

Research Article

Dual Evaluation of Serum and Tissue Interleukin-17 Levels in Atopic Dermatitis Patients Treated with Topical Mometasone Furoate: A Cohort-Based Case-Control Study

Abdelaziz Ibrahim Eltaweel¹, Hanan Rabea Nada^{2*}, Laila Rahsed³, Kholoud Mohammed Rizk^{4*}, Aya Mohamed Fahmy Mohamed Elhossary^{4*}, and Mohamed Saad Hegazy⁵

¹Department of Dermatology, Benha University, Egypt

²Department of Dermatology, Cairo University, Egypt

³Department of Biochemistry, Cairo University, Egypt

⁴Department of Dermatology, October 6 University, Egypt

⁵Department of Dermatology, Military Hospitals, Egypt

***Corresponding author**

Hanan Rabea Nada, Department of Dermatology, Faculty of Medicine, Cairo University, Egypt,

Tel: 01023000226

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- Atopic Dermatitis
- Interleukin-17
- Mometasone Furoate
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- Skin Tissue
- SCORAD

Abstract

Background: Atopic dermatitis (AD) is a chronic inflammatory skin disorder characterized by immune dysregulation and elevated levels of interleukin-17 (IL-17), a cytokine implicated in both systemic and local inflammatory responses.

Objective: To assess the impact of topical mometasone furoate 0.1% cream on IL-17 levels in both serum and skin tissue of patients with acute and subacute AD, and to compare these levels with healthy controls.

Methods: A diagnostic interventional case-control study was conducted on 30 AD patients and 30 age- and sex-matched healthy controls. Clinical severity was evaluated using the SCORAD index and visual analogue scales. IL-17 levels were measured in serum via ELISA and in skin tissue via immunohistochemistry before and after a two-week course of topical mometasone furoate.

Results: AD patients exhibited significantly elevated IL-17 levels in both serum and tissue compared to controls. Post-treatment, IL-17 levels decreased markedly in both compartments (serum: 238.12 ± 23.16 to 126.86 ± 10.21 pg/ml, $P < 0.001$). SCORAD scores also improved significantly (59.7 to 25.7, $P < 0.001$). ROC analysis revealed serum IL-17 had excellent diagnostic accuracy (AUC = 1.0, sensitivity = 96.7%, specificity = 100%).

Conclusion: Elevated level of IL-17 in both tissues & sera of AD patients & its decrease after treatment with one of topical corticosteroids could shed the light on the role of IL-17 on the pathogenesis of AD that needs further investigations. Topical mometasone furoate significantly reduces IL-17 expression both systemically and locally in AD patients, underscoring its dual anti-inflammatory effect and the potential of IL-17 as a biomarker for disease activity and therapeutic response.

INTRODUCTION

Atopic dermatitis (AD) is a multifactorial, chronic inflammatory skin disease marked by pruritus, eczematous lesions, and a relapsing course. Typically, associated with Th2-mediated immune responses, recent insights have revealed a more complex immunopathology involving Th1 and Th17 pathways, particularly in acute and subacute phases of the disease [1].

Interleukin-17 (IL-17), primarily produced by Th17

cells, has emerged as a key cytokine in the pathogenesis of AD. It promotes neutrophil recruitment, keratinocyte activation, and the release of pro-inflammatory mediators such as IL-6, IL-8, and TNF- α . Elevated IL-17 levels have been documented in both serum and lesional skin of AD patients, suggesting its role in both systemic inflammation and local tissue remodeling.

Topical corticosteroids remain the cornerstone of AD management. Mometasone furoate, a potent glucocorticoid,

has demonstrated efficacy in reducing clinical symptoms and inflammatory markers [2,3].

This study aims to bridge that gap by assessing IL-17 expression in both compartments before and after treatment with mometasone furoate, to highlight the role played by IL-17 in AD, providing a comprehensive view of its immunomodulatory effects and reinforcing IL-17's potential as a biomarker for disease activity and therapeutic response.

METHODOLOGY

Study Design and Setting

This diagnostic interventional case-control study was conducted at the Dermatology Department of October 6 University between October 2022 and April 2023.

Participants

A total of 60 participants were enrolled:

- **Group A (AD patients):** 30 individuals diagnosed with acute or subacute AD.
- **Group B (Controls):** 30 age- and sex-matched healthy subjects undergoing elective abdominoplasty.

