REVIEW ARTICLE

Chemical Peels for Acne and Acne Scars in Asians: Evidence Based Review

Chemical peeling is a widely used procedure in the management of acne and acne scars, but there are very few studies on Asian populations who are more prone to develop hyper pigmentation. This article aims to summarize and evaluate the existing studies on the role of chemical peels in the treatment of acne and acne scars among Asians. An online search was conducted to identify prospective studies published in English that evaluated the use of chemical peels in active acne and acne scars in Asian populations. There were six studies for acne and eight studies for acne scars that were identified using our search parameters. Most were single-centre, open label and with small sample sizes. Acne severity was not uniformly reported and the objective outcome measures of some studies were not explicitly reported as well. The general trend of the results of the studies support the safety and efficacy of chemical peels for acne and acne scars including those of darker skin types. The existing studies support the use of chemical peels in the treatment of acne and acne scars in Asians. Further clinical trials with better study design and more subjects are needed to further establish the role of chemical peels in Asian acne patients.

KEYWORDS: Acne, acne scars, asians, chemical peel, glycolic acid, salicylic acid, trichloroacetic acid

INTRODUCTION

Superficial chemical peels are considered as adjunctive treatments for the management of acne.[1,2] They are often added to first line therapies such as retinoids and antibiotics, whether topical or systemic.[3,4] Their addition to the regimen is preferred due to the quick decrease in lesional count as well as the improvement of overall skin texture.[5] A series of chemical peels can give significant improvement over a short period of time, leading to patient satisfaction and maintenance of clinical results.[6,7] Chemical peels with increased depth of penetration have also been used for the treatment of acne scars, either alone or in combination with other resurfacing procedures. Chemical peels are generally considered safe and effective, forming an important part of a dermatologist's arsenal. However, the use of chemical peels can have adverse effects, such as post-inflammatory hyper pigmentation that is more commonly seen in darker skin types.

Most of the available literature on chemical peels focuses on its role in skin rejuvenation and the correction of dyschromias. While there is no doubt that chemical peeling is widely being performed on Asians for various indications, there is a paucity of published literature on the safety and efficacy of chemical peels specifically for acne and acne scars in Asian patients.

The purpose of this review is to summarize and evaluate the existing studies on the role of chemical peels in the treatment of acne and acne scars among Asians.

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EPIDEMIOLOGY OF ACNE AND ACNE SCARS IN ASIANS

Acne is one of the most prevalent skin conditions affecting humans globally and the single most common reason for dermatologic consult.[8]

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Goh *et al*. surveyed visits by 74,589 Asians (e.g., Chinese, Malaysians, and Indians) in a Singapore clinic and determined that acne vulgaris was the second most common diagnosis, occurring in 10.9% of the adult patient population and was the eighth most common diagnosis in a paediatric population, occurring in 3.1%.[9]

In 2002, the first Asian community based study was conducted to measure both the prevalence and complications of acne among adolescents and young adults ranging from 15 to 25 years old. The study was conducted in Hong Kong to determine the prevalence and severity of acne in a randomized sample of 522 from a total of 5,522 persons interviewed. The prevalence of self-reported acne was 91.3% while there were 52.2% of respondents who had active acne during the time of the interview were reported. There was a higher prevalence among the 15-20 year age group as compared to the 21-25 year age group, the latter being 43.5% as compared to 55.8%. It showed that acne scarring and hyper pigmentation occurred in 52.6% of all respondents interviewed, with females accounting for 57% as compared to males at 48%.[10]

Several studies have been done regarding the epidemiology of acne in the Philippines, where the majority of citizens have Fitzpatrick skin types III-V. A survey done in 2002 by Roa *et al*. showed that out of the 114 Filipino dermatologists surveyed, 44% were treating more than 50% of acne cases in their daily practice. At the Research Institute for Tropical Medicine, acne vulgaris was the number one dermatologic diagnosis among 32,313 new consults between 2004 and 2007.[11]

A preliminary study investigating the epidemiology of skin concerns and diseases in a population of South Asian descent in the United States, showed that 49% of those surveyed responded to having visited a dermatologist with acne being at the top of the list accounting for 37% of all dermatologic diagnoses.[12]

Asian acne patients have clinical features distinct from that of Caucasians. One is the lesser incidence of nodulocystic acne.[13] However, Asians represent a rather challenging group of patients because of the greater tendency to develop post-inflammatory hyper pigmentation as sequelae of acne or any inflammation of the skin.[13,14]

