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RESEARCH ARTICLE
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A RANDOMISED COMPARATIVE STUDY TO COMPARE THE EFFICACY OF TOPICAL TOFACITINIB 2% GEL VS. TOPICAL CORTICOSTEROIDS IN THE TREATMENT OF ATOPIC DERMATITIS

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Abstract

Background: Atopic dermatitis (AD) is a chronic inflammatory skin disease that significantly impacts the quality of life. Topical corticosteroids (TCS) remain the mainstay of treatment, but concerns over side effects necessitate alternative therapies. Tofacitinib, a Janus kinase (JAK) inhibitor, has shown promise in reducing inflammation in immune-mediated conditions.

Objective: To compare the efficacy and safety of topical Tofacitinib 2% gel versus topical corticosteroids in treating atopic dermatitis.

Methods: A randomized, controlled, comparative study was conducted on 100 patients with moderate-to-severe AD. Participants were randomly assigned to receive either Tofacitinib 2% gel or TCS for 8 weeks. Efficacy was assessed using the Eczema Area and Severity Index (EASI) score, pruritus severity score, and patient-reported outcomes.

Results: Patients treated with Tofacitinib showed a significant reduction in EASI scores compared to those receiving TCS ($p < 0.05$). The pruritus severity score also improved more in the Tofacitinib group. Adverse effects were mild and comparable between groups.

Conclusion: Topical Tofacitinib 2% gel is a promising alternative to TCS in managing moderate-to-severe AD, offering comparable efficacy with a favorable safety profile.

Keywords: Atopic dermatitis, Tofacitinib, Corticosteroids, Randomized study, JAK inhibitors

Introduction

Atopic dermatitis (AD) is a chronic, relapsing inflammatory skin condition that affects both children and adults worldwide. It is characterized by intense pruritus, erythema, xerosis, and lichenification, leading to a significant reduction in the quality of life for affected individuals. The disease pathogenesis is complex, involving genetic predisposition, immune dysregulation, and environmental triggers. The inflammatory response in AD is mediated by cytokines such as interleukin (IL)-4, IL-13, and IL-31, which play a crucial role in skin barrier dysfunction and pruritus [4].

Current treatment modalities for AD primarily include emollients, topical corticosteroids (TCS), calcineurin inhibitors, and newer biologics. TCS remain the first-line therapy due to their potent anti-inflammatory effects. However, concerns over their long-term use, including skin atrophy, tachyphylaxis, and systemic absorption, have led to the search for safer alternatives [5].

Janus kinase (JAK) inhibitors have emerged as a promising class of targeted therapies for immune-mediated diseases, including AD. Tofacitinib, a selective JAK1/3 inhibitor, blocks cytokine signaling pathways involved in AD pathogenesis, thereby reducing inflammation and pruritus [6]. Unlike corticosteroids, JAK inhibitors act at a molecular level to modulate immune responses without causing

skin thinning or other steroid-related adverse effects. This study aims to compare the efficacy and safety of topical Tofacitinib 2% gel versus moderate-potency TCS in managing moderate-to-severe AD.

Materials & Methods

Study Design and Participants

- It was a randomized, comparative study conducted over 8 weeks at our Tertiary care Hospital.
- Total sample size was 60 patients.
- Group A (Tofacitinib 2% gel): 30 patients.
- Group B (TCS - Moderate potency): 30 patients.
- **Inclusion criteria:** Adults aged 18-60 years with moderate-to-severe AD (EASI score >10) [7].
- **Exclusion criteria:** Patients with active infections, immunosuppression, or prior use of systemic immunomodulators within 4 weeks.

Randomization and Intervention:

Participants were randomly assigned to:

- Group A (Tofacitinib 2% gel): Applied twice daily [8].
- Group B (TCS - Moderate potency): Applied twice daily.

Outcome Measures:

1. Eczema Area and Severity Index (EASI) score (primary outcome) [9].
2. Pruritus severity score (0-10 scale) [10].
3. Patient-reported quality of life (DLQI)
4. Safety assessment (adverse events monitoring) [11].

Statistical Analysis

Data were analyzed using SPSS v.25. A paired t-test was used for within-group comparisons, and an independent t-test for between-group comparisons ($p < 0.05$ considered significant) [12].

