EVALUATION OF BIOPTRON POLARIZED LIGHT THERAPY AS AN ADJUNCT TO BASELINE TREATMENT IN ATOPIC DERMATITIS

Turaev N.T.
Tashkent State Medical University (Tashkent, Uzbekistan)
Xodjayeva Sh.K.
The Republican Specialized Scientific and Practical Medical Center of Allergology and Clinical Immunology (Tashkent, Uzbekistan)

Abstract. Background: *Atopic dermatitis (AD) is a chronic inflammatory skin disease characterized by epithelial barrier dysfunction, Th2-skewed immune response, and recurrent exacerbations. Photobiomodulation using Bioptron polarized light (PLP, 480–3400 nm) has shown immunomodulatory, anti-inflammatory, and reparative effects.*

Objective: *To evaluate the clinical efficacy of Bioptron PLP as an adjunct to standard topical therapy in patients with moderate-to-severe AD.*

Methods: *A controlled, non-randomized clinical study was conducted on 60 adults (aged 20–55 years) diagnosed with AD (EASI score 10–30). The PLP group (n = 30) received standard topical corticosteroid therapy plus Bioptron PLP (10 min, once daily, for 10 days), while the control group (n = 30) received standard therapy alone. Clinical outcomes were evaluated using EASI, SCORAD, and pruritus scores on days 0, 5, and 10.*

Results: *The PLP group demonstrated a 65% mean reduction in EASI score versus 38% in controls ($p < 0.01$). Pruritus intensity decreased by 70% in the PLP group vs 40% in controls. No adverse effects were reported.*

Conclusion: *Bioptron PLP significantly enhances the effectiveness of standard topical therapy in AD, providing faster symptom control and improved epithelial repair without side effects.*

Keywords: *atopic dermatitis, Bioptron, polarized light therapy, photobiomodulation, IL-4/IL-13, epithelial barrier, inflammation*

Introduction.

Atopic dermatitis (AD) is a chronic, relapsing, inflammatory skin disorder characterized by intense pruritus, xerosis, and impaired skin barrier integrity. It involves a Th2-dominant immune response with increased expression of IL-4, IL-13, and TSLP, which contribute to keratinocyte dysfunction and corticosteroid resistance. Photobiomodulation (PBM) with Bioptron PLP emits non-coherent, polarized, polychromatic light in the 480–3400 nm range and is reported to modulate cytokine secretion, enhance microcirculation, and promote epithelial regeneration. Recent studies suggest that PBM can suppress Th2 cytokines (IL-4, IL-13) and enhance anti-inflammatory mediators such as IL-10 and TGF-β1 (Shah et al., 2024; PubMed ID: 38547219). This study aims to assess the efficacy of Bioptron PLP as an adjunct to topical corticosteroid therapy in AD, focusing on symptom improvement and reduction of steroid need.

Materials and Methods.

Study design and participants: A prospective, controlled, non-randomized clinical trial was conducted at the Department of Immunology and Allergology, Tashkent Medical Academy. Sixty adult patients (20–55 years) with moderate-to-severe AD were enrolled (EASI = 10–30). Exclusion criteria included systemic corticosteroid use within 4 weeks, acute infection, or phototherapy intolerance.

Intervention:

- **PLP group (n = 30):** Received standard topical corticosteroids and daily Bioptron PLP exposure (10 min, 480–3400 nm, 40 cm distance, perpendicular to lesion) for 10 days.
- **Control group (n = 30):** Received standard topical corticosteroids only.

Assessment parameters: Clinical scores (EASI, SCORAD, pruritus VAS) were

recorded on days 0, 5, and 10. Safety and adverse events were monitored.

Statistical analysis: Data were analyzed using Student's t-test and χ^2 test, with $p < 0.05$ considered statistically significant.

Results

Baseline characteristics: Groups were age- and sex-matched (mean age = 36.8 ± 9.2 years; female = 33, male = 27). Baseline EASI and SCORAD values did not differ significantly between groups ($p > 0.05$).

Clinical efficacy: By day 10:

• EASI score decreased by 65 ± 8% in PLP group vs 38 ± 7% in controls ($p < 0.01$).

• Pruritus intensity reduced by 70% vs 40% ($p < 0.001$).

• 83% of PLP patients achieved marked improvement (≥ 50% reduction in SCORAD).

• Control group: only 47% achieved similar improvement.

Safety: No local irritation, burns, or systemic side effects were observed.

Discussion.

This study confirms that Bioptron PLP enhances the efficacy of topical corticosteroids in atopic dermatitis. The observed rapid clinical improvement can be attributed to several mechanisms:

1. **Cytokine modulation:** PLP reduces Th2 cytokine expression (IL-4, IL-13) and enhances IL-10 and TGF-β1 production.

2. **Epithelial repair:** Polarized light accelerates keratinocyte proliferation and barrier restoration.

3. **Microcirculatory activation:** Improved tissue oxygenation promotes resolution of inflammation and pruritus. Comparable findings were reported in animal models of allergic inflammation treated with PBM (PubMed ID: 38547219; Shah et al., 2024), where IL-10 upregulation correlated with symptom relief. Thus, Bioptron PLP may serve as a non-pharmacologic adjunct, reducing steroid dependence and enhancing patient outcomes.

Conclusion.

Bioptron PLP is an effective, safe, and non-invasive adjunct therapy in atopic dermatitis. It accelerates recovery, reduces inflammation, and enhances topical corticosteroid efficacy without side effects. Future randomized, double-blind trials with cytokine profiling (IL-4, IL-13, IL-10) are recommended to validate long-term benefits.

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