Reliability assessment and validation of the postacne hyperpigmentation index (PAHPI), a new instrument to measure postinflammatory hyperpigmentation from acne vulgaris

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Background: There are no validated outcome measures for postinflammatory hyperpigmentation (PIH).

Objective: We sought to determine the reliability and validity of an outcome measure for PIH after acne in patients with skin of color.

Methods: A postacne hyperpigmentation index (PAHPI) was developed. Six raters scored 21 patients with PIH twice. Reliability was determined within and between raters, whereas validity was evaluated by comparing scores with severity ranking by an independent dermatologist. The pigment intensity scores were compared with the melanin index of each patient using a narrowband reflectance spectrophotometer. A quality-of-life score (Skindex-29) was also compared with PAHPI scores.

Results: Total PAHPI scores showed good reliability within and between raters and were valid when compared with clinical severity and melanin indices. Good correlation was achieved between the total PAHPI score and the emotion subscale of the Skindex-29.

Limitations: Generalizability of results is limited to African American females.

Conclusion: The PAHPI shows good reliability and validity when scored on patients with PIH from acne vulgaris. The PAHPI also correlates well with the emotional impact of PIH as measured by the Skindex-29. Future studies should assess the ability of the PAHPI to change with improvement of PIH from acne after treatment. (J Am Acad Dermatol 2014;70:108-14.)

Key words: acne vulgaris; clinical trials; evidence-based medicine; hyperpigmentation; outcome measures; pigment; pigmentation; postinflammatory; postinflammatory hypermelanosis; skin of color; validation.

Hyperpigmentation is an unfortunate consequence of several inflammatory dermatologic disorders. This consequence is more obvious and longer lasting in patients with skin of color, defined as Fitzpatrick skin types IV to VI. A previous study reported that postinflammatory

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hyperpigmentation (PIH) was the third most common chief symptom among African Americans presenting to a dermatology clinic.[1] Acne is a common cause of PIH in patients with skin of color,[2] and it is also one of the most prevalent skin disorders in this patient population.[2,3] When treating such patients, if the inciting inflammatory condition improves but the resulting pigment alteration remains unaddressed, the patient will often consider the treatment to be inadequate.[4,5]

Reported treatments for PIH include hydroquinone, kojic acid, vitamin E, vitamin C, arbutin, bearberry extract, benzoquinone, azelaic acid, retinoids, chemical peels, and various combinations of these interventions.[2,6-12] However, these studies used different nonvalidated scales for assessing the severity of PIH.

CAPSULE SUMMARY

- No validated outcome measures for postinflammatory hyperpigmentation (PIH) exist.
- The postacne hyperpigmentation index (PAHPI) was found to be reliable and valid using several comparators.
- Use of the PAHPI in future trials for PIH should improve the reliability of the results, ultimately helping clinicians select the best treatments for this disorder.

In other skin conditions, validated outcome measures, such as the Psoriasis Area and Severity Index and the Melasma Area and Severity Index, have become standards for assessing treatments and guiding management.[13,14] A similar tool for PIH would improve interpretation of treatment results, would allow for better comparisons between treatment modalities, and should ultimately improve PIH in affected individuals. We sought to develop a reliable, validated outcome measure for PIH from acne that would be easy to learn, inexpensive, and applicable to patients worldwide.

METHODS

Postacne hyperpigmentation index development and preliminary testing

After interviewing a focus group of 7 patients with PIH, a postacne hyperpigmentation index (PAHPI) was developed, which consisted of the 3 characteristics of PIH deemed most important to the patients: size, intensity, and number of lesions. The members of the focus group were asked to rank these variables in order of importance. Each of these 3 variables was weighted, based on feedback from the focus group that gave higher importance to lesion size and intensity. A summation of the weighted variables gives the total PAHPI score, ranging from 6 to 22 (Table I). The scores for lesion size and darkness were arbitrarily assigned higher weights based on ranking by the focus group patients. The resulting score was subsequently tested, as described below.

Fifteen patients with PIH, ranging from mild to severe (12 African American, 3 Asian), were photographed using standardized photography and a stereotactic face device (Canfield Scientific, Fairfield, NJ). A pictorial representation of these patients is provided in Figs 1 to 3. Polarized filters were used to reduce glare and improve visibility of the lesions. High-quality 8 × 10 prints were made of each patient. A 30-minute training program was also developed, during which 4 raters were shown examples of affected patients with PIH and asked to independently score each one. The responses were then discussed and questions were answered. The 4 raters (1 board-certified dermatologist and 3 dermatology residents) were asked to rank the photographs in order of severity and assign a PAHPI score to each patient. Raters repeated the ranking and PAHPI scoring after the training program. Interclass correlations (results not shown) revealed excellent intrarater reliability, good to excellent interrater reliability, and improvement of agreement between raters after the training program. Validity of the PAHPI by comparing with severity ranking was also very high. Based on these encouraging preliminary results, a study with live patients was conducted.

PAHPI reliability and validity testing in patients

This study was approved by the institutional review board of the University of Texas Southwestern Medical Center, and all patients gave written informed consent. Six raters with various levels of dermatologic experience were recruited, including 2 dermatology residents, 2 faculty dermatologists, and 2 pigmentary disorder experts. The raters comprised 2 Caucasian males, 1 Asian Indian male, 2 Latino females, and 1 African American female. The training program was presented to all raters. The raters were taught to ignore excoriations, inflammatory acne lesions, and other lesions that did not represent PIH from acne.

A sample size of 6 raters and 21 patients with mild to severe melasma was determined to be sufficient for a similar study reported previously; therefore, the same sample sizes were used for the current study.[14] A total of 21 patients with mild to severe PIH were