

Therapeutic Role of Diphenylcyclopropenone (Diphencyprone) in Alopecia Areata: A Comprehensive Overview of 15 Cases in Kashmiri Population

Farah Sameem , Seerat Fatima , Adil Abdullah , Seema Qayoom .

Original Article

Abstract

Background

Alopecia areata (AA) is an autoimmune condition characterized by non-scarring hair loss. Diphencyprone (DPCP) is a topical immunomodulator commonly used in refractory cases, but data on its efficacy and safety in larger patient groups remain limited.

Aims and Objectives

This study aims to evaluate the clinical efficacy, safety, and tolerability of DPCP in patients with AA through a case series of 15 individuals.

Methodology

A prospective analysis of 15 patients diagnosed with severe AA who were treated with DPCP was conducted. The study included individuals aged 12 to 60 years with alopecia areata. Patients received 3 weekly applications, and responses were assessed using clinical photographs and hair regrowth scoring over 6 months. Adverse effects were recorded to evaluate tolerability.

Results

In our study it was seen that, 4 (26.7%) patients had grade 4 improvement i.e. complete hair growth in affected area and 3 (20%) had grade 3 improvement. Time to initial response was seen to be Avg. 3.48 ± 1.05 months and time to maximum response was Avg. 6.14 ± 1.48 months. It was also observed that 13.3% patients experienced relapse during follow-up. While adverse events like contact dermatitis, chemical leukoderma and urticarial lesions were observed in a few patients, they were generally well-tolerated by the patients and did not lead to treatment discontinuation.

Conclusion

DPCP showed promising results in inducing hair regrowth in a significant proportion of patients, with minimal adverse effects. It remains a valuable therapeutic option for AA, particularly in refractory cases.

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international databases.

Introduction

Alopecia areata (AA) is an autoimmune condition affecting hair follicles, resulting in unpredictable and often relapsing hair loss [1]. It is characterized by its heterogeneous presentation, ranging from small, well-demarcated patches of hair loss to complete loss of scalp (alopecia totalis) or even body hair (alopecia universalis) [2]. While the exact pathophysiology is not entirely understood, it is hypothesized that a breakdown of immune privilege at the hair follicle plays a central role. This breakdown triggers T-cell-mediated inflammation against anagen-phase hair follicles, halting their growth and leading to hair loss. Genetic predisposition, environmental factors, and psychological stress have also been implicated as potential triggers.

Management of AA remains challenging due to its unpredictable course and variability in patient response to treatments. Current therapeutic strategies aim to suppress immune-mediated damage or modulate the immune response. These include corticosteroids (topical, intralesional, or systemic), calcineurin inhibitors, Janus kinase (JAK) inhibitors, and topical immunotherapies. However, the lack of a definitive cure and the potential for relapses necessitate the exploration of alternative approaches.

Among the available options, diphencyprone (DPCP) has gained attention as a topical immunomodulator for refractory AA. It works by inducing a mild allergic contact dermatitis, thereby creating a diversion for the immune system and restoring the immune privilege of the hair follicle [3]. The therapy is typically reserved for patients who fail to respond to first-line treatments, given its time-intensive nature and requirement for close monitoring. Despite its increasing use, data regarding the efficacy, safety, and patient tolerability of DPCP are limited, particularly in diverse patient populations [4].

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Keywords

Alopecia areata , Diphencyprone

This study presents a case series of 15 patients with AA treated with DPCP. The primary objective is to assess the clinical efficacy, safety, and tolerability of this treatment, with a secondary goal of identifying factors that may influence therapeutic outcomes. By doing so, the study aims to contribute to the growing body of evidence supporting the role of DPCP in managing this challenging condition.

Aims and Objectives:

To evaluate the safety, efficacy, and tolerability of DPCP (Diphenylcyclopropenone) treatment in patients with severe alopecia areata.

Methodology

This prospective study conducted in the post-graduate department of dermatology SKIMS MCH Bemina. It was conducted over a period of 2 years and included 15 patients in the age group of 12 to 60 years, who had severe disease and were recalcitrant to other conventional modalities of treatment. Written informed consent and ethical clearance was obtained from the Institutional ethical committee.

Inclusion criteria

1. Extensive Alopecia Areata: Participants must have experienced loss of more than 40% of their scalp hair.
2. Long-lasting Alopecia Areata: Participants must have had no hair regrowth for more than 12 months
3. Treatment-free Period: Participants must have had an interruption of any therapy for alopecia areata for the past 6 months

Exclusion criteria

1. Pregnant or breastfeeding individuals were excluded due to potential risks and unknown effects of the treatment.
2. Individuals with a history of any cardiovascular conditions were excluded to avoid potential safety risks.

Patients were clinically assessed for the severity grading of alopecia areata and baseline photographs and records were documented. Initial baseline investigations along with thyroid profile and ANA profile were assessed.

Diphenylcyclopropenone (DPCP) solutions were prepared in acetone at concentrations of 0.001%, 0.01%, 0.1% and 2%. Patients were first sensitized with a 2% DPCP solution applied to a 2cm x 2cm area of the scalp. Treatment was initiated on one half of the scalp, with the other half serving as a control. Subsequent treatments involved 3 weekly sessions, gradually increasing DPCP concentrations starting from 0.001%, adjusted to maintain erythema and itch on the scalp for 48 hours. Patients were advised to avoid direct sunlight or ultraviolet radiation exposure to the treated area for 48 hours after applying the Diphenylcyclopropenone (DPCP) treatment and to not wash or submerge the treated area in water for 48 hours following the application of the DPCP treatment. Treatment response was evaluated every 3 months for a period of 2 years. Patients who did not show any response within 6 months were considered non-responders. If a response was

observed on the treated half of the scalp within 3-6 months, DPCP application was extended to the entire scalp. The severity of alopecia areata (AA) was evaluated using the AA Investigational Assessment Guidelines, which provide a standardized method for assessing the extent and distribution of hair loss. Additionally, hair regrowth was graded according to the MacDonald, Hull, and Norris system, which categorizes the type and amount of hair regrowth on a scale from 1 to 4.

