MICRONEEDLING AND GLYCOLIC ACID PEEL FOR TREATMENT OF ACNE SCAR; COMPARATIVE STUDY

Amr Nazir Saadawi , Abdallah Mohamed Esawy , Walaa Elsayed Mohamed
Department of Dermatology, Zagazig University, Al-sharkia, Egypt

ABSTRACT

Background: Atrophic acne scars are common and undesirable outcome of acne vulgaris related to both its severity and delay in treatment. Such scars can be classified according to the depth and shape of the collagen loss: ice pick, boxcar, or rolling. Many options are available for treatment of acne scars such as: laser surgery, radiofrequency intervention, chemical peels, chemical reconstruction of skin scars (cross technique), dermabrasion, needling, subcision, punch techniques, fat transplantation, and other tissue augmenting agents.**Objective**: The aim of this study was to compare between GA peel monotherapy and microneedling with dermapen monotherapy in treatment of acne scars. Moreover, combined treatment of GA peel and microneedling with dermapen is compared to each of the above monotherapies in treatment of acne scars.**Methods**: Thirty patients of both sexes (10 men and 20 women) with age ranged from 19-45 years old with different types of atrophic acne scars were enrolled in the study. Patients were randomly divided into three groups: Group I**:** Included ten patients (4 males and 6 females) aged 27 - 45 years. They had microneedling with dermapen for treatment of the scars. Group II: Included ten patients (4 males and 6 females) aged 19- 42 years. They had glycolic acid 35% peel for treatment of the scars. Group III: Included ten patients (2 males and 8 females) aged 19-39 years. They were treated with skin microneedling with dermapen combined with glycolic acid 35% peel.**Results**: Results revealed that there was statistical significant decrease between acne scar grade in dermapen group before and after treatment with degree of improvement (80%). Also, in glycolic acid group before and after treatment with degree of improvement (70%). Statistical significant decrease between acne scar grade in combination group before and after treatment with degree of improvement (100%). Statistical significant increase in frequency of improvement in rolling compared to boxcar and icepick in all groups and also in boxcar compared to icepick.**Conclusion**: Dermapen and glycolic acid peel are effective and safe techniques in acne scars especially (superficial scars). Combination of dermapen and glycolic acid peel is more effective than monotherapy by either dermapen or glycolic acid peel and also helps in improvement of deep acne scars.

Keyword: Microneedling, Glycolic acid, Acne scar.

Corresponding author: Walaa Elsayed Mohamed, walaa_m223@yahoo.com, 01021244921

INRODUCTION

Acne is estimated to affect 94% of the global population, making it the eighth most prevalent disease worldwide. Epidemiological studies have demonstrated that acne is most common in adolescent teens, with boys most frequently affected, particularly with more severe forms of the disease**.** [1]

Acne is a common condition seen in people between 11 and 30 years of age and in up to 5% of older adults. In some patients, the severe inflammatory response results in permanent scars. Scars can involve textural change in the superficial and deep dermis**.** [2]

Treatment of acne scarring creates a challenge for both patients and dermatologists. Many options are available: laser surgery, radiofrequency intervention, chemical peels, chemical reconstruction of skin scars (cross) technique, dermabrasion, needling, subcision, punch techniques, fat transplantation, and other tissue augmenting agents. Each scar type has a different structural cause warranting a personalized approach. Little literature exists about the safety and efficacy of combining such procedures and devices. [3]

Skin needling is a technique which is predominantly used to improve the appearance of cutaneous scarring and photodamage. Fine needles puncture the skin, resulting in increased dermal elastin and collagen, collagen remodeling, and thickening of the epidermis and dermis**.** [4] Additionally, skin needling creates small channels, which increase the absorption of topically applied preparations [5,6], a property which has been used in various dermatological treatments**.** [7]

Both manual and electronic hand-held skin needling devices are now widely available as low-cost therapies for the treatment of acne scarring**.** [8,9] The

microneedles penetrate through the epidermis but do not remove it. The epidermis is only punctured and rapidly heals based on the controlled mechanical stimulation of the wound-healing process by the needle. Wound healing involves three phases: initiation/inflammatory, proliferation and remodeling. [10]

