

Post-Inflammatory Hyperpigmentation in Skin of Color Patients With Atopic Dermatitis

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INTRODUCTION

Atopic dermatitis (AD) is a chronic inflammatory condition affecting an estimated 129 million patients worldwide.¹ The chronic relapsing disease is characterized by recurrent, spongiotic patches with ill-defined borders and persistent, intense pruritus. AD often presents in early childhood and frequently persists into adulthood, significantly impacting quality of life. Chronic complications may resemble other dermatologic conditions, including seborrheic dermatitis, ichthyoses, plaque psoriasis, and pityriasis rosea.² Accurate diagnosis requires thorough history taking and differential diagnoses consideration, supported when necessary by skin biopsy.³ AD-induced hyperpigmentation, especially in higher Fitzpatrick skin types, is an underrecognized complication where patients routinely mistake pigmentary changes for persistent active disease, with significant clinical and psychosocial impact.

Post-inflammatory hyperpigmentation (PIH) in AD is a sequela that results from the chronic inflammation underlying AD. Few publications describe in detail the characteristic findings, duration, psychosocial impact, and the response to chronic pigmentary changes, even when new medications are administered. Recently, a case report focused on the reduction of PIH in one adult skin of color (SoC) patient with AD treated with dupilumab.⁴ Beyond AD, the VISIBLE study in psoriasis demonstrates the feasibility of intentional trial designs that capture historically underrepresented patients and SoC-relevant outcomes, including pigmentary changes.^{5,6}

Patients with AD across all age groups, ethnicities, and Fitzpatrick skin types can experience PIH. Compared to Caucasian patients, African American and Hispanic patients are disproportionately affected by AD, and the clinical presentation may be more severe.⁷ SoC patients with AD are more likely to develop lichenification, prurigo nodularis, and “follicular lichenification” with firm papules or diffuse thickening with prominent skin markings.^{8,9} SoC patients may be delayed in referral to dermatology due to masking of the erythema associated with AD, resulting in delayed diagnosis and disease progression.¹⁰ Persistence of AD into adulthood is more common in children with SoC compared with non-Hispanic white children.¹¹ While genetic predisposition may play a role,

a variety of socioeconomic, environmental, and health care factors consistently influence AD severity, persistence, and prevalence among SoC patients.¹²

The literature discussing AD patients of diverse sex, gender, race, and ethnicity has been historically lacking. Less than 5% of publications in multiple high-impact dermatology journals focus on SoC populations.¹³ Underrepresentation leaves clinicians unprepared to manage AD in patients most affected by its severe manifestations. Additionally, current therapeutic guidelines for AD do not consider ethnicity despite important clinical differences.¹⁴

This discussion highlights the duration and distribution of AD-induced hyperpigmentation in higher Fitzpatrick skin types. PIH has been underappreciated in the medical literature, and these cases serve to emphasize its clinical significance, particularly in populations historically underrepresented in dermatologic research.

CASE PRESENTATION

This collection of cases illustrates PIH in a cohort of patients with AD aged 1 to 17 years, focusing on individuals with SoC. The pigmentary changes observed in this group varied both in morphology and in severity, with many of the hyperpigmented areas also manifesting lichen simplex chronicus.

Younger children (Figures 1-3) presented with scattered hyperpigmented macules and patches on the anterior, lateral, and posterior lower extremities. Hyperpigmentation persisting longer than the original spongiotic dermatitis was observed in each of these cases. Other areas with pigmentary changes included the dorsal hands and upper extremities.

Adolescents (Figures 4-6) exhibiting PIH on the upper and lower extremities. The hyperpigmented areas tend to be larger and more confluent than those in the younger cohort, often corresponding to regions of chronic AD involvement. A greater number of plaques related to the duration of chronic inflammatory changes in adolescents are seen compared to those plaques illustrated in the younger age groups.

FIGURE 1. One-year-old female patient with PIH on bilateral lower extremities.**FIGURE 2.** Seven-year-old female patient with PIH on dorsal hands and knees.**FIGURE 3.** Ten-year-old male patient with PIH on bilateral upper extremities.

