

Chemical Peels for Post Acne Hyperpigmentation in Skin of Color

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Abstract

Acne has a complex multifactorial etiology. Inflammatory acne lesions often heal with sequelae. In skin of color the post acne healing phase often reflects post inflammatory hyperpigmentation which is very commonly seen. Though this hyperpigmentation is often transient and fades with time, in certain cases the life of pigmentary marks post acne is prolonged and is not conducive to therapy with topical agents and sunscreens alone. Chemical peels are often used as an interventional therapy in dark-skinned individuals for treatment of post acne hyperpigmented marks. This article reviews efficacy, and complications of chemical peels on post acne hyperpigmented marks

Keywords: Post inflammatory hyperpigmentation; Acne; Chemical peels

Introduction

Patients with dark skin types Fitzpatrick type 3-6 have an increased incidence of inflammatory acne lesions which predispose to development of pigmentation (PIH), scars and keloids [1,2] compared to the fair skin types who manifest with more erythema. Often as the active acne phase shows signs of resolution, pigmentation and erythema in darker skin prototypes is a very common manifestation along with atrophic acne scars [2,3]. Literature evidence highlights that in patients with dark skin types with acne marked inflammation exists in all types of acne lesions including the non inflamed comedones as studied by histological evaluation [4]. Halder et al. reported by a study that comedones which showed no clinical evidence of inflammation in African-American patients showed histological inflammatory infiltrate in non inflamed lesions and markedly so in clinically inflamed lesions and in their vicinity. Histological studies in post acne pigmented macules revealed epidermal melanin granules and dermal melanophages infiltration upto the reticular dermis, along with foreign body granulomas and giant cells [4]. Callender et al. has postulated that this heightened inflammatory response may be a major reason that African Americans with even mild-to-moderate acne still develop hyperpigmented macules. This was proven by; biopsies from recalcitrant open comedones without clinical evidence of inflammation in an African-American patient. The histopathology in this patient showing dilated, distorted, keratin-filled follicles consistent with comedones and patchy chronic inflammation similar to the above findings larger studies are needed to determine the exact prevalence [1,3].

Kligman et al. described comedogenicity of cosmetic products applied on face due to presence of certain ingredients in their formulas also called as acne cosmetics. In skin of color with acne lesions increased use of cosmetic products may inadvertently be a causative factor for acne and PIH [5].

PIH can manifest de novo or aggravated by irritant dermatitis from topical applications, picking of lesions, sun exposure, and cosmetics. An irritant contact dermatitis in a dark skin patient can be signaled by the presence of erythema hyperpigmentation, or hypopigmentation [2]. The ability to scar after acne depends on patient's inflammatory profile while healing [6-8]. The author has observed that the initial scars are erythematous seen at base of resolving acne lesions, followed by purplish discoloration and eventually hyperpigmentation which may persist for a long period of time and also heralds progressive scarring in these patients (Tables 1 and 2, Figures 1 and 2).

While treating acne and scars in dark skin types which harbor certain characteristics, (Table 2) the physician has to often address

the pigmented acne lesions and PIH simultaneously along with acne reduction as it forms an important and crucial cosmetic concern for the patients [2,9] (Figures 1 and 2). Often the PIH treatment needs to be initiated at an early phase into the treatment regimen for these patients to prevent progressive darkening and achieve early resolution and thus makes a necessary step before embarking on laser resurfacing or other methods for acne scars.

The management of such patients thus focuses on usage of molecules which can address both active acne lesions to resolve them faster as well as treat the hyperpigmentation and thereafter scars. The general observation by the author is that longer post acne the erythema more the chances of healing with PIH. Broad spectrum sunscreens form a mandatory mainstay in treatment of post acne macules in skin of color and adherence to sunscreen is strongly encouraged in early treatment phases. Topical retinoids, topical lightening agents and topical antioxidants find their way into prescriptions to address post acne pigmentation [10,11].

Interventional therapies for treatment of post acne pigmentation in skin of color revolve around achieving an optimum outcome and hence aggressive modalities are replaced by less aggressive, safer options and repeated treatments are conducted by physicians all through a controlled stage of inflammation to minimize complications and optimize results [12].