The commercially available microneedling devices are, dermaroller, dermapen and derma stamp. Dermaroller has a pit fall of variable pressure application by physician. Dermapen designed in a special form to overcome these varieties beside control microneedling depth penetration of the skin. Dermapen can be described as a spring-loaded, fractional micro needling device, with an adjustment ring allowing for alteration of the heights of the micro needling. This carries out the function of 'fractional mechanical resurfacing. It utilizes an electrically powered pen to deliver a vibrating stamp-like motion to the skin, creating a series of micro-channels in the skin. [11] Derma stamp is a stamp shaped and it contains 0.8 mm or 2.1 mm long multiple stainless-steel needles. It simply presses down on the scar 3~4 times and makes 200~300 holes on 1 cm2 scar area. Derma stamping breaks the dense collagen fiber and fibroblast in the scar tissue and rearranges collagen fiber and fibroblast in the scar tissue. [12]

Glycolic Acid (GA) is an alpha-hydroxy acid, which decreases corneocyte cohesion and promotes desquamation and epidermolysis. Due to its exfoliative properties, it is widely used as a superficial peeling agent. In addition, a study has shown that GA peel has an anti-inflammatory effect on acne through its bactericidal effect on *P. acne.* [13]

In acne scars, glycolic acid increases dermal hyaluronic acid and collagen gene expression by increasing secretion of IL-6. Glycolic acid, in the concentration of 10–30% for 3–5 minutes at fortnightly intervals, revealed that the treatment is quite effective and safe in the management of superficial scarring. [14] It has been seen that a combination of various modalities gives better results than using a single method of treatment. Subcision, fractional laser, mid infrared laser, trichloro acetic acid and glycolic acid (GA) have been used in combination in various studies with good results. [15]

SUBJECT AND METHOD

Subjects: This study was carried out at the outpatient clinics of Dermatology, Venereology and Andrology Department, Faculty of Medicine, Zagazig University Hospitals in the period from March 2017 till August 2017. Thirty patients of both sexes (10 men and 20 women) with age ranged from 19-45 years old with different types of atrophic acne scars were enrolled in the study. Patients with history of glycolate hypersensitivity, contact dermatitis, bleeding disorder, patients with infectious or inflammatory skin, acute or chronic anticoagulant therapy, presence of skin cancers, pregnancy, patient with herpes simplex infection, patient with, solar keratosis, keloids, uncontrolled diabetes, patient with collagen vascular disease and neuromuscular disease and keloid prone patients were excluded from this study. Informed written consent was taken from all the patients before the study. Full history was taken from each case. All patients were subjected to general and dermatological examination to assess the skin type, the scar type (icepick, boxcar and rolling type), the scar severity (grade 2, 3 or 4 according the qualitative global acne scarring grading system) [16] The study had the approval of The Institutional Review Board (IRB) at Zagazig University.

Table (1): Qualitative scarring grading system.

Score	Description
1	Macular These scars can be erythematous, hyper- or hypopigmented flat marks. They do not represent a problem of contour like other scar grades but of color.
2	Mild atrophic or hypertrophic scars that may not be obvious at social distances of 50cm or greater and may be covered adequately by makeup or the normal shadow of shaved beard hair in men or normal body hair if extra facial.
3	Moderate atrophic or hypertrophic scarring that is obvious at social distances of 50cm or greater and is not covered easily by makeup or the normal shadow of shaved beard hair in men or body hair if extra facial, but is still able to be flattened by manual stretching of the skin (if atrophic)
4	Severe atrophic or hypertrophic scarring that is evident at social distances greater than 50cm and is not covered easily by makeup or the normal shadow of shaved beard hair in men or body hair if extra facial and is not able to be flattened by manual stretching of the skin.

Method: Patients were randomly divided into three groups: **Group I:** Included ten patients (4 males and 6 females) aged 27 - 45 years. They had microneedling with dermapen for treatment of the scars. **Group II:** Included ten patients (4 males and 6 females) aged 19-42 years. They had glycolic acid 35% peel for treatment of the scars. **Group III**: Included ten patients (2 males and 8 females) aged 19-39 years. They were treated with skin microneedling with dermapen combined with glycolic acid 35% peel. Every patient of the three groups had six sessions with two weeks interval between the sessions. Patients were observed for one month in all groups.