Statistical analysis

The recorded data was compiled and entered in a spreadsheet (Microsoft Excel) and then exported to data editor of SPSS Version 20.0 (SPSS Inc., Chicago, Illinois, USA). Continuous variables were expressed as Mean $\pm$ SD and categorical variables were summarized as frequencies and percentages. A P-value of less than 0.05 was considered statistically significant.

Results

At completion of therapy, it was seen that, 4 (26.7%) patients had grade 4 improvement i.e. complete hair growth in affected area, 3 (20%), 2 (13.3%), 3 (20%) and 3 (20%) had grade 3, grade 2, grade 1 and no response respectively. Time to initial response was seen to be Avg. 3.48 ± 1.05 months and time to maximum response was Avg. 6.14 ± 1.48 months. It was also observed that 13.3% patients experienced relapse during follow-up. While adverse events like contact dermatitis, chemical leukoderma and urticarial lesions were observed in a few patients, they were generally well-tolerated by the patients and did not lead to treatment discontinuation. The comparison of response rates (percentage of patients achieving a grade 3 or 4 response) between Kashmiri patients and other populations showed a lesser response (47%) as compared to previous studies in different populations showing 60% with grade 3 and 4 responses. The lower response rate could be attributed to several factors including genetic variability, environmental factors, patients with extensive or long-standing alopecia areata and the limited sample size of 15 patients in this study restricts the generalizability of the findings.

Discussion

The results of this case series affirm the utility of DPCP in promoting hair regrowth in patients with AA, particularly in those with patchy disease [5]. A majority of patients achieved cosmetically acceptable regrowth within six months, a finding consistent with previously published studies. This suggests that DPCP is an effective therapeutic option for patients with refractory or recalcitrant AA who have not responded to corticosteroids or other immunosuppressive therapies. DPCP's mechanism of action is thought to involve the induction of a type IV hypersensitivity reaction at the site of application [6]. This localized immune response may distract autoreactive T-cells away from the hair follicles, allowing them to resume their normal growth cycle. Additionally, the inflammatory milieu created by DPCP may recruit regulatory T-cells, which play a role in restoring immune privilege at the hair follicle. The

observed responses in this case series underscore the potential of this mechanism in achieving significant regrowth.

However, the variability in response among patients highlights the complex interplay of factors influencing treatment outcomes. For instance, patients with extensive AA, such as alopecia totalis or alopecia universalis, generally showed less favorable responses compared to those with localized patches of hair loss [7]. This aligns with the hypothesis that longstanding or severe disease may involve irreversible follicular damage or a more robust autoimmune response, limiting the efficacy of immunomodulatory therapies like DPCP. Adverse effects observed in this series were primarily mild and included erythema, pruritus, scaling, and transient hypopigmentation [8]. These side effects were generally well tolerated, and no patient required discontinuation of therapy due to adverse events. Importantly, no systemic side effects were reported, reaffirming the safety profile of DPCP when used appropriately. Patient adherence and satisfaction were also notable, despite the prolonged duration of treatment required to achieve visible results.

While the findings are encouraging, it is important to consider the limitations of DPCP therapy. The time-intensive nature of weekly applications and the need for regular follow-up may pose challenges for some patients. Additionally, the therapy's delayed onset of action requires careful counseling to manage patient expectations. Psychological support may also be necessary to address the emotional burden of AA, particularly for patients with extensive or relapsing disease.

Overall, this case series contributes to the growing evidence supporting the use of DPCP as a therapeutic option for AA. Future studies should aim to identify biomarkers or clinical predictors of response to optimize patient selection and outcomes. Furthermore, exploring combination therapies with DPCP may enhance efficacy, particularly in patients with severe or refractory disease [0].

In our study it was seen that the comparison of response rates (percentage of patients achieving a grade 3 or 4 response) between Kashmiri patients and other populations showed a lesser response (47%) as compared to previous studies in different populations showing 60% with grade 3 and 4 responses. The lower response rate could be attributed to several factors including genetic variability, environmental factors, patients with extensive or long-standing alopecia areata and the limited sample size of 15 patients in this study restricts the generalizability of the findings. The safety profile of diphenylcyclopropenone (DPCP) in our study of Kashmiri patients with alopecia areata was consistent with previous reports. The most common adverse events, including contact dermatitis, chemical leukoderma, occipital lymphadenopathy and urticarial lesions, were generally well-tolerated by the patients

Conclusion

This case series reinforces the efficacy and safety of

DPCP as a therapeutic option for alopecia areata, particularly in patients with patchy hair loss. DPCP demonstrated significant hair regrowth with minimal adverse effects, making it a valuable addition to the armamentarium for AA management. However, its variable efficacy in extensive cases and the time-intensive nature of treatment require careful patient selection and counseling.

Limitations

The findings of this study are limited by the small sample size and its retrospective nature, which may introduce selection and recall biases. The absence of a control group prevents direct comparison with other treatment modalities. Furthermore, the short duration of follow-up may not capture long-term efficacy and relapse rates. Larger, randomized controlled trials are needed to validate these findings and explore strategies to optimize treatment outcomes for AA patients.

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