Acne scars, on the other hand, correlate with the duration of acne, the severity of the lesions and the delay in treatment.[15,16] It is more common in those with persistent acne belonging to the 25 to 44 years old age group. Minor scarring may occur in up to 95% of patients while more severe acne scarring may occur in only up to 22%.[16] Acne scars are generally classified based on their morphology and are of three main types, namely rolling scars, boxcar or punched out scars and ice pick scars, the latter being the most difficult to treat.[15,17]

OVERVIEW OF CHEMICAL PEELS FOR ACNE AND ACNE SCARS

The most commonly used chemical peels in treating acne and acne scars include salicylic acid (SA), glycolic acid (GA), Jessner's solution (JS), resorcinol, and trichloroacetic acid (TCA).[18] More recently, other peels have emerged that been proven useful in the management of acne such as lactic acid, and a salicylic acid-mandelic acid (SM) combination.

Salicylic acid

Salicylic acid is a beta-hydroxy acid that has a phenolic ring in its chemical structure.[13] It is an excellent keratolytic agent by way of its ability to dissolve intercellular cement thereby reducing corneocyte adhesion.[1,18]

Due to its lipophilicity, it has better penetration into the pilosebaceous unit. This property of salicylic acid accounts for its strong comedolytic effect, and its utility in the treatment of acne.[3,4,13,18-20] The anti-inflammatory activity of SA makes it useful in rapidly decreasing facial erythema.[21] Salicylic acid also has very good safety profile with no incidences of salicylism reported till date. It is low in cost, easy to apply and has the ability of self-neutralization.[13] Another benefit of SA is its lightening effect on post-inflammatory pigmentation due to acne.[19]

Glycolic acid

Glycolic acid is widely used as a superficial peeling agent owing to its exfoliative properties.[1] Exposure of skin to GA leads to reduced corneocyte adhesion, correction of abnormal keratinization in the infundibulum, decreased keratinocyte plugging and ultimately decreased follicular occlusion.[1,22]

Previous studies have reported that alpha hydroxy acids such as GA, do not possess anti-inflammatory properties, making it inferior to SA in the treatment of acne,[18] despite evidence showing that there was clinically significant improvement of the inflammatory lesions.[22,23] A recent study however, has shown that glycolic acid has an anti-inflammatory effect on acne through its inhibitory and bactericidal effect on *Proprionibacterium acnes*.[22]

Jessner's solution

Jessner's solution is a combination of 14% resorcinol, 14% salicylic acid, 14% lactic acid and ethanol. The strength of the peel is determined by how many layers of the solution is applied, and is usually used in combination with other peels to increase the depth of the overall peel. It is a useful peel for patients with acne because of its salicylic acid and resorcinol components. It should

however be remembered, that resorcinol may cause post-inflammatory hyper pigmentation in those with Fitzpatrick skin type IV or greater or those who have a tendency to develop dyschromias. There is also a risk of developing contact dermatitis to resorcinol and this peel should therefore be used with caution along with proper patient selection.[6]

Trichloroacetic acid

TCA is a well-studied and inexpensive peeling agent that can be used either as a superficial, medium depth or deep peel depending on the concentration used.[15,24] When applied to the skin, TCA causes coagulation of epidermal and dermal proteins, and necrosis of collagen up to the upper reticular dermis.[16] The re-epithelialization begins from the surviving islets of keratinocytes and from the skin appendages.[25] The clinical effects of TCA are due to the resultant increase in dermal volume of collagen, glycosaminoglycans and elastin.[16] TCA is a self-neutralizing peel, therefore it is not absorbed systemically even if high concentrations are used.[15] It is considered safer compared to phenol peels as there is no systemic absorption nor toxicity and pain is also less severe.[26]

Phenol peel

Phenol is a deep chemical peeling agent, with effects lasting for 10-20 years.[27] Phenol causes complete epidermolysis and dermal elastolysis. Fibroblast stimulation then results in neocollagenesis.[28] When absorbed systemically, there may be serious side effects such as cardiotoxicity resulting in fatal arrhythmias, hepatotoxicity, nephrotoxicity and respiratory depression. Cutaneous side effects are hypo-pigmentation, hyper pigmentation, hypertrophic and keloid scarring and prolonged erythema. It has rarely been used in Asians due to hypo-pigmentation, which has been attributed to either melanocyte toxicity or extensive dermal fibrosis following the peel.[27]

SEARCH METHOD

We conducted a search on PubMed using the terms "acne, acne scars, chemical peels, glycolic acid, salicylic acid, Jessner's solution, trichloroacetic acid, resorcinol, phenol, Asians, Chinese, Japanese, Koreans, Indians, ethnic skin, and dark skin." All prospective clinical trials or case series from 1990 to 2011, with Asians as subjects, were included and grouped according to the peeling agent used and the indication, being acne or acne scars. Only studies published in English were included.