In group I: patients were primed with topical vitamin A and C (C-mix) formulations twice a day for two weeks to maximize dermal collagen formation. Microneedling treatment was performed with dermapen (Bomtech Electronics /Korea (34, Hyoryeong-ro 49-gil, Seocho-gu, Seoul, JX-120DR). Thick layer of Local anesthetic cream (eutectic mixture of lidocaine and prilocaine, (EMLA cream), APP pharmaceuticals, Fresenius Kabi, USA) was applied to the face for approximately 45 to 60 minutes before the procedure. The cream was gently removed. Dermapen was performed every two weeks for six sessions. It was passed in various directions with minimal pressure. The end point was uniform pinpoint bleeding from the treated area. The serum oozed from the skin was cleaned with saline-soaked gauge and ice pack applied for 5–10 min. Potential side effects or complications including erythema, edema, crustation, ecchymosis and hypo or hyperpigmentation were monitored. We prescribed topical antibiotic (Fucidin) two times per day for three days after treatment as well as a proper sunscreen (Sun top) to be applied daily.

In group II: Our patients were primed at home by using mild topical peeling agents (tretinoin 0.025%), for 2 weeks prior to the peel and discontinued it 2 days before the procedure. We asked the patient to wash his face with soap and water then, we cleansed the skin surface to remove any remaining traces of makeups or oils. We used ethyl alcohol to clean the skin and acetone for degreasing. The patients were seated in a comfortable position, wearing a hair cap, and we asked them to keep their eyes closed during the entire procedure. We applied the glycolic acid 35% (Care Mid East Pharma Company, El-Mansura, Egypt) with a cotton-tipped applicator. We started applying the glycolic acid on the forehead and then to the rest of the face since the forehead is less sensitive and can tolerate a little more exposure to the acid than other parts of the face can. We protected very sensitive areas, like the corners of the nose and lips with Vaseline. We neutralized the peel when a uniform erythema (endpoint) was seen by 3–5 min. If frosting was observed in any area before the set time or end point, we neutralized it at the same time by sodium bicarbonate 10%. This is especially important at some

areas with a thinner stratum corneum, like the alar groove or nasolabial fold, which absorb the acid faster than others, and sometimes needed to be neutralized before the rest of the face. Glycolic acid peels were neutralized with sodium bicarbonate 10%, which was applied until the patient stated that the pruritus had resolved in all peeled areas. Patients were instructed to apply moisturizing cream (Hipanthen cream), topical antibiotic (Fucidin) and a proper sunscreen (Sun top) to be applied daily.

In group III: Patients in this group were treated with dermapen alternative with glycolic acid 35% every two weeks interval for six sessions alternating with each other**.** Procedure, Post procedure care*:* as mentioned in group I and group II.

STATISTICAL ANALYSIS

The collected data were computerized and statistically analyzed using SPSS program (Statistical Package for Social Science, version 18.0. (SPSS INC., IL, Chicago, USA). Chi square test was used to calculate difference between qualitative variables. McNamara test was used to found differences between 2 qualitative variables in the same group. Quantitative data were expressed as mean ± SD (Standard deviation). Statistical significance was defined as P value of <0.05. also, P value of <0.01 indicates highly significant results.

RESULTS

All patients completed the study with minimal side effects. There were no statistical significant differences between the three studied groups in age or occupation (p=0.24) (p=0.32) respectively as shown in table (2). The response to treatment was assessed using the qualitative global scarring grading system before and after treatment, quartile grading scale and degree of patient satisfaction. The three groups showed statistically significant improvement in the degree of acne scars before and after treatment with the three methods (P< 0.05). There was statistically significant difference between the groups in the degree of improvement (P=0.04) as there were statistical significant differences between the three studied groups in degree of improvement. Marked increase in frequency of good and v. good improvement in Group III compared to Group I and II. An increase was also noticed in frequency of good improvement in Group I compared to Group II (P =0.04) was also noticed as shown in (table 3) (figures 1-6).

There was statistical significant increase in frequency of improvement in rolling compared to boxcar and icepick in all groups and also in boxcar compared to icepick (p=0.03, p=0.04, p=0.04) in the three groups respectively as shown in table (4). There was statistical significant increase in frequency of v. good satisfactory and objective rate in Group III compared to Group I and Group II and in Group I compared to Group II (P=0.04) (P=0.03) as shown in table (5). There was statistical significance difference between satisfactory and objective rate (p=0.03, p= 0.04, p= 0.02) in all studied groups respectively as shown in table (6). Complication*:* Group (I): Six patients complained of pain during the procedure, group (II): Seven patients complained of burning sensation during the procedure and one patient had acne flare. While in group (III): Five patients complained of pain during the procedure, one patient complained of burning sensation during sessions of glycolic acid peel and one patient complained of acne flare.