Chemical peels are evidenced based in treatment of post acne pigmented macules and atrophic scars as they improve coexisting

Acne scars characters in skin of color	
✓	Post acne sequelae include atrophic acne scarring of various degrees, distributed in different anatomical locations of the face and reflect variable appearance in different areas
✓	Each face zone may have multiple types of scars
✓	Acne scars are more in skin of color
✓	Scars are often pigmented and or erythematous
✓	Coexisting active acne may be superimposed

Table 1: Acne scars characters in skin of color

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Figure 1: Acne with post acne hyperpigmented marks in healed lesions in FP skin type 5.



Figure 2: Post acne hyperpigmented scars in FP type 4 skin.

Evolution profile of pigmentation in post acne phase	
✓	Initially phase of erythema
✓	intermediate phase of purplish color
✓	Atrophic phase either pigmented or skin colored
✓	Progressive scarring post acne is a known phenomenon.

Table 2: Evolution profile of pigmentation in post acne phase

comedonal and papular acne [11], reduce post acne erythema and have a lightening effect on pigmentation at base of healed lesions and scars [11,13,14]. Also in addition chemical peels improve the depth, contour and cause softening of associated scars by their action on collagen remodeling and stimulation of new collagen activity .Above all peels also impart added improvement in texture glow [9,11,14]. The chemical peels thus form a bridging link of creating interventional priming for treatment of pigmented acne marks in skin of color before resurfacing therapies with lasers and lights are sought for. The advantages of peels in pigmented acne scars are highlighted in Table 3.

A thick stratum corneum, large melanosomes and a thick dermis with abundant fibroblasts constitutes morphological features in a dark skin prototype 4-6. Chemical peels facilitate improvement by thinning the stratum corneum and regenerating a compact epidermis which reflects light evenly across the skin surface and imparts a textural improvement and lightening effect as the elimination of epidermal melanin and prevention of transfer of melanin to keratinocytes occurs [15].

There is resultant improvement in dyschromias, texture and fine lines. And rejuvenation effect is enhanced if the patient is well primed, especially in dark skin types [11,13,15].

The commonly used peels in post acne healing phase are Salicylic Acid (SA) 20-30%, Glycolic acid (GA) 50-70%, Mandelic acid (MA)

30- 45%, Retinol peel (RA)- 5% or combinations of above.

The important features of peeling agent in skin of color for acne scars are decided by its action on superficial to medium depth of dermis, the response to a peel intervention may be variable in various shades of brown skin and thus the peeling agent must be cautiously chosen. Lesser the inflammatory profile of the peeling agent is better as the more inflammatory peeling agents are associated pigmentary sequelae in healing phase. Thus SA, GA and RA peels are better options than TCA peels. The strength of peeling agents has to be low to moderate strength and repetitive sessions 3-5 on an average need to be conducted. Topical priming and lightening agents should be continued. Rotational or sequential peels with different agents according to skin type can be chosen.

Literature evidence is reflected by a number of clinical studies which report the clinical efficacy of superficial peels for improvement of post acne hyperpigmented scars in dark skin types [9,11,14,16-21].

The glycolic acid is an AHA peel with epidermolytic properties in high strength and acidic PH in aqueous base. Enzymatic degradation at corneocyte surface facilitates detachment and peeling and subsequent regeneration evokes a thin stratum corneum and compact epidermis and dispersion of epidermal melanin. The dermal action in GA manifests due to its rapid penetration through horny layer by its small molecular size, By its dermal action GA improves quality of elastin and decreases density of collagen [11,16]. A regularized keratin layer and good hydration and its pigment reducing action makes GA a popular peel of choice in post acne phase due to its multi-modality action. GA peels can be made less aggressive by gel based formulations which have less available free acids making them safer for skin types 4-6. Terminating a GA peel in skin of color is decided by end point of erythema or timing of peel in absence of erythema in very dark skin. The author prefers GA peels 30-50% in a series of 4-6 sessions for post acne pigmentation. Phytic peels which constitute slow release combination of GA, MA and lactic acid is also studied by author and found to be efficient for post acne pigmentation in a series of 3-5 sessions.