RESULTS

We found a total of fourteen articles on chemical peeling for both active acne and acne scars among Asians, whether randomized clinical trials, open label studies or pilot studies. Among these, there were seven articles on active acne however, we only included six clinical studies, as the outcome measures of one study were the skin lightening effect and the decrease in erythema from the peel, rather than the effect of the peeling agent on the acne lesions *per se* [Table 1].[3,5,8,14,18,29] There was one trial that evaluated the effects of the peels on both active acne and acne scars and was thus included for both indications.[8] Among the eight articles on acne scars, one trial involved the use of glycolic acid as an adjuvant to a resurfacing procedure, but was still included as there were effects on the acne scars that could be attributed to the peeling agent itself [Table 2].[8,15,16,26,27,30-32]

The level of evidence of each study was determined using the UK National Health Service system.

CHEMICAL PEELS FOR ACNE IN ASIANS

Salicylic acid

Three open label studies on salicylic acid peels were found with one of these serving as the pilot study for the other. All three studies used 30% SA and an average of five peels was administered to the patients. In the largest study, some patients with severely inflamed acne were allowed to take oral antibiotics simultaneously, with no adverse effects reported. Two studies evaluated a novel polyethylene glycol (PEG) vehicle that reduced the stinging sensation experienced with peels using an alcohol vehicle. In all three studies, there was significant improvement of both comedonal and inflammatory acne lesions, with few and mild side effects reported.

Glycolic acid

One open label study evaluated GA alone in patients with moderate to moderately severe acne while two studies compared it against other peeling agents namely Jessner's solution and a combination of salicylic acid and mandelic acid (MA).

In the first study, initial results were unsatisfactory but after several peels majority had fair to good improvement of both comedones and inflammatory lesions. There was also an overall brightening of the skin appreciated after the peelings were concluded.[29]

In a split-face, randomized, investigator-blinded trial that compared 70% GA against JS, it was determined that both peeling agents were equally effective in reducing the acne scores. However, the exfoliation on the side treated with JS was longer, which was problematic for some patients. Thus, more patients preferred GA to JS for this reason.[5]

An open label, non-randomized study compared head to head, GA against a combination peel containing salicylic acid and mandelic acid (SM).[8] Both GA and the SM peel produced significant reduction in the total acne score

