Benha Journal of Applied Sciences (BJAS) **print: ISSN 2356–9751**
Vol. (10) Issue (1) (2025), (41- 46) **online: ISSN 2356–976x**
http://bjas.bu.edu.eg
Medical and Health Science

Uses of Chemical Peeling in Acne Scars

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Abstract:

People who suffer from severe acne are more likely to develop acne scars, which may significantly impact their quality of life. People who have dealt with acne vulgaris know too well the annoyance of acne scars. For those working in the field of dermatology and cosmetics, acne scars provide a significant difficulty. For many years, chemical peels have been one of the most popular aesthetic treatments offered by medical professionals. A chemical peel is a procedure that involves carefully removing layers of skin from the body by applying a chemical agent to the skin, the intensity of which may be adjusted. One method of skin resurfacing is chemical peeling, which uses exfoliants to bring back healthy skin cells. It has a long history of use in the treatment of several skin problems, including acne vulgaris. It is common practice to categorize chemical agents into three levels: superficial, medium, and deep peels, according to their different modes of action. By lowering the stratum cornium's barrier function, chemical peels increase the penetration and absorption of further topical treatments. These features, together with the fact that superficial peels are risk-free and compatible with other acne treatments, contribute to their high popularity.
This article's goal is to review chemical peeling's efficacy in reducing the appearance of acne scars.

Keywords: Acne Scars; Chemical Peeling

1. Introduction

Scarring from acne is a typical side effect. Their impact on the patient's quality of life may be substantial. It is important to take the kind of scar into account when selecting a treatment strategy for atrophic acne scars, especially when many types of scars are visible at the same time. Preventing psychological impacts and ensuring effective treatment of acne scars are the utmost importance. Combination therapy tailored to each individual patient may provide the greatest opportunity for substantial improvement in the treatment of acne scars, which necessitates an algorithmic strategy that addresses each component of the scars. The unsightly scarring that develops after acne may have a negative impact on a person's self-esteem, social life, and overall health, all of contribute to a diminished quality of life. Even small acne scars have a significant influence on patients' quality of life, and this effect becomes more pronounced with the severity of the scar. Consequently, to avoid psychological and social consequences, it is essential to choose treatment techniques that effectively reduce the likelihood of acne scarring [1].

Impaired acne healing is the most common cause of scars. Differentiating between atrophic and chypertrophic acne scars is as simple as looking for signs of collagen decrease or accumulation. Hypertrophic scars and keloids are very rare, but atrophic scars affect almost 90% of acne scar patients. Factors such as subcutaneous fat, collagen degradation, and inflammatory mediator levels play a significant role in the development of atrophic acne scars. Individuals prone to acne scarring exhibit an exaggerated initial inflammatory response that rapidly diminishes, leading to abnormal granulation tissue formation. Table 1 shows that those who are prone to acne have inflammation, but it is insufficient, delayed, or extended, and does not heal tissues efficiently. One of the main causes of acne scarring is inflammation, which may be delayed or protracted [2].

Table 1: Risk factors for acne scarring [3]

Sr. no.	Risk factors	Description
1	Inflammatory acne	These often include acne cysts and nodules. This type of acne tends to penetrate deep into the skin, which damages the skin
2	Delayed or no treatment of inflammatory acne	Longer a person has inflammatory acne, the greater the risk of scarring
3	Picks, squeezes, or pops acne	This increases inflammation, which increases the risk of scarring
4	Gender	Male gender might be at higher risk for acne scars. This is more likely because men suffer more from severe acne than women, which might be associated with high androgen levels and special

		sebaceous gland
5	Genetics factors	Positive family history of acne

The three distinct forms of atrophic acne scars are ice pick, rolling, and boxcar [Table 2]. The available treatment choices are greatly affected by the categorization of scar types. Traditional methods of skin resurfacing are often ineffective on ice-pick scars because of how far they penetrate the dermis. Because rolling scars are broader and have fibrous anchoring to the subcutis, and need treatment at the subdermal level. While skin resurfacing treatments work well on shallower boxcar scars, and are not effective on deeper scars. Not only may the severity of acne scars be utilized to categorize them [Table 3], but it is also an essential factor in their treatment [4].