Table (2): Comparison of demographic data of the studied groups:

Variable	Group I (*n*=10)		Group II (*n*=10)		Group III (*n*=10)		F	p
Age (years)								
Mean ± SD	32.10 ± 5.61		28.6 ± 8.78		26.8 ± 6.07		1.5	0.24
Range	27 - 45		19 - 42		19 - 39			NS
Variable	**No**	**%**	**No**	**%**	**No**	**%**	χ^2	**p**
Occupation:								
House wife	1	10	1	10	2	20	9.3	0.32 NS
Skilled	3	30	0	0	2	20		
Employer	0	0	1	10	0	0		
Student	0	0	3	30	3	30		
Specialist	6	60	5	50	3	30		

There were no statistical significant differences between the three studied groups in age or occupation (p=0.24) (p=0.32) respectively as shown in table (2).

Table (3): Degree of improvement among the studied groups:

Variable	Group I (*n*=10)		Group II (*n*=10)		Group III (*n*=10)		χ^2	p
	No	**%**	**No**	**%**	**No**	**%**		
Improvement:								
No	2	20	3	30	0	0	**12.87**	**0.04***
Mild	4	40	5	50	2	20		
Good	4	40	2	20	4	40		
V.Good	0	0	0	0	4	40		

There were statistical significant differences between the three studied groups in degree of improvement. Marked increase in frequency of good and v. good improvement in Group III compared to Group I and II. An increase was also noticed in frequency of good improvement in Group I compared to Group II (P =0.04) was also noticed as shown in (table 3) (figures 1-6).

Table (4): Relation between scar type and Degree of improvement among the studied groups:

Group	Variable	Boxcar		Icepick		Rolling		χ^2	p
		No	**%**	**No**	**%**	**No**	**%**		
Group (I)	**Improvement:**	(n=5)		(n=3)		(n=2)		**10.90**	**0.03***
	No	0	0	2	66.74	0	0		
	Mild	3	60	1	33.3	0	0		
	Good	2	40	0	0	2	100		
Group (II)	**Improvement:**	(n=4)		(n=3)		(n=3)		**8.14**	**0.04***
	No	2	50	1	33.3	0	0		
	Mild	2	50	2	66.7	1	33.3		
	Good	0	0	0	0	2	66.7		
Group (III)	**Improvement:**	(n=2)		(n=4)		(n=4)		**9.87**	**0.04***
	Mild	0	0	2	50	0	0		
	Good	1	50	2	50	1	25		
	V.good	1	50	0	0	3	75		

There was statistical significant increase in frequency of improvement in rolling compared to boxcar and icepick in all groups and also in boxcar compared to icepick (p=0.03, p=0.04, p=0.04) in the three groups respectively. (based on objective scar grade).

Table (5): Satisfactory and objective rate of the studied groups:

Variable	Group I (*n*=10)		Group II (*n*=10)		Group III (*n*=10)		χ^2	p
	No	%	No	%	No	%		
Satisfactory:								
Mild	2	20	6	60	3	30	**11.23**	**0.04***
Good	6	60	3	30	3	30		
V.good	2	20	1	10	4	40		
Objective:								
No	1	10	3	30	0	0	**13.83**	**0.03***
Mild	2	20	5	50	2	20		
Good	5	50	2	20	5	50		
V.good	2	20	0	0	3	30		

There was statistical significant increase in frequency of v. good satisfactory and objective rate in Group III compared to Group I and Group II and in Group I compared to Group II (P=0.04) (P=0.03)

Table (6): Relation between satisfactory and objective rate of the studied group

Group	Variable	Satisfactory						P^
		Mild		Good		Very good		
		No	%	No	%	No	%	
	Objective:	(n=2)		(n=6)		(n=2)		
	No	1	50	0	0	0	0	
Group I	*Mild*	0	0	2	33.3	0	0	**0.03***
	Good	1	50	3	50	1	50	
	Very good	0	0	1	16.7	1	50	
	Objective:	(n=6)		(n=3)		(n=1)		
	No	3	50	0	0	0	0	
Group II	*Mild*	3	50	2	66.7	0	0	**0.04***
	Good	0	0	1	33.3	1	100	
	Objective:	(n=2)		(n=5)		(n=3)		
	Mild	1	50	2	40	0	0	
Group III	*Good*	1	50	1	20	1	33.3	**0.02***
	V.good	0	0	2	40	2	66.7	