Table 1: Studies on chemical peels for acne in Asian patients

Author	Level of evidence	Peeling agent	Population	Intervention	Outcome	Side effects
Lee *et al*.[18]	C	SA	*N*=35, Korean patients	Single centre, open label, investigator-blinded	Statistically significant reduction of both Inflammatory and non-inflammatory lesions decreased	Dryness (*n*=11)
			Skin type III-IV	Total of five treatments of SA 30%, 2 weeks apart	Mean total facial lesion count: 68.2 at baseline, 39 at end of study	Intense exfoliation (*n*=6)
			Acne severity: Mild to moderate based on Cunliffe grading system (Leeds scale)	No concomitant acne therapy	Mean non-inflammatory lesion count: 43 to 29	Crusting after 1st peel (*n*=4)
					Mean inflammatory lesion count: 25 to 11	Prolonged erythema (*n*=3)
					77.1% of patients self-rated moderate or good improvement; all patients reported improvement	Burning sensation more than 24 hours (*n*=3)
Hashimoto *et al*.[3]	C	SA	*N*=16, Japanese	Single centre, open label, investigator-blinded	Mean total comedone count: 39.3 at baseline, 9.2 at end of study,	Mild burning and erythema (*n*=3)
			Acne type: Facial acne, mostly comedonal with fewer than 10 papules/ pustules	Total of five treatments of SA 30% (in PEG vehicle), 2 weeks apart	Mean comedone count reduction rate: 75% (*P*=0.001)	
				No concomitant acne therapy	Acne grade decreased from Grade II/III at baseline to Grade I in all patients at end of study	
Dainichi *et al*.[14]	C	SA	*N*=426, Japanese	Single centre, open label, investigator-blinded	No objective outcome measures reported, only considerable reduction "in the development of comedones and papules" within one month of treatment	Pain on peeling (*n*=7)
			Age: 17-46 years old	Range of one to twelve SA 30% (in PEG vehicle) peels, mean of 5.9 peels per patient, at least 4 weeks apart	Only 42/426 patients interviewed for subjective results; majority reported improvement in acne, skin texture and color and satisfaction with the treatment	Pain after peeling (*n*=1)
			Acne severity: Not reported for majority of patients except for three representative patients	Two patients with severely inflamed acne allowed concomitant use of oral antibiotics		Dryness (*n*=7)
Wang *et al*.[29]	C	GA	*N*=40	Single centre, open label	Comedones: 32% good, 57.5% fair improvement	All transient: PIH (*n*=3)
			Age: 16-51 years old	Total of four treatments of either GA 35% or 50% depending on degree of seborrhea, 3 weeks apart	Papules: 37.5% good, 55% fair improvement	Mild herpes simplex activation (*n*=3)
			Skin type IV	Concomitant use of 15% GA home product	Pustules: 17.7% good, 26.5% fair improvement	Mild irritation (*n*=3)
			Acne severity: Moderate-moderately severe acne		Cysts: 45.5% fair improvement, 45.5% poor results	
Kim *et al*.[5]	B	GA vs. JS	*N*=26, Korean patients	Single centre, randomized, controlled, split-face	No statistically significant difference in the treatment effect between GA and JS	Erythema
			Age: 16-27 years old	Investigator-blinded	Equal improvement in both groups but exfoliation was more severe and bothersome in JS treated side; More patients with GA as preferred peel	Acute eczema (*n*=2)
			Skin type III-IV	Total of three treatments of GA 70% or JS on each side of the face, 2 weeks apart		
			Acne severity: Mild to moderate based on Cunliffe grading system (Leeds scale)	No concomitant acne therapy		
Garg *et al*.[8]	C	GA vs. SM	N=44, Indian patients	Single centre, open label, comparative, non-randomized, no blinding	Change in lesion count: Comedones: Both agents reduced comedones but SM peel had a greater change in comedone count (45.7%) compared to GA (20.9%) from 8 weeks onwards (*P*<0.001)	Both: Burning or stinging sensation (17.3%)
			Age: 16-27 years old	Total of six treatments of either GA 35% or SM (SA 20%-MA 10%), 2 weeks apart	Papules: 27.3% in GA, 47.7% in SM (*P*=0.02)	GA: Desquamation (8.7%)
			Skin type IV-VI	No concomitant acne therapy	Pustules: 34.7% in GA, 58.4% in SM (*P*=0.02)	Photosensitivity and initial acne flare (*n*=1)
			Acne severity: Not specified but patients also had co-existing acne scarring and hyper pigmentation		Nodules and cysts: No significant improvement with either peeling agent	SM: Dryness (14.28%)
					Change in total acne score: 27.3% in GA, 52.3% in SM (*P*<0.001)	Photosensitivity and initial acne flare (*n*=1)
					Higher overall subjective assessment in SM group	

SA: Salicylic acid, PEG: Polyethylene glycol, GA: Glycolic acid, PIH: Post-inflammatory hyper pigmentation, JS: Jessner's solution, SM: Salicylic acid and Mandelic acid combination peel, MA: Mandelic acid, Level of evidence classification according to UK National Health Service