Table 2: Acne scar subtypes [3]

Acne scars subtype	Clinical features
Ice pick	Ice pick scars are narrow [<2 mm], deep, and sharply demarcated tracts that extend vertically to the deep dermis or subcutaneous tissue [forming a "V" shape]
Rolling	Rolling scars may reach ≥5 mm in diameter. They have a rolling or undulating appearance [forming "M" shape] that occurs from fibrous tethering of the dermis to the subcutis
Boxcar	Boxcar scars are oval depressions with sharply demarcated vertical edges. They are wider at the surface than ice pick scars and do not taper to a point at the base [forming "U" shape]

Table 3: Acne scar severity grading scale [3]

Grade	Level of lesion	Clinical features
1	**Macular**	Macular erythematous, hyperpigmented, or hypopigmented flat marks
2	**Mild**	Mild atrophic or hypertrophic scarring that may not be obvious at social distances of 50 cm or greater and easily covered by makeup or beard hair in men
3	**Moderate**	Moderate atrophic or hypertrophic scarring that is obvious at social distances of 50 cm or greater and is not covered easily by makeup or beard hair in men, but is still able to be flattened by manual stretching of the skin
4	**Severe**	Severe atrophic or hypertrophic scarring not flattened by manual stretching of the skin

For many years, chemical peels have been one of the most popular aesthetic treatments offered by medical professionals. A chemical peel is a procedure that involves removing layers of skin carefully from the body by applying a chemical agent to the skin, the intensity of which may be adjusted. Dermal and epidermal regeneration from neighbouring epithelium and skin adnexa follows the induced exfoliation, leading to enhanced surface texture and appearance of the skin. There are several dermatological uses for this straightforward and inexpensive technique. There are three different levels of chemical peels, named "superficial," "medium," and "deep," according to the degree of penetration: the epidermis, the papillary dermis, and the upper reticular dermis. Actinic keratosis, melasma, post-inflammatory hyperpigmentation, acne, and dyschromia are the most typical indications for superficial peels. Sunspots, pigmentation issues, and superficial scars may all benefit from medium depth peels. Photoaging, deep scars or wrinkles, and precancerous skin lesions may all be treated with deep chemical peels [5].

Dermatologists are increasingly turning to chemical peels, both superficial and medium depth, to treat acne scars. Their chemical characteristics aim at its many pathophysiological components. Although there seems to be evidence supporting the use of these safe and inexpensive procedures, dermatologists should remember to personalize their patients' treatments to get the best potential results [6].

Chemical peeling agents

Because of its potent keratolytic and comedolytic effects, salicylic acid [SA], a 2-hydroxybenzoic acid derived from the willow tree, is used for superficial peeling. Because of its lipophilic nature, it can permeate comedones and pores, facilitating the shedding of epidermal cells and the subsequent neutralization of germs. The stratum corneum's higher lipophilic layers are encouraged to desquamate by this. Its efficacy and widespread use in treating acne are due to its unique chemical characteristics. Its ability to

reduce inflammation has also been extensively studied. For superficial peeling, acne treatments employ SA concentrations ranging from 5% to 30%. No neutralizing chemicals are needed since this peel is safe and self-limiting at these concentrations [7].

In the treatment of acne, glycolic acid [GA], which is a member of the class of α-hydroxy acids [fruit acid derivatives], is applied as a peel either superficially or to a medium depth. By decreasing corneocyte adhesion and keratinocyte plugging at the stratum granulosum, GA produces epidermolysis with desquamation of the skin, making it an exfoliative agent. It causes the epidermis and dermis to thicken, increases the manufacture of collagen and mucopolysaccharides, and disperse melanin, much as other α-hydroxy acids. One possible explanation for GA's efficacy in both inflammatory and noninflammatory forms of acne is that it reduces inflammation by killing the acne-causing bacteria Propionibacterium acnes [8].

GA peels are offered in a range of concentrations, from 20% to 70%, on the market. As concentration and exposure duration rise, GA peels become more intense and deeply penetrating. An alkaline solution, such sodium bicarbonate or normal saline, may neutralize this chemical and cease its exfoliative effects. The safety profile of GA peels is favourable, and the likelihood of systemic toxicity is low [9].