In all age groups, PIH persisted long after the resolution of the acute AD skin manifestations. Among these patients, the darker pigmentation lasted for months to years, depending on the chronicity and severity of the initial inflammation.

DISCUSSION

PIH is a concern in patients with SoC who suffer from AD, as the complication often leads to prolonged discoloration and considerable psychosocial impact. This case series demonstrates the protracted nature of PIH in SoC patients, with color changes persisting after the resolution of the acute phase of AD. The cosmetic and psychological burden associated with

FIGURE 4. 15-year-old female patient with PIH on bilateral upper and lower extremities.**FIGURE 5.** 15-year-old female patient with PIH on bilateral lower extremities.**FIGURE 6.** 17-year-old female patient with PIH on bilateral upper extremities.

PIH, especially in visible areas such as the face, neck, and hands, can lead to significant distress in these patients.¹⁵ Addressing the pigmentation component in SoC patients with AD should be a priority in AD-focused research and provider treatment plans. Purposefully designed prospective trials such as **VISIBLE** provide a framework for representation and skin tone-relevant outcome assessment that could be applied to AD.^{5,6}

Recent advances in the use of biologics, such as dupilumab and lebrikizumab, offer promising options for controlling AD as well as potentially mitigating the duration of PIH. Dupilumab, an IL-4 receptor antagonist, has been shown to reduce AD flares significantly and may help decrease the inflammatory triggers that lead to hyperpigmentation in SoC patients, as demonstrated in a single case report from 2020.⁴ Similarly, lebrikizumab, a novel selective IL-13 inhibitor that binds IL-13 and inhibits signaling via IL-13R α 1 while preserving binding to IL-13R α 2, a decoy receptor implicated in IL-13 clearance, has demonstrated improved outcomes of PIH in AD patients, with 64.4% of patients (n = 45)

showing improvement in hyperpigmentation after 24 weeks of therapy in a phase IIIb trial.¹⁶ This was the first AD clinical trial with a validated scale for both hypo- and hyperpigmentation being employed as an exploratory endpoint. While current data on targeted inhibitors and AD pigmentary outcomes are limited, these findings suggest that systemic therapies could shorten the duration or lessen the severity of PIH in AD. This case series highlights the phenomenon of PIH in SoC patients with chronic AD, underscoring the need for targeted treatment strategies that address residual hyperpigmentation.

Alternative studies have focused on early intervention and management of AD to reduce long-term disease burden. Practices such as early patient education, skin care regimens including moisturization, acute and chronic medical management, and aggressive prevention of inflammatory outbreaks have been associated with improved outcomes in SoC patients with AD.¹⁷ Additionally, objective measures such as the PDCA-derm scale are validated and available for evaluating post-inflammatory dyspigmentation in AD to assist in recognizing the condition in patients of varying skin color.¹⁸ Patients of varying skin tones present differently with post-inflammatory hyperpigmentation or hypopigmentation, and early recognition is paramount to ensure early intervention and prevention of complications.

Patients with PIH exhibit significantly higher psychosocial distress. In a study comparing the Dermatology Life Quality Index among patients with pigmentation disorders, patients with PIH were the most negatively affected cohort.¹⁹ When considering treatment for AD, it is crucial to account for the entire clinical course of the condition, including the long-term burden of disease, local versus systemic manifestations, and psychological impact. Treating AD requires clinical context beyond managing local flaring and intermittent lesions. These cases highlight PIH as an often-overlooked complication in AD and suggest that a limited number of available biologic agents have been shown to improve PIH in SoC patients.