Table 2: Studies on chemical peels for acne scars in Asian patients

Author	Level of evidence	Peeling agent	Population	Intervention	Outcome	Side effects
Lee *et al*.[16]	C	TCA	*N*=65	Single centre, open label, comparative, investigator-blinded	65% TCA group: 12/33 (36.4%) had excellent results (>70% improvement)	Mild erythema lasting 2-8 weeks
			Age: 25-45 years old	65% or 100% TCA using CROSS method	15/33 (45.4%) had good results (50-70% improvement)	PIH, transient
			Skin type IV-VI	Varying number of peels per patient: Range of 3 to 6 peels;	3/33 (9.1%) had fair results (30-50% improvement)	Mild pustular eruptions (*n*=4)
			Scar type: Atrophic acne scars	Peeling done at 1 to 3 month intervals	3/33 (9.1%) had poor results (<30% improvement)	
				In between peels, patients applied a moisturizing sunscreen with 0.05% tretinoin and 5% hydroquinone	100% TCA group: 19/32 (59.4%) had excellent results (>70% improvement)	
					11/32 (34.4%) had good results (50-70% improvement)	
					2/32 (6.2%) had fair results (30-50% improvement)	
					None had poor results	
					All patients in the 100% TCA group who received 5 or 6 treatments had excellent results	
Bhardwaj *et al*.[15]	C	TCA	*N*=10, Indian patients	Single centre, open label, pilot study	8/10 (80%) had excellent results (>70% improvement)	Hypo-pigmentation, transient (*n*=1)
			Age: 14-42 years old	Pre-peel preparation for two weeks: Tretinoin 0.025% nightly, hydroquinone 4% and sunscreen at daytime	2/10 (20%) had good results (50-70% improvement)	Hyper pigmentation, transient (*n*=1)
			Scar type: Mainly ice pick scars	Total of four treatments of 100% TCA using CROSS technique, 2 weeks apart		
Khunger *et al*.[30]	C	TCA	*N*=30, Indian patients	Single centre, open label Investigator-blinded	22/30 (73.3%) had excellent improvement (>70% reduction of scars)	Hypo-pigmentation, transient (*n*=1)
			Age: 17-42 years old	Pre-peel preparation for two weeks: tretinoin 0.025% nightly, hydroquinone 4% and sunscreen at daytime	6/30 (20%) had good improvement (51-70% reduction of scars)	Hyper pigmentation, transient (*n*=2)
			Skin type IV-V	Total of four treatments of 100% TCA using CROSS technique, 2 weeks apart	2/30 (6.7%) had fair improvement (30-50% reduction of scars)	
			Scar type: Mainly ice pick scars			
Al-Waiz *et al*.[26]	C	JS plus TCA	*N*=15	Single centre, open label	1/15 (6.6%) had significant improvement (>75% clearance),	PIH, transient (*n*=9)
			Mean age: 28 years old	Investigator-blinded	8/15 (53.3%) had moderate improvement (51-75% clearance)	Erythema>1 month (*n*=2)
			Scar type: Saucer or crater-like and ice pick scars; four patients with mostly ice pick and deep scars, rest of patients with scars of moderate depth	Total of three peels of JS followed by 35% TCA; 50% TCA on deep scar edges, one month apart (except for 2 patients with 1 and 2 peels each)	4/15 (26.6%) had mild improvement (26-50% clearance)	
				Hydroquinone 2% cream nightly from second week after the first peel until the second treatment	1/15 (6.6%) had minimal improvement (1-25% clearance)	
					No response in 1 patient (6.6%)	
					Percentage of patients satisfied:	
					After first treatment: 33.3%	
					After second treatment: 73.3%	
					After third treatment: 80%	
Sachdeva[31]	D	LA	*N*=7, Indian patients	Single centre, open label, no blinding	1/7 (14.3%) had significant improvement (>75% clearance of lesions)	PIH, transient (*n*=1)
			Age: 20-30 years old	Pilot study	3/7 (42.8%) had good improvement	
			Skin type IV-V	Total of four peels of full strength 92% LA, two weeks apart; half strength LA (46%) was used during the first peel	(51-75% clearance of lesions)	
			Scar type: Superficial atrophic scars and ice pick scars		2/7 (28.6%) had moderate improvement (26-50% clearance of lesions)	
					1/7 (14.3%) had mild improvement	
					(1-25% clearance of lesions)	
					Additional effect of improvement in skin texture, color and appearance of pores.	

(*Contd...*)

Table 2: Continued

Author	Level of evidence	Peeling agent	Population	Intervention	Outcome	Side effects
Sharad[32]	C	GA	*N*=30, Indian patients	Single centre, open label, comparative, non-randomized, no blinding	The improvement of scores using the ECCA classification in Group B was significantly better than Group A (*P*=0.001)	Bruising
			Age: 20-40 years old	Group A: Five micro needling treatments	The mean improvement of Group A was 31.33%; Group B was 62% (*P*=0.001)	Edema
			Skin type: III-V	Group B: Five micro needling treatments plus five 35% GA peels	Greater improvement of skin tone and texture and reduction of pore size in Group B	Milia (*n*=4)
			Scar type: Atrophic box type or rolling scars with PIH		Excellent improvement in PIH in Group B	PIH (*n*=4, in Group A)
Garg *et al*.[8]	C	GA vs. SM	*N*=44, Indian patients	Single centre, open label, comparative, non-randomized, no blinding	Ice pick scars: Change in scars 10.4% with GA, 13.2% with SM (*P*=0.3)	Both: Burning or stinging sensation (17.3%)
			Age: 16-27 years old	Total of six treatments of either GA 35% or SM (SA 20%-MA 10%), 2 weeks apart	No significant difference in the two agents at the end of the study (*P*=0.10)	GA: Desquamation (8.7%)
			Skin type IV-VI		Boxcar scars: Change in scars 20.1% with GA, 23.3% with SM (*P*=0.02)	Photosensitivity and initial acne flare (*n*=1)
			Scar type: Ice pick scars, rolling scars and boxcar scars		Both peels produced significant improvement at 8 weeks, but no significant difference thereafter (*P*<0.001)	SM: Dryness (14.28%)
					Rolling scars: No change with either of the two peeling agents (*P*=1.00 for both)	Photosensitivity and initial acne flare (*n*=1)
Park *et al*.[27]	C	Phenol	*N*=11 (out of 46 in entire study; Other indications were wrinkles and melasma)	Multicenter, open label Investigator-blinded	7/11 (64%) had 51% or more improvement	Among all 46 subjects: PIH (*n*=34)
			Age: 21-74 years old	Pre-peel treatment for one month: Kligman formula	Average improvement score was 2.73 out of 4.00	Prolonged erythema (*n*=5)
			Skin type IV-V	Single session using the modified phenol peel		Milia (*n*=4)
			Scar type: Unspecified			Keloid (*n*=1)
						Hypo-pigmentation (*n*=1)