• Lactic acid [LA]

One further α-hydroxy acid that may be found in bilberries or sour milk is LA, and it is utilized as an additional treatment for acne, either by itself or in conjunction with other peels. By reducing corneocyte adhesion and removing dead skin cells, LA thins the stratum corneum and a new stratum corneum is formed. Its skin-lightening effects are explained by its ability to suppress melanin formation via direct inhibition of the tyrosinase enzyme. The negative effects of LA peels are minimal and safe [10].

- **Mandalic acid**

  An aromatic α-hydroxy acid, mandelic acid is extensively used in the management of mild to severe acne. Mandelic acid, like other α-hydroxy acids, causes the epidermis to shed by lowering the adhesion of corneocytes. It has antibacterial characteristics and is a big molecule that slowly enters the skin. Because of its lower toxicity, mandelic acid is a popular substitute for glycolic acid peels. A mixture of 20% salicylic acid and 10% mandelic acid is used to create the Mandelic acid peel [11].

- **Tricloroacetic acid [TCA]**

  TCA, an inorganic crystalline molecule, may be used as a peeling agent at different concentrations, ranging from superficial to deep. Proteins in the dermis and epidermis are denaturated by TCA, dermal collagen is destroyed, and epidermal cells undergo coagulative necrosis. Clinical benefits are brought about by a realignment of dermal structure and a rise in dermal collagen, glycosaminoglycans, and elastin. For aggressive acne, TCA peels can be used in concentrations ranging from 15% to 50%. Very little systemic absorption [12] and self-neutralization [12] characterize this peel.

- **Jessner's solution [JS]**

  The acne adjuvant JS consists of 14% salicylic acid, 14% resorcinol, and 14% lactic acid in 95% ethanol; it is a superficial peeling agent. Combining JS peel with another peel is a typical way to make it penetrate deeper. Its previously documented modes of action are ingredient-specific, although it is generally believed to disrupt keratinocyte bridges. Chemically it is like phenol, résorcinol is a 1,3-dihydroxybenzene that kills bacteria, disrupts cell membranes [cell death], and induces keratolysis [the breaking of hydrogen bonds in keratin]. The efficacy of JS in treating acne is greatly enhanced by the combination of these substances [13].

- **Kojic acid [KA]**

  Some fungus generates KA, which is another name for 5-hydoxyl-2-[hydroxymethyl]-4-pyrone; it is a copper chelating agent. Inhibiting the tyrosinase enzyme is where its skin lightening effects come from. Lightening agents like arbutin, aloesin, soy extract, etc., are often used in conjunction with GA or this ingredient, which is available at doses ranging from 1% to 4%, to enhance penetration and effectiveness. Cosmetic products designed to treat pigmentary problems of the skin often include KA. Preventing and treating post-inflammatory hyperpigmentation, KA may be used before and after a peel in individuals with aggressive acne [14].

- **Phenol**

  For many years, dermatologists have relied on phenol, an aromatic alcohol, as a thorough chemical peel. It triggers keratin coagulation in the epidermis, dermal elastosis, and epidermal lysis. As a result, cutaneous fibroblasts become active and new collagen is produced. The substantial potential for systemic toxicity makes phenol peels a useful

therapy that requires cautious usage with suitable precautions [15].

2.Methods for Removing Acne Scars Through Chemical Peels

Additionally, acne scars may be treated with deeper penetration chemical peels, either on their own or in conjunction with other resurfacing treatments. A dermatologist's toolbox should include chemical peels because of their reputed safety and effectiveness [3].

Whether used alone or in conjunction with another peeling agent, such Jessner's solution, TCA in concentrations ranging from 35% to 100% is the peel most often used for the treatment of acne scars. Atrophic boxcar scars and rolling scars respond well to lower doses of TCA, but the CROSS approach, which employs 100% TCA, is effective against intractable ice pick scars. People with severe rolling or boxcar scars, as well as ice pick wounds, should avoid using it because of its gentle nature. Additional research may be conducted to assess the usefulness and effectiveness of glycolic acid, which was shown to enhance a resurfacing technique. But phenol had a lot of negative side effects and wasn't as effective as laser skin resurfacing, especially when you consider how time-consuming the process was. Chemical peeling is an effective adjunct to acne care and a first-line treatment for acne scars, regardless of the quality of the research referenced. It was found that most of the peeling agents are safe, effective, and simple to use. Chemical peeling is a less invasive, less expensive, and more accessible alternative to more modern machine-based methods for acne and acne scars [16].