McNamara test: **There was statistical significance difference between satisfactory and objective rate (p=0.03, p= 0.04, p= 0.02) in all studied groups respectively.**

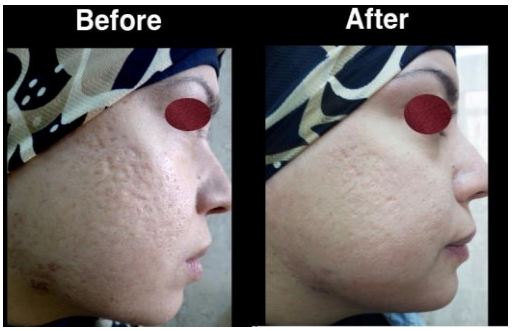

Figure (1): A case of 33 years old female with atrophic acne scar (boxcar type). Preoperative (Goodman and Baron qualitative grading system) grade was 4; 1months later after receiving 6 sessions of dermapen treatment; the grade was 2 with good improvement.

Figure (2): A case of 19 years old female with atrophic acne scar (icepick type). Preoperative (Goodman and Baron qualitative grading system) grade was 4. 1months later after receiving 6 sessions of combination treatment; the grade was 2 with very good improvement.

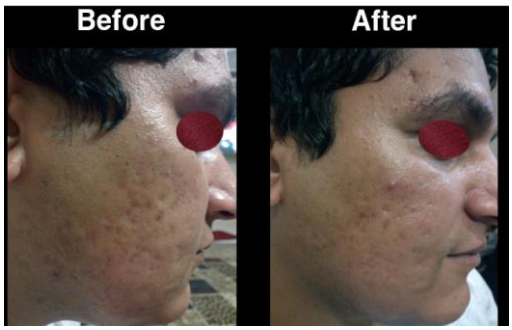

Figure (3): A case of 28 years old male with atrophic acne scar (boxcar type). Preoperative (Goodman and Baron qualitative grading system) grade was 4. 1months later after receiving 6 sessions of combination treatment; the grade was 2 with very good improvement.

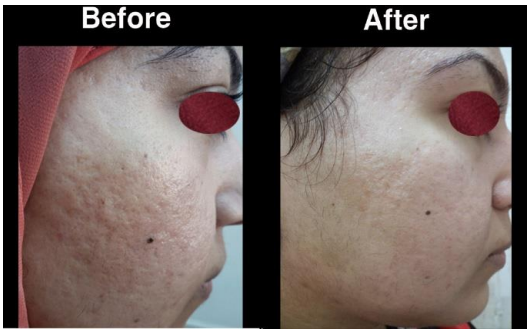

Figure (4): A case of 25 years old female with atrophic acne scar (boxcar type). Preoperative (Goodman and baron qualitative grading system) grade was 4. 1months later after receiving 6 sessions of combination treatment; the grade was 2 with very good improvement.

Figure (5): A case of 22 years old male with atrophic acne scar (rolling type). Preoperative (Goodman and Baron qualitative grading system) grade was 4; 1months later after receiving 6 sessions of glycolic acid peel treatment; the grade was 2 with good improvement.

Figure (6): A case of 38 years old male with atrophic acne scar (boxcar type). Preoperative (Goodman and Baron qualitative grading system) grade was 4. 1months later after receiving 6 sessions of dermapen ttt; the grade was 3 with good improvement.

DISSCUSSION

Acne has a prevalence of over 90% in the adolescent community and persists into adulthood in approximately 12% to 14% of patients. [17] Follicular hyper keratinization, increased sebum production, proliferation of Propionibacterium acnes within the follicle and release of inflammatory mediators into the skin contribute to the development of acne. [18]

Possible outcomes of inflammatory acne lesions are acne scars, which can cause considerable emotional and psychological distress. Minor acne scarring may occur in up to 95% of patients and significant scarring in only 22%. The latter represent areas of fibrous tissue that replace normal skin following injury. [19] There are two basic types of scar, which are atrophic and hypertrophic scars, depending on whether there is a net loss or gain of collagen. [20]

Atrophic acne scars are a common and undesirable outcome of acne vulgaris related to both its severity and delay in treatment. Such scars can be classified according to the depth and shape of the collagen loss: ice pick, boxcar, or rolling. The presence of atrophic acne scars can compromise the self-esteem and psychologic well-being of patients, creating a challenge for both the patient and the dermatologist. [21]