LA: Lactic acid, PIH: Post inflammatory hyper pigmentation, GA: Glycolic acid, ECCA: Echelle d'Evaluation clinique des Cicatres d'acne, TCA: Trichloroacetic acid, CROSS: Chemical reconstruction of skin scars, JS: Jessner's solution, SM: Salicylic acid and Mandelic acid combination peel, Level of evidence classification according to UK National Health Service

but the SM peel was statistically more effective than the GA peel from 12 weeks onwards.

CHEMICAL PEELS FOR ACNE SCARS IN ASIANS

Trichloroacetic acid

There were two open label studies and one pilot study that evaluated high concentrations of TCA using a technique called "chemical reconstruction of skin scars" (CROSS) to focally treat atrophic acne scars. This involves the application of the solution using a sharp tipped wooden applicator into the base of the scar, sparing the normal surrounding skin. This technique takes advantage of the dermal thickening and increased collagen production that normally results from repeated application of high concentrations of TCA (60-100%).[16,17]

An open label, comparative study first evaluated the safety and efficacy the CROSS technique for acne scars in Asians and using two concentrations of TCA, 65% and 100%. While both groups showed improvement, the number of treatments received was proportional to the degree of improvement and that 100% TCA was more effective than 65% TCA.[16]

A pilot study was done to evaluate the safety of the CROSS technique using 100% TCA among Asians with darker skin types.[15] All patients had good to excellent results however, there was one patient who noticed a reduced effect at three months without further improvement until the end of the sixth month follow up period. All the patients were able to tolerate the procedure well. There was one case each of transient hypo-pigmentation and hyper pigmentation.

Following the aforementioned pilot study, the authors conducted a larger study using the same method

described.[30] Excellent results were achieved in more than 70% of patients; while 20% of patients showed good improvement and 6.7% of patients had fair results after receiving four peels. There were no cases of neither scarring nor prolonged pigmentary alteration. The authors of both studies concluded that 100% TCA was safe and effective in treating ice pick acne scars in patients with Fitzpatrick skin types IV-V.

TCA combined with Jessner's solution

An open label study evaluated the combination of two peeling agents to achieve a medium depth peel for treatment of acne scars. Improvement occurred in all except one patient who had mainly pitted scars and deep atrophic scars. They also noted that those who did not develop hyper pigmentation had lighter skin complexion than those who did.[26]

Lactic acid

A pilot study evaluated the effects of pure full strength lactic acid peel for superficial acne scarring. Patients were assessed to have good to significant improvement (>50% clearance) in four patients, while the three patients had mild to moderate (<50% clearance) improvement. There was also improvement in the texture and pigmentation as well as the appearance of pores.[31]

Glycolic acid

A study by Sharad evaluated the use of glycolic peel as an adjuvant to micro needling in Indian patients. Three months after the last treatments were performed, while both groups showed improvement of the acne scars, the group that had received GA was significantly superior. This indicated that glycolic acid peeling had an additive effect to the micro needling in improving the acne scars by promoting neocollagenesis. In addition to this, GA improved pigmentation from acne and the procedure.[32]

In an open label, non-randomized comparative study that evaluated GA against SM, both peels produced equally significant improvement in the number of boxcar scars but had no significant effect on rolling scars and minimal effect on ice pick scars.[8]

Phenol peel

A study done in Korea previously evaluated the use of phenol peel, not for acne scars but for small pox scars. However, it was during this study that many side effects were seen such as cardiac arrhythmia.[33] In view of this safety issue, Park and colleagues evaluated the effectiveness of a modified phenol peel also for Korean patients. Seven out of the 11 acne patients had good to excellent results and no cases of systemic toxicity were reported. However, 74% of patients experienced hyper pigmentation. One case had persistent hypo-pigmentation. Though the modified phenol peel was found to be safe and effective in treating acne scars in Asians, it was less effective when compared to laser resurfacing.