Mandelic acid peels obtained from bitter almonds are AHA peels with a low molecular weight and in strength of 20-50% are often utilized for post acne pigmentation due to their tolerability on dark skin. Active acne lesions and hyperpigmented marks improve with MA peels due to the antibacterial and anti-inflammatory properties. 20%, 30%, 45% MA shows synergistic results when used in combination with SA and RA peels and hence incorporated in many peel formulations in various strengths. The safety profile of this peel is high due to absence of post peel irritation for Asian skin types [17].

Salicylic acid (SA) is a non caustic, keratolytic, anti-inflammatory, lipophilic ,sebotytic peels which causes epidermal exfoliation [9,11] in 20-30% strength which constitutes a superficial peel, this is usually executed as a single peel or in a combination mode with other agents of which the Jessener's solution is most popular consisting of of 14 g resorcinol, 14 g salicylic acid, and 14 g lactic acid in 95% ethanol, which decreases epidermal cohesion between corneocytes and causes

Advantages of peels in pigmented acne scars
• Adjunct to topical therapy
• Pigment elimination, textural improvements and photo damage correction
• Improves patient compliance and tolerance
• Adherence to therapy and enables acne and sequelae monitoring
• Synergistic to lasers in treating atrophic scars
• Enhances outcome to laser resurfacing

Table 3: Advantages of peels in pigmented acne scars

exfoliation i.e. keratolysis by decreasing corneocyte cohesion and subsequent epidermopoiesis [17]. In combinations with other AHA agents it has synergistic action on post acne marks and active acne lesions and is commonly used in dark skin individuals [11,17].

Retinol peels are now mainstay for pigmented acne marks dark skin due to strong keratolytic, sebostatic and pigment elevation helpful for acne of any stage as well as post inflammatory hyperpigmented marks. Topical retinoids are recommended as first line treatment for acne and are excellent priming agents hence retinol peels are a natural choice of intervention for post acne marks. Used for acne and scars in males as skin is more seborrheic and thicker. Pigment elimination, textural improvements and photo damage correction is marked with this peel. Retinol peels are relatively safer and often show good results when used sequentially at extra facial sites. RA is useful as a slow release peel as it can be used sequentially after SA or TCA peels. In authors experience RA peel form an excellent priming peel before laser resurfacing [14].

The author considers salicylic peels in early erythematous and pigmented acne scars along with comedogenic or popular inflammatory acne. SA reduces associated seborrhea and is best combined with best combined with mandelic acid/Retinol peel and also as an interventional peel before high strength peels like TCA or AFR (ablative fractional resurfacing). It can be used in sequential mode with retinol peels. A series of 3-5 sessions over 2-3 months enables marked improvement in post acne pigmentation (Figures 3-5).

In a study on sixteen cases, the patients receiving the glycolic acid peels (upto 68%) showed a trend toward more rapid and greater improvement compared to topical lightening agents alone in post acne PIH. The peel group also experienced increased lightening of the normal skin [19].

Garg et al studied GA 35% vs SA 20% and MA 10% peels in 44 asian patients with acne and hyperpigmentation over 6 sittings at 2 weeks interval and reported SA and MA peel combination had better efficacy for active acne lesions ($P<0.001$) and hyperpigmentation ($P<0.001$) and better tolerance than GA peels. The PIH efficacy was reported in this study [20].

Wang et al studied 35-50% GA peels in Taiwanese patients and reported PIH and acne flare after peels in 5.6% patients where as rest noted improvement [21].

Grimes at al studied 20-30% SA peels in skin of color and reported marked clearance in PIH in all patients. There was a rapid resolution of papules, pustules, and comedones in acne patients. Moderate to significant improvement occurred in 89% of acne and 100% of PIH patients. Some patients had mild dryness and crusting with transient hyperpigmentation [22].

Substantial epidermal necrosis with GA peels, deep collagen changes with TCA peels and mild lymphocytic infiltrates with SA and Jessener's peels are reported and illustrated in histological studies on peels in dark skin types conducted by Grimes et al. [23].

Al Waiz et al studied sequential peels in dark skin types for acne scars. Jessener's solution with 35% TCA peels were studied however this study reported PIH after peels [24]. Another study with phenol peels also reported PIH in 7 out of 11 patients and hence peels with moderate depth of penetration are generally not recommended for dark skin types [25].