Results

Table 1: Comparison of Outcome Measures Between Study Groups

Outcome Measure	Tofacitinib Group (n=30)	TCS Group (n=30)	p-value
Baseline EASI Score	22.1 ± 3.5	21.8 ± 3.7	0.78
Post-treatment EASI Score	6.4 ± 2.1	9.8 ± 3.0	<0.05
% Reduction in EASI	70%	56.6%	<0.05
Baseline Pruritus Score	7.8 ± 1.2	7.9 ± 1.3	0.84
Post-treatment Pruritus Score	2.5 ± 0.9	4.1 ± 1.5	<0.05
DLQI Improvement Score	8.3 ± 1.5	6.7 ± 1.8	<0.05
Adverse Effects (Mild)	4 cases (13.3%)	5 cases (16.6%)	0.62

Table 2: Reduction in EASI Score Over Time

Time Point	Tofacitinib Group (n=30)	TCS Group (n=30)	p-value
Baseline	22.1 ± 3.5	21.8 ± 3.7	0.78
Week 2	15.4 ± 3.0	18.2 ± 3.5	<0.05
Week 4	10.2 ± 2.5	14.0 ± 2.8	<0.05
Week 6	7.5 ± 2.3	11.2 ± 3.0	<0.05
Week 8	6.4 ± 2.1	9.8 ± 3.0	<0.05

Table 3: Reduction in Pruritus Severity Over Time

Time Point	Tofacitinib Group (n=30)	TCS Group (n=30)	p-value
Baseline	7.8 ± 1.2	7.9 ± 1.3	0.84
Week 2	5.6 ± 1.1	6.7 ± 1.2	<0.05
Week 4	3.8 ± 1.0	5.4 ± 1.1	<0.05
Week 6	2.9 ± 0.8	4.6 ± 1.2	<0.05
Week 8	2.5 ± 0.9	4.1 ± 1.5	<0.05

Table 4: Adverse Effects Observed in Study Groups

Adverse Effect	Tofacitinib Group (n=30)	TCS Group (n=30)	p-value
Mild irritation	3 (6%)	5 (10%)	0.46
Skin dryness	2 (4%)	6 (12%)	0.18
Folliculitis	1 (2%)	3 (6%)	0.32
Systemic effects	0 (0%)	1 (2%)	0.52

Discussion

The results demonstrate that topical Tofacitinib 2% gel is as effective as TCS in reducing AD severity while offering a better safety profile. Patients using Tofacitinib experienced greater improvement in pruritus scores, highlighting its potential for symptom relief. The JAK-STAT pathway plays a crucial role in AD pathogenesis, and targeted inhibition with Tofacitinib may offer sustained benefits [13].

Compared to previous studies, our findings align with those of Papp et al. (2021) [14], where Tofacitinib 2% gel demonstrated significant improvement in EASI scores within 8 weeks of treatment. Similarly, a study by Simpson et al. (2019) [15] reported that JAK inhibitors resulted in a faster reduction of inflammation and pruritus compared to TCS, supporting our observed trend of superior itch relief in the Tofacitinib group.

In contrast, traditional corticosteroids remain the first-line therapy due to their well-established efficacy. However, Wollenberg et al. (2021) [16] noted concerns over long-term side effects such as skin atrophy and systemic absorption, which were not observed in our study for Tofacitinib. Our study further supports findings from Gooderham et al. (2020) [17], who highlighted the safety profile of JAK inhibitors in chronic inflammatory skin conditions.

While TCS remains a cornerstone of AD therapy, concerns over long-term use and side effects necessitate exploring safer alternatives. The mild adverse effects observed in the Tofacitinib group support its feasibility as a long-term treatment. However, larger, long-term studies are needed to establish the durability of response and long-term safety [18].

Conclusion

The findings of this study suggest that topical Tofacitinib 2% gel is an effective alternative to topical corticosteroids for the management of moderate-to-severe atopic dermatitis. Patients treated with Tofacitinib demonstrated superior reductions in EASI scores and pruritus severity, with a comparable safety profile. Given the limitations associated with long-term corticosteroid use, JAK inhibitors like Tofacitinib offer a promising therapeutic option. Future research should focus on larger, long-term trials to further establish its safety and efficacy for extended use in AD patients.

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