CONCLUSIONS

Chemical peels are considered as adjuvant therapy in treating all forms of acne. The addition of chemical peels leads to a faster clinical response and patient satisfaction.

Salicylic acid at 30% concentration and 35-70% glycolic acid has been shown to be effective in reducing both inflammatory and non-inflammatory lesions of acne in Asian skin. Glycolic acid was shown to be safe in the treatment of acne even in darker skin types as well as adjunctive therapy for the treatment of acne scars. Salicylic acid also has the added advantage of having a whitening effect, which is favourable for Asians with darker skin types, as well as those with co-existing hyper pigmentation. Jessner's solution was found to be as effective as 70% GA but the exfoliation it produced was bothersome for some patients. The combination peel of salicylic acid and mandelic acid had superior results compared to 35% GA, which calls for further studies to cement its role as a standard peel for acne.

In the treatment of acne scars, the most commonly used peel is TCA at concentrations of 35 to 100% either alone or in combination with another peeling agent, such as Jessner's solution. Lower concentrations are useful for atrophic boxcar scars or rolling scars while the CROSS method using 100% TCA is useful for ice pick scars that are difficult to treat. Another peel useful for more superficial scars is the full strength lactic acid peel. Since it is non-aggressive it is not recommended for those with ice pick scars or deep rolling and boxcar scars. Glycolic acid was also shown to have an additive effect to a resurfacing procedure, and further study may be done to evaluate its utility and efficacy. Phenol however, was associated with a lot of side effects, and was less effective when compared to laser skin resurfacing, considering how tedious the procedure was.

However, notwithstanding the level of evidence of the studies that were cited, chemical peeling stands a useful adjuvant in the management of acne and as a first line therapy for acne scars. Most of the peeling agents were evaluated to be safe, efficacious, and easy to administer. Compared to newer machine-based technologies for acne and acne scars, chemical peeling is affordable and with minimal downtime, and can be performed in any dermatologist's office. It is hoped that more randomized clinical trials with larger sample sizes be undertaken in order to strengthen the current body of knowledge on the

safety and utility of chemical peeling for Asian patients. This review on chemical peels for acne and acne scars will hopefully aid the physician in designing an optimum treatment plan in Asian patients.