DISCLOSURES

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REFERENCES

1. Sun C, Zhang X, Su Z, et al. Global, regional, and national burdens of atopic dermatitis from 1990 to 2021: A trend analysis from the Global Burden of Disease Study 2021. *J Am Acad Dermatol*. 2025;93(4):1008-1017.
2. Nguyen C, Thompson J, Nguyen DA, et al. Presentations of cutaneous disease in various skin pigmentations: chronic atopic dermatitis. *HCA Healthc J Med*. 2024;5(2):103-111.
3. Siegfried EC, Hebert AA. Diagnosis of atopic dermatitis: mimics, overlaps, and complications. *J Clin Med*. 2015;4(5):884-917.
4. Grayson C, Heath CR. Dupilumab improves atopic dermatitis and post-inflammatory hyperpigmentation in patients with skin of color. *J Drugs Dermatol*. 2020;19(7):776-778.
5. Alexis A, McMichael A, Soung J, et al; for the VISIBLE Trial Investigators. Guselkumab for moderate to severe psoriasis across all skin tones: cohort A of the VISIBLE randomized clinical trial. *JAMA Dermatol*. 2025;161(9):901-911.
6. Alexis AF, McMichael A, Vashi N, et al. Improving diversity in a novel psoriasis study: VISIBLE as a framework for clinical trial quality improvement. *JAMA Dermatol*. 2025;161(3):256-264.
7. Silverberg JI, Simpson EL. Associations of childhood eczema severity: a US population-based study. *Dermatitis*. 2014;25(3):107-114.
8. Vachiramon V, Tey HL, Thompson AE, et al. Atopic dermatitis in African American children: addressing unmet needs of a common disease. *Pediatr Dermatol*. 2012;29(4):395-402.
9. Hanifin JM, Baghoomian W, Grinich E, et al. The eczema area and severity index-a practical guide. *Dermatitis*. 2022;33(3):187-192.
10. Kaufman BP, Guttman-Yassky E, Alexis AF. Atopic dermatitis in diverse racial and ethnic groups-Variations in epidemiology, genetics, clinical presentation and treatment. *Exp Dermatol*. 2018;27(4):340-357.
11. Kim Y, Blomberg M, Rifas-Shiman SL, et al. Racial/ethnic differences in incidence and persistence of childhood atopic dermatitis. *J Invest Dermatol*. 2019;139(4):827-834.
12. Croce EA, Levy ML, Adamson AS, et al. Reframing racial and ethnic disparities in atopic dermatitis in Black and Latinx populations. *J Allergy Clin Immunol*. 2021;148(5):1104-1111.
13. Wilson BN, Sun M, Ashbaugh AG, et al. Assessment of skin of color and diversity and inclusion content of dermatologic published literature: An analysis and call to action. *Int J Womens Dermatol*. 2021;7(4):391-397.
14. Eichenfield LF, Ahluwalia J, Waldman A, et al. Current guidelines for the evaluation and management of atopic dermatitis: A comparison of the Joint Task Force Practice Parameter and American Academy of Dermatology guidelines. *J Allergy Clin Immunol*. 2017;139(4S):S49-S57.
15. Eckert L, Gupta S, Amand C, et al. Impact of atopic dermatitis on health-related quality of life and productivity in adults in the United States: An analysis using the National Health and Wellness Survey. *J Am Acad Dermatol*. 2017;77(2):274-279.e3.
16. Alexis AF, Moiin A, Waibel J, et al. Efficacy and safety of lebrikizumab in adult and adolescent patients with skin of color and moderate-to-severe atopic dermatitis: results from the phase IIIb, Open-Label ADmirable Study. *Am J Clin Dermatol*. 2025;26(5):803-817.
17. Alexis AF, Woolery-Lloyd H, Andriessen A, et al. An algorithm for the management of atopic dermatitis in people with skin of color. *J Drugs Dermatol*. 2023;22(8(Suppl 2)):s3-10.
18. Alexis AF, Pierce E, Cohee A, et al. Assessing Post-Inflammatory Pigmentation in Atopic Dermatitis: Reliability of the PDCA-Derm™. Poster presented at: *FC 2024 Dermatology Conference®*. October 2024, Las Vegas, Nevada.
19. Maymone MBC, Neamah HH, Wiry SA, et al. The impact of skin hyperpigmentation and hyperchromia on quality of life: a cross-sectional study. *J Am Acad Dermatol*. 2017;77(4):775-778.

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