Overview on Post-Inflammatory Hyperpigmentation

Abstract:

Post inflammatory hyperpigmentation (PIH) can affect people of all skin colours, but it is more common in people of colour, such as African Americans, Hispanics/Latinos, Asians, Native Americans, Pacific Islanders, and those of Middle Eastern descent. There is no distinction between men and women. In darker-skinned acne sufferers, the prevalence of PIH might reach 65 percent. Many studies have demonstrated that topical retinoids, especially in darker skin types, can be beneficial in treating PIH associated with acne. However, Hydroquinone is still a go-to treatment for melasma and hyperpigmentation, and it's commonly referred to as the "gold standard." triple combination fixed treatment has also become a common intervention, with evidence showing that the combination is more successful than hydroquinone monotherapy. In this review article we will be looking at PIH etiology, epidemiology, different treatment options as well as the effectiveness of each medication.

Introduction:

Postinflammatory hyperpigmentation (PIH) is a type of acquired hypermelanosis that develops after cutaneous inflammation or injury. It can affect people of all skin colours, but it is more common in people of colour, such as African Americans, Hispanics/Latinos, Asians, Native Americans, Pacific Islanders, and those of Middle Eastern descent. PIH can have a substantial psychological impact on patients of colour (Fitzpatrick skin types IV through VI), since pigmentary alterations occur more frequently and with higher severity in these populations and are typically more visible in darker skin. Topical depigmenting agents, chemical peels, and laser and light therapy are only a few of the safe and effective therapies for PIH in skin of colour. [1]

Although the chances of epidermal hyperpigmentation resolving are greater than those of dermal hyperpigmentation, the clinical course of PIH is persistent and unpredictable. PIH can be avoided or reduced. When this happens, the underlying inflammatory problems should be searched out and treated as soon as possible to

prevent inflammation and PIH from progressing (which is an inflammatory consequence). If the inflammatory circumstances improve or if there is no indication of inflammation at the time of diagnosis, PIH therapies should be examined. Understanding the therapy choices available aids the physician in selecting the best treatment for each patient. The development of treatment options for PIH requires the establishment of a repeatable model. [2]

Hydroquinone is still a go-to treatment for melasma and hyperpigmentation, and it's commonly referred to as the "gold standard." Prescription topical hydroquinone had no more than a theoretical risk of cancer, ochronosis, or other long-term safety adverse effects when used under supervision. There is insufficient data to establish carcinogenicity. Importantly, ochronosis and undesired side effects have been connected to unsupervised hydroquinone usage and the use of unapproved formulations. As a result, patient education is essential. Patients should not be afraid of using hydroquinone, but rather have a healthy regard for it, lowering the danger of overuse and misuse. [3]

Epidemiology:

PIH can affect anybody at any age, however it is more frequent in Fitzpatrick skin types III-VI. Hypermelanosis tends to be more acute and chronic in those with darker skin. There is no distinction between men and women. In darker-skinned acne sufferers, the prevalence of PIH might reach 65 percent. [4-6]

PIH is more prevalent among skin-of-color individuals than among Caucasian patients, according to many epidemiological research. Halder et al. published a research in 1983 that compared the most frequent dermatoses found in African Americans and Caucasians. Other than vitiligo, pigmentary diseases were the third most prevalent dermatoses in African-American patients (9%), but the seventh most common in Caucasian individuals (1.7 percent). Dychromias was the second most prevalent diagnosis among African-American patients, according to a 20073 survey, whereas dyschromias did not reach the top ten most common diagnoses among Caucasian patients. In a research done in Singapore, the authors found that PIH was more common among Asians with darker complexion, such as Malays and Indians, than among Asians with lighter skin, such as Chinese, implying that pigmentation rather than race/ethnicity may be more important in the development of PIH. [1,8-10]

Etiology and Pathophysiology:

One of two pathways causes postinflammatory hyperpigmentation, which results in epidermal or dermal melanosis. The release and subsequent oxidation of arachidonic acid to prostaglandins, leukotrienes, and other chemicals occurs as a result of the epidermal inflammatory response (i.e. dermatitis). Both immune cells and melanocytes are affected by these inflammatory chemicals. TCA-induced postinflammatory hyperpigmentation was proven to be an useful in vivo model for the investigation of acne-induced postinflammatory hyperpigmentation when a 35 percent trichloroacetic acid (TCA) solution was administered to skin. [2]