Microneedling or percutaneous collagen induction is a new modality used for skin rejuvenation, tightening, and scar remodeling. It offers a simple and effective treatment for photoaged skin with minimal disruption of the epidermis, thus limiting adverse effects and minimizing downtime. [22] The technique of microneedling has been shown to increase the remolding of the skin by creating thousands of microscopic

channels through the epidermis to the dermis. In response to the multiple cutaneous injuries and breaking the old collagen strands, a cascade of growth factors (stimulating, migration, and proliferation of fibroblasts) leads to collagen production. Thus, architectural and histopathologic changes take place in the lesioned area, and scars are attenuated. [23]

Chemical peeling is a widely used procedure in the management of acne and acne scars. It causes controlled destruction of a part of or the entire epidermis, with or without the dermis, leading to exfoliation and removal of superficial lesions, followed by regeneration of new epidermal and dermal tissues. The most frequently used peeling agents are salicylic acid, glycolic acid, pyruvic acid, lactic acid, mandelic acid, Jessner's solution, trichloro acetic acid, and phenol. [24] Alpha hydroxy acids (AHAs), including glycolic acid (GA) and citric acid, are naturally occurring organic acids commonly present in foods. GA has been established as a safe, nontoxic substance in fruits and participates in multiple bioactivities such as inducing antioxidant activity, increasing the effects of melasma treatment, and biosynthesizing ceramide. [15, 25]

This study included 30 patients divided into three groups (I, II, III) and each included 10 patients complaining of atrophic acne scars. Group I was treated by skin needling using dermapen, group II was treated with glycolic acid peel and group III was treated with combined treatment of dermapen and glycolic acid peel and. All patients had completed the full period of the study. Our study used the qualitative grading system of **Goodman and Baron** [16] for results analysis.

To our knowledge **Ibrahim et al.,** [26] was the only one who used dermapen for treatment of acne scars. They conducted a study in which all patients in the dermapen group showed improvement; better response was observed in non-acne scars than acne scars, although the difference was statistically insignificant. In our study, two patients had no improvement with dermapen, this might be due to long duration of scar. Their study also included eighteen patients with atrophic acne scars and ten patients with post traumatic scars. Our study agreed with this study in that the response of rolling acne scars was better than boxcar and icepick scars. To our knowledge, this study was the only study that had used dermapen for treatment of acne scars.

In other comparative studies**, Osman et al.,** [27] Made a study on thirty patients with atrophic acne scars who were randomly treated in a split-face manner with a fractional (Er: YAG) laser on one side and microneedling using Derma stamp electric pen on the other side. All patients received 5 treatments with one-month interval. In this study at the 3-month follow-up, they observed that the overall improvement was 70% in fractional (Er: YAG) laser side and 33% in microneedling side. Our study gave better results than this study as degree of improvement in our study was 80% as we used dermapen. It is noteworthy that **Osman et al.,** [27] had used derma stamp. Post inflammatory hyperpigmentation (PIH) was not reported on any sides treated with microneedling. Our study agreed with this study in that there was no PIH.

Puri, [28] who conducted a study on fifteen patients using dermaroller disagreed with our study in that his results were marked improvement in 40%, moderate improvement in 40% of cases and mild improvement in 20% of cases. While in our study the results were, good improvement in 40%, mild improvement in 40% and no improvement in 20%. This may be due to low number of cases in our study and the session interval in our study was 2 weeks, while in the other study was 4 weeks interval which may lead to more time for collagen deposition.

Our study was in agreement with **El-Domyati et al.,** [22] who conducted a study on ten patients using dermaroller as they found that dermaroller gave good results in both rolling and boxcar atrophic acne scars

while icepick and other deep scars showed poor results.

A study by **Erbağci and Akçali,** [29] was conducted on 23 patients in the first group and 20 patients in the second group. Their study concluded that a 70% GA peel performed every 2 weeks resulted in significant improvement in atrophic acne scarring, as compared to 15% GA cream used daily. Furthermore, apparently good responses were observed in the peel group only (P, 0.01). It was concomitant with our study in that glycolic acid peel gave mild and good response in acne scar as in our study (p, 0.04).

Grover and Reddu, [30] conducted a study of 41 patients with Fitzpatrick Skin Type III–V, of whom 16 patients had acne. They used GA (10-30%) for 5 minutes A significant number of patients had scarring and pigmentation. After undergoing peels with GA, the therapeutic response was good in 75% of patients. Patients with postinflammatory hyperpigmentation and scarring showed excellent improvement. While in our study, patients with acne scar showed mild and good improvement. This may be due to low number of patients in our study.