3.Problems with peeled skin

When it comes to non-invasive cosmetic procedures, chemical peels have been the gold standard for generations. When performed correctly, these treatments are both safe and effective. The risks and uncertainties of these procedures are the same as those of any other medical procedure. To avoid unwanted effects and complications, it is important to know the chemical qualities, indications, and technique of each medication [17].

Prior to any chemical peel, it is vital that patients undergo preoperative preparation. The risk of hyperpigmentation or dyschromia may be reduced if patients utilize broad-spectrum sunscreen for at least 2-3 months before the peel. For optimal wound healing and peel penetration, tretinoin should be taken at night for six weeks before the treatment. To reduce the risk of post-peel hyperpigmentation, hypopigmentation, or scarring, light-skinned persons should cease taking tretinoin 48 hours before the peel, whereas dark-skinned patients should stop taking it 2-3 weeks earlier. A low-dose α-hydroxy acid applied a few weeks before to the peel is one of the topical treatments that may be utilized to reduce the likelihood of problems. Dyschromia may be treated and reduced using bleaching chemicals such as hydroquinone, KA, azelaic acid, aloesin, vitamin C or E, glabridin, etc., used before and after the peel. Additionally, it is strongly advised that all patients having medium to deep peels take antiviral prophylaxis to avoid the reactivation of HSV [18].

Complications still arise, no matter how careful one is. It is normal for all agents to cause swelling, redness, discomfort, burning, itching, blistering, infection, milia, and telangiectasia in the days and weeks after the surgery. The appearance of larger pores and changes in skin texture are possible side effects for certain people. These side effects are less common with superficial peels and go away in a few weeks, but they may be rather significant with deeper peels. See Table 4 for a rundown of the major risks associated with light, medium, and deep chemical peels [19].

Table 4: Serious complications for superficial, medium, and deep chemical peels [20]

Superficial peel	Medium depth peel	Deep peel (phenol)
Transient hyperpigmentation	Hypo- or hyperpigmentation	Cardiotoxic
Other dyschromia	Prolonged erythema	Hepatotoxic
Infection	Infections	Nephrotoxic
Desquamation	Delayed wound healing	Corneal damage
	Scarring	Respiratory depression, laryngeal edema
	HSV reactivation	Hypo- or hyperpigmentation
		Scarring
		HSV reactivation

Particularly worrisome is hyperpigmentation that occurs after a peel. Patients with dark skin tones [types IV–VI] are more likely to develop it, while it may affect any skin type. Reducing risk requires a thorough assessment of skin type to choose the suitable agent. Patients who have Fitzpatrick skin types III–VI, should stay away from thorough chemical peels. Standard treatment for post-inflammatory hyperpigmentation includes bleaching chemicals like hydroquinone. With peels that are medium to superficial in depth, the chances of dyschromia and scarring are minimal [21].

Lastly, certain agents are particularly cautious about certain risks. When taken excessively or in conjunction with other salicylates, SA peel may induce salicylism, which manifests as tinnitus, nausea/vomiting, fast breathing, or stroke. There is a chemical similarity between phenol and résorcinol. Overuse may result in systemic toxicity and contact dermatitis, which in turn can produce a host of unpleasant side effects as tremors, headaches, dizziness, dyspnea, paralysis, and nausea/vomiting. Skin types III–VI are more likely to have hyperpigmentation, one of the most prevalent side effects of TCA peels. Highlighting nevi or lentigines is another possible side effect of this medium-depth peel. Some people have had toxic shock syndrome after getting a chemical peel [22].

4.Conclusion

When it comes to treating acne scars, chemical peels are seen as supplementary treatment options. A more rapid clinical response and happier patients are the results of including chemical peels. Whether used alone or in conjunction with another peeling agent, such Jessner's solution, TCA in concentrations ranging from 35% to 100% is the peel most often used for the treatment of acne scars. Atrophic boxcar scars and rolling scars respond well to lower doses of TCA, but the CROSS approach, which employs 100% TCA, is effective against intractable ice pick scars. If scar is on the surface, a full-strength lactic acid peel may help.

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