Infections like dermatophytoses or viral exanthems, allergic reactions like insect bites or contact dermatitis, papulosquamous diseases like psoriasis or lichen planus, medication-induced PIH from hypersensitivity reactions, or cutaneous injury from irritants, burns, or cosmetic procedures are all possible causes of PIH. Acne vulgaris, atopic dermatitis, and impetigo are all prevalent causes of PIH in people of colour. Among fact, in dark-skinned people, PIH is a very prevalent sequela to acne. In a 2002 research of acne in people of race, it was shown that 65.3 percent of African-Americans, 52.7 percent of Hispanics, and 47.4 percent of Asians had acne-induced PIH. Pseudofolliculitis barbae (PFB) is another prevalent inflammatory dermatosis that causes PIH and is believed to have a prevalence rate of 45 to 83 percent among African Americans. 90.1 percent of 71 African American and Hispanic patients with PFB exhibited hyperpigmentation in a research by Perry et al; hence, the authors conclude that PIH may be a prominent clinical finding in PFB. [1,11-14]

Transient PIH is typical in individuals with darker complexions who are receiving acne therapy with chemical peels, according to Callender. In Fitzpatrick skin type IV, YAG laser resurfacing has been linked to a 68 percent risk of PIH. PIH develops 32 days after laser resurfacing and lasts an average of 112 days. PIH has also been linked to laser hair removal. Weisberg and Greenbaum described a group of individuals who had a similar pattern of hyperpigmented rings that turned into a thin, wafer-like crust. Hypopigmentation resulted, with a gradual recovery to normal skin tone. In 35 patients with acne treated by dermabrasion, Mandy found a 20% incidence of milia and a 28% incidence of PIH; however, pre- and posttreatment use of 0.05 percent tretinoin decreased the incidence to null. [5]

Furthermore, UV radiation, as well as other chemicals and treatments including tetracycline, bleomycin, doxorubicin, 5-fluorouracil, busulfan, arsenicals, silver, gold, antimalarial drugs, hormones, and clofazimine, can darken lesions of postinflammatory hyperpigmentation. Hyperpigmentation has been identified following foamed bleomycin sclerotherapy for vascular abnormalities. [2]

Effectiveness of different medication:

Topical Retinoids: Many studies have demonstrated that topical retinoids, especially in darker skin types, can be beneficial in treating PIH associated with acne. In randomised controlled studies of patients utilising tretinoin 0.1 percent for 50 weeks and tazarotene 0.1 percent for up to 18 weeks, a considerably larger reduction in clinical evaluation of PIH was reported compared to placebo. Similarly, treatment of adapalene 0.1 percent gel for 12 weeks reduced hyperpigmented macules and density of hyperpigmentation in 2/3 of the "very pigmented" instances in a study of 65 acne patients. In addition, two trials look at using topical retinoids in conjunction with other topical treatments. When compared to placebo, a topical clindamycin 1.2 percent and tretinoin 0.025 percent gel for individuals with facial acne and PIH had no effect on melanin chromameter measurement or clinical assessment of PIH. 5 At 16 weeks, 75 percent of 50 acne patients (60 percent of whom had PIH) who used a 0.3 percent adapalene gel/benzoyl peroxide 2.5 percent gel daily had no PIH or very moderate PIH, with an average drop in PIH severity score of 27%.Thus, while topical retinoids alone may be beneficial for treating acne-induced PIH, the best combination therapy have yet to be determined. [15]

Hydroquinone (HQ): The mainstay of PIH therapy is still HQ. It is a phenolic molecule that inhibits tyrosinase, which prevents the conversion of dihydroxyphenylalanine (DOPA) to melanin. Inhibition of deoxyribonucleic acid (DNA) and ribonucleic acid (RNA) production, preferential cytotoxicity targeting melanocytes, and melanosome destruction might all be part of its mode of action. HQ is generally used in doses of 2 to 4%, although it may be prescribed in dosages up to 10% and is available over the counter (OTC) in the United States at a concentration of 2%. [1,16-18]

Studies on the usage of hydroquinone for PIH show that it is effective when used in conjunction with a retinoid. Four patients with PIH responded to a combined

treatment of 5% hydroquinone, 7% lactic acid ointment, and either 0.1 percent all trans retinoic acid ointment or gel used twice daily. Two studies combined microencapsulated hydroquinone 4 percent with retinol 0.15 percent twice daily for 12 weeks; one study found that melanin content as measured by spectrophotometer was significantly reduced by week 4; and both studies found that clinically assessed disease severity was significantly improved by week 4 compared to baseline. [15]

