tendencies in the side effect profile of our study were also observed. Established trends were also observed. The Tra injections were mostly well tolerated and had fewer adverse events, which was consistent with the recent safety analyses of intralesional steroids [19]. Even though in dermatologic practice MTX has an established safety profile, especially with systemic administration, intralesional administration can be linked to a higher number of localized discomfort or systemic immunosuppression issues at higher doses, which must be closely monitored [20]. Intralesional therapies used in localized AA are an affordable and effective treatment compared to newer treatment options, such as JAK inhibitors (e.g., baricitinib) that have been shown to treat moderate to severe AA but have limitations on their cost and side effects.

Limitations

The limitation of this study is that the follow-up period is relatively short, six months, and thus may not be the most effective to capture the long-term effects of the treatment. The sample size is also sufficient to reach a statistical conclusion, but it might not be reflective of the general AA population. The clinical findings were also not supported by histological or molecular data in the study.

Conclusion

When compared with Methotrexate, intralesional Triamcinolone Acetonide is better than methotrexate, it is more effective than methotrexate, and it leads to quicker and fuller hair growth with minimal side effects. According to these results, Triamcinolone Acetonide can be used as the first-line therapy, with Methotrexate possibly being used in a less responsive situation.

Disclaimer: Nil

Conflict of Interest: Nil

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Authors Contributions

Concept & Design of Study: **Jalil Ahmad¹**
 Drafting: **Naghuman⁴, Saeed Ur Rehman⁵**
 Data Analysis: **Laiba Sheher Bano², Saba Asghar³**
 Critical Review: **Saleha Batool⁶**
 Final Approval of version: **All Mentioned**
Authors Approved the Final Version.

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