Our results disagreed with Garg et al., [31] who conducted a study on forty-four patients by using glycolic acid 35% for six sessions for two weeks in that glycolic acid gave no results in rolling scar, poor results in Icepick and good results in boxcar type. In our study all patients with rolling acne scar showed mild and good improvement. Also, boxcar and icepick types showed mild improvement. This may be due to difference in number of patients between two studies.

Khee et al., [32] conducted a study on 13 patients with acne scar using glycolic acid 70% plus vitamin c for three sessions one month apart. Most of the patients experienced further improvement at week 16, except for two whose scores remained unchanged from week 12. 9 out of 13 patients (69.2%) scored an improvement post-peel as compared to pre-peel scores. It was concomitant with our study as degree of improvement was 70%.

To our knowledge, the study of **Sharad,** [33] was the only study comparing dermaroller with dermaroller and glycolic acid peel. This study was conducted on thirty patients divided into two groups (microneedling group and combination group). This study reported excellent results in the treatment of post-acne scars, especially when associated with PIH, by combining sequential treatment with microneedling and 35% glycolic acid peel without increasing the adverse effects.

There was significant improvement in superficial and moderately deep scars (grade 1–3). The mean improvement in microneedling and combination groups was 31.33% and 62% respectively. However, in our study, the mean improvement in microneedling and combination groups was 80% and 100% respectively. This may be due to we used dermapen in our study while **Sharad,** [33] had used dermaroller.

There was also improvement in skin texture, which made this study to be concomitant with our study in that rolling type gave the best results rather than boxcar and icepick types. Milia occurred in two patients in this study while in our study no complications occurred except for acne flare in one patient.

CONCLUSION

Dermapen and glycolic acid peel are effective and safe techniques in acne scars especially (superficial scars). Combination of dermapen and glycolic acid peel is more effective than monotherapy by either dermapen or glycolic acid peel and also helps in improvement of deep acne scars. The absence of major complications, the simplicity of the technique and the favorable results obtained in the present study indicate that this is a valid method in achieving satisfying results in acne scars.

REFERENCES

1. **Tan K.L. and Bhate K.** A global perspective on the epidemiology of acne. Br J Dermatol. 2015; 172 (1): 3–12.
2. **Fabbrocini G, Fardella N, Monfrecola A, Proietti I., Innocenzi D.** Acne scarring

treatment using skin needling. Clin Exp Dermatol. 2009; 34(8): 874-879.