Long-term daily usage of 4% or greater HQ might cause inflammatory responses, especially when used with other irritants such retinoids. Concomitant usage of a topical corticosteroid, on the other hand, can minimise discomfort and hence the likelihood of additional hyperpigmentation. Kligman's formula, which contained 5% HQ, 0.1 percent tretinoin, and 0.1 percent dexamethasone, is an example of an early formulation that was beneficial yet troublesome because to the high amounts of tretinoin and the inclusion of a powerful fluorinated steroid. TriLuma® (Galderma, Fort Worth, Texas), which comprises 4% HQ, 0.05% tretinoin, and 0.01 percent fluocinolone acetonide, has recently been created as a less irritative combination agent. [1,19-22]

Azelaic acid: The topical azelaic acid, which is used to treat acne vulgaris, is also effective for postinflammatory hyperpigmentation. Azelaic acid may be an useful therapy choice for acne patients who are prone to postinflammatory hyperpigmentation. The efficacy of tazarotene 0.1 percent cream in the treatment of dyschromia associated with photoaging and acne vulgaris, especially in those with dark skin tones, may also be advantageous. [2] In addition to inhibiting tyrosinase, azelaic acid possesses antimicrobial properties. It comes in the shape of a cream and must be used for several months. This product must be used in combination with sunscreen. Azelaic acid or vehicle were given to 52 participants with skin types IV to VI in a 24-week, multicenter, double-blind research. In the subset of patients with PIH, azelaic acid caused considerably higher reductions in pigmentary intensity according to the investigator's subjective scale and chromometer analyses, as well as significantly better overall improvement at week 24. PIH was not cleared in any of the patients. At weeks 4 and 12, patients who received azelaic acid had much higher burning and stinging. [5]

Combination Therapy: In a prospective, randomised, controlled study spanning 20 weeks, the effectiveness and safety of a combination therapy regimen combining successive GA peels, topical azelaic acid cream, and adapalene gel in the treatment of refractory melasma were examined in 28 patients. Serial GA peels were used in conjunction with topical azelaic acid 20% cream (twice daily) and adapalene 0.1 percent gel for those getting chemical peels (4 times daily, applied at night). Serial GA peels, azelaic acid cream, and adapalene gel in combination may be an effective and safe treatment for resistant melasma. According to Choi et al, Lepidium apetalum is a possible inhibitor of UV-induced hyperpigmentation. [2]

Fluocinolone acetonide 0.01 percent, hydroquinone 4 percent, and tretinoin 0.05 percent triple combination fixed treatment has also become a common intervention, with evidence showing that the combination is more successful than hydroquinone monotherapy. In a multicenter, randomised, controlled study of Southeast and East Asian patients, 129 people were allocated to the triple combination group and 131 to hydroquinone-only therapy. Melasma severity (Global Severity Score [GSS], Melasma Area and Severity Index score [MASI]) and patient satisfaction were assessed during the eight-week research. In terms of GSS and other factors, triple combination treatment outperformed monotherapy, even though it was accompanied with higher side effects.

Mexameter readings showed reduction in pigmentation as early as four weeks after commencing therapy in a trial of mostly women with PIH related to acne. At the 12-week mark, all of the patients' pigmentation had diminished. Treatment with hydroquinone + glycolic acid, tretinoin, or hydroquinone + glycolic acid + tretinoin for 16 weeks in a subset of patients with moderate to severe dyschromia and actinic photodamage showed continued improvement from weeks 12 to 16, whereas improvement tailed off in subjects using tretinoin alone. Improvement in PIH was 35.4 percent, 16.9 percent, and 30.6 percent, respectively, per investigator assessment at week 16. [5]

Conclusion:

Hydroquinone is still the golden standard for treating post-inflammatory hyperpigmentation, although there’s strong evidence suggesting that multiple combination therapy such as the one that uses (Fluocinolone acetonide 0.01

percent, hydroquinone 4 percent, and tretinoin) which seems to be more effective than monotherapy, yet monotherapy is still recommended due to less side effects. However, such combination can be used if the patient can tolerate the side effects and want better results from the treatment.

COMPETING INTERESTS DISCLAIMER:

Authors have declared that no competing interests exist. The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

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