Inclusion criteria:

- Age ≥ 18 years
- Both genders
- Clinical diagnosis of acute or subacute AD

Exclusion criteria:

- Use of topical/systemic therapy or phototherapy within 4 weeks prior to enrollment
- Presence of systemic diseases or other dermatologic conditions

Ethical Considerations

The study was approved by the Ethics Committee of the Faculty of Medicine (Approval No. PMC-Me-2211.39). Written informed consent was obtained from all participants. The study was designated according to Helsinki criteria.

Clinical Assessment

- Dermatological examination
- SCORAD index for disease severity

- Visual analogue scale (VAS) for pruritus and sleep disturbance

Intervention

Patients received **topical mometasone furoate 0.1% cream** twice daily for two weeks.

Laboratory Procedures

- **Serum IL-17:** Measured via ELISA (Quantikine D1700, R&D Systems)
- **Tissue IL-17:** Assessed via immunohistochemistry on skin biopsies

Statistical Analysis

SPSS v25 was used.

- Quantitative data: Student's t-test, paired t-test
- Qualitative data: Chi-square, Monte Carlo
- Correlations: Spearman's rank
- ROC analysis for diagnostic accuracy
- Significance: $P \leq 0.05$

RESULTS

Demographics

No significant differences in age, gender, or occupation between groups ($P > 0.05$). All AD patients had recurrent disease; median duration was 18 years.

SCORAD and Symptoms

- SCORAD: $59.7 \pm 12.4 \rightarrow 25.7 \pm 8.6$ ($P < 0.001$)
- Pruritus and sleep scores improved significantly ($P < 0.001$)

Serum IL-17

- AD vs. Controls: 238.12 ± 23.16 vs. 101.79 ± 10.94 pg/ml ($P < 0.001$)
- Post-treatment: 126.86 ± 10.21 pg/ml ($P < 0.001$)

Tissue IL-17

- Pre-treatment: Strong IL-17 staining in lesional skin
- Post-treatment: Marked reduction in staining intensity
- Controls: Minimal IL-17 expression

Correlation

- IL-17 correlated with pruritus ($r = 0.418$; $P = 0.021$)
- No significant correlation with SCORAD

ROC Analysis

- Cut-off: 211.5 pg/ml
- Sensitivity: 96.7%
- Specificity: 100%
- AUC: 1.0 ($P < 0.001$)

Correlation between Serum and Tissue IL-17 Levels

A Spearman's rank correlation analysis was performed to evaluate the relationship between serum IL-17 concentrations and tissue IL-17 expression scores in AD patients before treatment. The analysis revealed a **strong positive correlation**:

- **Spearman's $\rho = 0.72$, $P < 0.001$**

This indicates that higher serum IL-17 levels were significantly associated with more intense IL-17 staining in lesional skin tissue. Post-treatment, the correlation remained positive but was less pronounced ($\rho = 0.48$, $P = 0.007$), suggesting differential resolution kinetics between systemic and local inflammation.

DISCUSSION

The observed strong correlation between serum and tissue IL-17 levels prior to treatment underscores the interconnected nature of systemic and local immune responses in atopic dermatitis. This finding supports the hypothesis that serum IL-17 may serve as a surrogate marker for tissue-level inflammation, offering a non-invasive means of monitoring disease activity [4-8].

Interestingly, the correlation weakened after treatment, which may reflect the differential pharmacodynamics of topical corticosteroids—where local suppression of cytokine expression may precede systemic normalization. This temporal dissociation highlights the importance of dual-compartment analysis when evaluating therapeutic efficacy.

These results align with emerging literature suggesting that IL-17 plays a pivotal role in both the initiation and amplification of cutaneous inflammation in AD. The ability to track IL-17 dynamics in serum and tissue simultaneously provides a more nuanced understanding of disease progression and treatment response, and may

inform future biomarker-driven therapeutic strategies [9-12].

The strong correlation with pruritus suggests IL-17 may influence neuroimmune pathways in AD. The ROC analysis underscores its diagnostic potential. These findings align with prior studies but offer a more integrated perspective by evaluating both compartments simultaneously [13-19].

Limitations include short follow-up and single treatment modality. Future research should explore IL-17 dynamics over time and across different therapeutic agents [20-25].

CONCLUSION

Topical mometasone furoate effectively reduces IL-17 levels in both serum and skin tissue of AD patients, leading to significant clinical improvement. IL-17 may serve as a valuable biomarker for diagnosis, monitoring, and treatment response in atopic dermatitis.

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