3. **Gozali M.V, Zhou B, and Luo D.** Effective Treatments of Atrophic Acne Scars. J Clin Aesthet Dermatol. 2015; 8(5):33–40.
4. **Kim S, Lee J, Kwon HB, Ahn B., Lee A.** Greater collagen deposition with the microneedle therapy system than with intense pulsed light. Dermatol Surg. 2011; 37:336–41.
5. **Badran MM, Kuntsche J, and Fahr A.** Skin penetration enhancement by a microneedle device (Dermaroller) in vitro: dependency on needle size and applied formulation. Eur J Pharm Sci. 2009; 36:511–23.
6. **Kalluri H, Kolli CS, and Banga AK.** Characterization of micro channels created by metal microneedles: formation and closure. AAPS J. 2011; 13(3):473–81.
7. **Bencini PL, Galimberti MG, Pellacani G, Longo C**. Application of photodynamic therapy combined with pre-illumination microneedling in the treatment of actinic keratosis in organ transplant recipients. Br J Dermatol. 2012; 167:1193–4.
8. **Doddaballapur S.** Microneedling with dermaroller. J Cutan Asthet Surg. 2009 2(2):110–1.
9. **Dogra S, Yadav S and Sarangal R.** Microneedling for acne scars in Asian skin type: an effective low-cost treatment modality. J Cosmet Dermatol. 2014; 13:180–7.
10. **McCrudden MT, McAlister E, Courtenay AJ, González-Vázquez P, Singh TR,** et al. "Microneedle applications in improving skin appearance." Experimental dermatol. 2015; 24(8):561-6.
11. **Kim Y C, Park J H and Prausnitz M R.** Microneedle applications in improving skin appearance. Adv Drug Del Rev. 2012; 64: 1547–1568.
12. **Kim SK, Jang YH, Son YH, Ju Yu E J, R.N.** Management of Hypertrophic Scar after Burn Wound Using Microneedling Procedure (Derma stamp (R). J Korean Burn Soc. 2009; 12 (2):121-124.
13. **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.
14. **Bernstein E F, Lee J, Brown D B, Van Scott E.** Glycolic acid treatment increases type I collagen mRNA and hyaluronic acid content of human skin. Dermatol Surg. 2001; 27: 429-433.
15. **Kang WH, Kim YJ, Pyo WS, Park SJ, Kim JH.** Atrophic acne scar treatment using triple combination therapy: dot peeling, subcision and fractional laser. J Cosmet Laser Ther. 2009; 11(4): 212–5.
16. **Goodman G and Baron J.** Post acne scarring: A qualitative global scarring grading system. Dermatol Surg. 2006; 32: 58 – 66.
17. **Garg S and Baveja S.** Combination therapy in the management of atrophic acne scars. J Cutan Aesthet Surg. 2014; 7(1): 18–23
18. **Kim R.H and Armstrong A. W.** Current state of acne treatment: highlighting lasers, photodynamic therapy, and chemical peels. Dermatol Online J. 2011; 17 – 2.
19. **Handog E.B, Datuin M.S and Singzon I.A.** Chemical peels for acne and acne scars in Asians: Evidence based review. J Cutan Aesthet Surg. 2012; 239–246.
20. **Jacob C.I, Dover J.S, and Kaminer M.S.**"Acne scarring: a classification system and review of treatment options." J Am Acad Dermatol. 2001; 45 (1):109–117.
21. **Athanasios I. P and Andreas D.** Therapeutic approaches to reducing atrophic acne scarring, j. clin dermatol. 2017; 10 (013): 0738-081.
22. **El-Domyati M, Barakat M, Awad S, Medhat W, El-Fakahany H, et al.** Multiple microneedling sessions for minimally invasive facial rejuvenation: an objective assessment. Internat J Dermatol. 2015; 54: 1361–1369.
23. **Costa IMC and Costa MC.** Microneedling for varicella scars in a dark- skinned teenager. Dermatol Surg. 2014; 40:333-357.
24. **Kontochristopoulos and Platsidaki E.** Chemical peels in active acne and acne scars. Clin Dermatol. 2017; 35 (2): 179–182.
25. **Sarkar R, Garg V, Bansal S. S, Sethi S, Gupta C.** Comparative evaluation of efficacy and tolerability of glycolic acid, salicylic mandelic acid, and phytic acid combination peels in melisma. Dermatol Surg. 2016; 42: 384–391.
26. **Ibrahim Z. A., El-Ashmawy A. A. and Shora O. A.** Therapeutic effect of microneedling and autologous platelet rich plasma in the treatment of atrophic scars: A randomized study. J Cosmet Dermatol. 2017; 311–8.

27. **Osman M.A, Shokeir H.A and Fawzy M.M.** Fractional Erbium-Doped Yttrium Aluminum Garnet Laser Versus Microneedling in Treatment of Atrophic Acne Scars: A Randomized Split-Face Clinical Study. Dermatol Surg. 2016; 43: 47–56.
28. **Puri N.** Comparative study of dermaroller therapy versus trichloro acetic acid CROSS for the treatment of atrophic acne scars. j Pakistan Association of Dermatologists. 2015; 25(2): 114-118.
29. **Erbağci Z and Akçali C.** Biweekly serial glycolic acid peels vs long-term daily use of topical low-strength glycolic acid in the treatment of atrophic acne scars. Int J Dermatol. 2000; 39(10):789–794.
30. **Grover C and Reddu B. S.** The therapeutic value of glycolic acid peels in dermatology. Indian J Dermatol Venereol Leprol. 2003; 69(2): 148-150.
31. **Garg, V. K., Sinha, S., and Sarkar R.** Glycolic Acid Peels Versus Salicylic–Mandelic Acid Peels in Active Acne Vulgaris and Post- Acne Scarring and Hyperpigmentation: A Comparative Study. Dermatol Surg. 2009; 35(1): 59-65.
32. **Khee H. J, May L. M, Sam Y. S, Derrick A.C, Sue-Ann H.** The efficacy and safety of a 70% glycolic acid peel with vitamin C for the treatment of acne scars. J Surg Dermatol. 2017; 2(4).
33. **Sharad J.** Combination of microneedling and glycolic acid peels for the treatment of acne scars in dark skin. J Cosmet Dermatol. 2011; 10(4): 317–23.