REFERENCES

1. Kessler E, Flanagan K, Chia C, Rogers C, Glaser DA. Comparison of alpha- and beta-hydroxy acid chemical peels in the treatment of mild to moderately severe facial acne vulgaris. Dermatol Surg 2008;34:45-50.
2. Taub AF. Procedural treatments for acne vulgaris. Dermatol Surg 2007;33:1005-26.
3. Hashimoto Y, Suga Y, Mizuno Y, Hasegawa T, Matsuba S, Ikeda S, *et al*. Salicylic acid peels in polyethylene glycol vehicle for the treatment of comedogenic acne in Japanese patients. Dermatol Surg 2008;34:276-9.
4. Kligman D, Kligman AM. Salicylic acid as a peeling agent for the treatment of acne. Cosmetic Dermatol 1997;10:44-7.
5. Kim SW, Moon SE, Kim JA, Eun HC. Glycolic acid versus Jessner's solution: Which is better for facial acne patients? A randomized prospective clinical trial of split-face model therapy. Dermatol Surg 1999;25:270-3.
6. Baumann L, Saghari S. Chemical Peels. In: Baumann L, editor. Cosmetic Dermatology. 2nd ed. New York: McGraw-Hill; 2002. p. 148-60.
7. Dréno B, Fischer TC, Perosino E, Poli F, Viera MS, Rendon MI, *et al*. Expert opinion: Efficacy of superficial chemical peels in active acne management--what can we learn from the literature today? Evidence-based recommendations. J Eur Acad Dermatol Venereol 2011;25:695-704.
8. Garg VK, Sinha S, Sarkar R. Glycolic acid peels versus salicylic-mandelic acid peels in active acne vulgaris and post-acne scarring and hyper pigmentation: A comparative study. Dermatol Surg 2009;35:59-65.
9. Goh CL, Akarapanth R. Epidemiology of skin disease among children in a referral skin clinic in Singapore. Pediatr Dermatol 1994;11:125-8.
10. Yeung CK, Teo LH, Xiang LH, Chan HH. A community-based epidemiological study of acne vulgaris in Hong Kong adolescents. Acta Derm Venereol 2002;82:104-7.
11. Handog EB, Macarayo MJ, Gabriel MT. Acne scars in Asian patients. In: Tosti A, De Padova M, Beer K, editors. Acne scars: Classification and treatment (Series in dermatological treatment). 1st ed. UK: Informa Healthcare; 2009. p. 90.
12. Shah SK, Bhanusali DG, Sachdev A, Geria AN, Alexis AF. A survey of skin conditions and concerns in South Asian Americans: A community-based study. J Drugs Dermatol 2011;10:524-8.
13. Kim IH. Salicylic acid peel (Acne peel). Hong Kong J Dermatol Venereol 2005;13:83-5.
14. Dainichi T, Ueda S, Imayama S, Furue M. Excellent clinical results with a new preparation for chemical peeling in acne: 30% salicylic acid in polyethylene glycol vehicle. Dermatol Surg 2008;34:891-9.
15. Bhardwaj D, Khunger N. An assessment of the efficacy and safety of CROSS Technique with 100% TCA in the management of ice pick acne scars. J Cutan Aesthet Surg 2010;3:93-6.
16. Lee JB, Chung WG, Kwahck H, Lee KH. Focal treatment of acne scars with trichloroacetic acid: Chemical reconstruction of skin scars method. Dermatol Surg 2002;28:1017-21.
17. Goodman G. Treatment of acne scarring. Int J Dermatol 2011;50:1179-94.
18. Lee HS, Kim IH. Salicylic acid peels for the treatment of acne vulgaris in Asian patients. Dermatol Surg 2003;29:1196-9; discussion 9.
19. Ahn HH, Kim IH. Whitening effect of salicylic acid peels in Asian patients. Dermatol Surg 2006;32:372-5; discussion 5.
20. Lai KW, Mercurio MG. Update on the treatment of acne vulgaris. J Clin Outcomes Manag 2009;16:115-26.
21. Berger R. Initial studies show salicylic acid promising as anti-aging preparation. Cosmet Dermatol 1997;10:31-2.
22. Taenaka Y, Hayashi N, Takeda M, Ashikaga S, Kawashima M. Glycolic acid chemical peeling improves inflammatory acne eruptions through its inhibitory and bactericidal effect of Proprionibacterium acnes. J Dermatol 2012;39:350-4.
23. Atzori L, Brundu MA, Orru A, Biggio P. Glycolic acid peeling in the treatment of acne. J Eur Acad Dermatol Venereol 1999;12:119-22.
24. Rubin MG. Manual of chemical peels. Superficial and medium depth. 1st ed. Philadelphia, PA: J.B. Lippincott Company; 1995. p. 111.
25. McCulloch EG, Langsdon PR, Maloney BP. Chemical peel with phenol. In: Roenigk RK, Roenigk HH, editors. Dermatologic Surgery, Principles and Practice. 2nd ed. UK, Oxford: Marcel Decker Ltd.; 1996. p. 1147-60.
26. Al-Waiz MM, Al-Sharqi AI. Medium-depth chemical peels in the treatment of acne scars in dark-skinned individuals. Dermatol Surg 2002;28:383-7.
27. Park JH, Choi YD, Kim SW, Kim YC, Park SW. Effectiveness of modified phenol peel (Exoderm) on facial wrinkles, acne scars and other skin problems in Asian patients. J Dermatol 2007;34:17-24.
28. Deprez P. Textbook of chemical peels: Superficial, medium and deep peels in cosmetic practice. London: Informa Healthcare; 2007. p. 206.
29. Wang CM, Huang CL, Hu CT, Chan HL. The effect of glycolic acid on the treatment of acne in Asian skin. Dermatol Surg 1997;23:23-9.
30. Khunger N, Bhardwaj D, Khunger M. Evaluation of CROSS technique with 100% TCA in the management of ice pick acne scars in darker skin types. J Cosmet Dermatol 2011;10:51-7.
31. Sachdeva S. Lactic acid peeling in superficial acne scarring in Indian skin. J Cosmet Dermatol 2010;9:246-8.
32. Sharad J. Combination of micro needling and glycolic acid peels for the treatment of acne scars in dark skin. J Cosmet Dermatol 2011;10:317-23.
33. Yoon ES, Ahn DS. Report of phenol peel for Asians. Plast Reconstr Surg 1999;103:207-14; discussion 215-7.

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