The author generally uses an approach of using chemical peels as an interventional priming therapy in post acne pigmented scars before laser resurfacing methods to improve pigmented marks and PIH

sequelae of acne. Chemical peels in post acne phase reduce seborrhea, alleviate remainder acne lesions, result in a thinner and more regular stratum corneum and are a boost to lightening agents when low strength repetitive peels are done. Chemical peels have properties of collagen remodeling and they are recommended for mild grade scars too. In addition they act in synergism with topical priming for a well prepared compact regular epidermis and a thin stratum corneum with a lighter skin post peels paves way for a better laser resurfacing results.

A proposed model for improving pigmented acne marks in dark skin types is highlighted in Figure 6.

Amidst the peeling agents in post acne phase SA are considered the safest followed by retinol peel (Figures 3 and 4). Both these peeling agents have anti acne action and are also sebostatic and help to clear the residual comedonal, papular and inflammatory acne lesions along with marked improvement in PIH. The GA is another peel which works for post acne marks AHA peels for acne, early scars and textural improvements, but caution is needed for high strength GA, due to its propensity for irritation and PIH. The PIH after peels is often transient and lasts for 4-6 weeks and fades in most cases PIH is predictable after peels if hyperpigmentation persists beyond 2-3 weeks. Continuing topical therapy in the intermittent peels phase is essential. Sun protection and hydroquinone or non hydroquinone based lightening agents not only help to prevent post peel hyperpigmentation, but also help to manage them.

Conclusion

The post acne phase signifies emergence of sequelae of inflammation and clinically reflects post acne pigmentation and pigmented scars which are exaggerated in expression in dark skin types. Early measures to address the pigmentary after effects of acne require topical lightening



Figure 3a: Post acne hyperpigmented macules before peels.



Figure 3b: Post acne hyperpigmented macules improvement after 5 sessions of 30% mandelic peels.



Figure 4a: Post acne pigmented scars before peels.



Figure 4b: Post acne pigmentation in scars improved after 4 sessions of Retinol peels.



Figure 5a: Seborrhea, residual acne and pigmented scars



Figure 5b: Improvement post salicylic acid and mandelic acid combination peels.

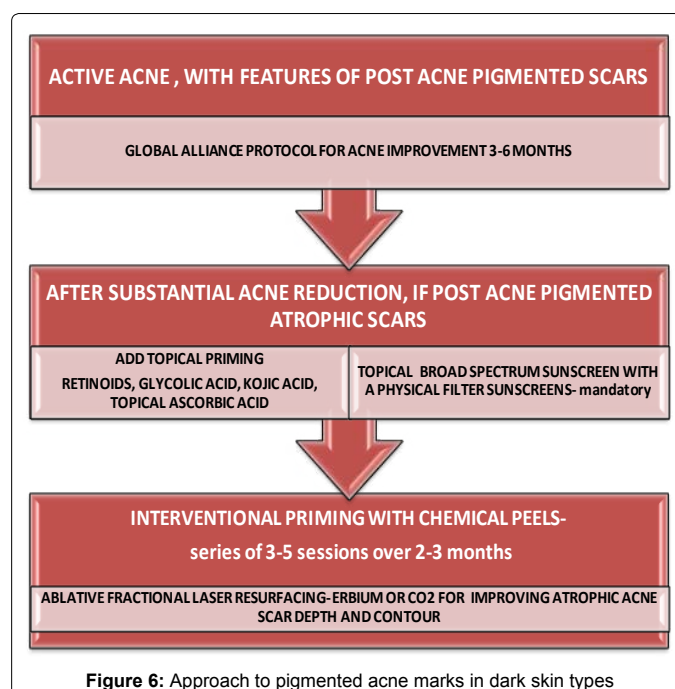


Figure 6: Approach to pigmented acne marks in dark skin types

agents and sun protection. In extensive or persistent pigmented marks after acne. Interventional therapies with chemical peels enable improvement in PIH after acne and should be definitely considered. Various peeling agents can be chosen depending on their inflammatory and safety profile on dark skin types. Peels thus form an important step in improving post acne pigmentation.

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