



Efficacy of Microneedling Combined with 30% Salicylic Acid Peel Versus Microneedling Alone in the Treatment of Post Acne Scar: A Clinical Trial

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Abstract

Background and objective: Acne scarring is a common problem with several treatment options available including microneedling, chemical peels and lasers. This study compares the efficacy of microneedling combined with 30% salicylic acid peel versus micro needling alone in the treatment of post acne scar.

Methods: This was a clinical trial in which 40 patients with acne scar were randomly assigned to either first group who underwent microneedling at weeks 0,4,8,12 followed by 30% salicylic acid peel at weeks 2,6,10,14 and Second group who underwent microneedling alone at weeks 0,4,8,12. The duration of the study was 6 months from October 2023. Samples were selected from the Dermatology Teaching Center in Sulaymaniyah City, Iraq. The severity and types of acne scars and the adverse effects of microneedling and 30% salicylic acid peel were also measured.

Results: The mean Baron and Goodman's score before treatment in treatment group was 13.30 ± 7.183 and after treatment was equal to 7.84 ± 7.480 . The decrease in the score in this group shows a good effect of combined microneedling and salicylic acid peel ($P \leq 0.001$). The mean score in control group before the intervention was 11.35 ± 4.880 and after the treatment decreased to 9.05 ± 5.404 and this decrease in the score indicated effectiveness of microneedling ($P \leq 0.001$).

Conclusion: Both groups benefited from the treatments but the improvement in the combination group of microneedling with 30% salicylic acid peeling was greater compared to microneedling alone as evidenced by 6 degrees decrease in the score while treatment group had 2 points decrease in the score, indicating the better effect of this combination treatment method.

Keyword: Acne scars, Efficacy, Microneedling, Salicylic Acid

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Introduction

Acne vulgaris and post-acne scarring are common problems. Even after treatment of the lesions, the residual scar can cause harmful psychological problems and has a negative effect on the quality of life of the patients.¹ Despite the advances that have been made in acne treatment, post-acne scarring remains a common problem.² Several treatment options are available for acne scars, including microneedling with and without platelet-rich plasma (PRP), chemical peels, lasers, and dermal fillers, with different procedures suited to each patient and scar characteristics.¹ There is no one way to completely remove acne scars, and often a combination of techniques is required.² Microneedling also known as percutaneous collagen induction therapy, is used in the treatment of post-acne scars.^{3, 4} Chemical peels are also widely used in acne scars treatment.⁷ These are an adjunctive treatment for facial acne scars.⁸ These heal scars by breaking down the epidermal and/or dermal layers, leading to exfoliation, rejuvenation, and skin regeneration. These peels include salicylic acid, tretinoin, resorcinol, lactic acid, glycolic acid, and trichloroacetic acid (TCA) 10 - 35%.¹ In a clinical trial, it was found that the combined use of 15% TCA peeling and microneedling was the most effective method in the treatment of atrophic acne scars.⁹ Chemical peeling provides the advantage of easy and efficient implementation in any environment.⁹ Less invasive methods have resulted in effective, safe, relatively long-term, and natural results with minimal skin damage.¹⁰ Among people with acne, only 16% undergo appropriate medical treatment and 74% wait more than a year before being evaluated.¹⁴ The aim of this study is to compare the efficacy of micro needling combined with 30% salicylic acid peel versus micro needling alone in the treatment of post acne scar. In microneedling, fine needles are used to create multiple pores

in the skin. This process involves creating limited injuries in the skin, leading to stimulation of elastin and collagen synthesis, and increasing epidermal and dermal thickness. Additionally, in this technique, microchannels are created in the skin, allowing for the absorption of topical materials and medications used in the treatment of various skin disorders.³ Performing microneedling at the site of scars causes the breakdown of old and ineffective collagen bundles and simultaneous nucleogenesis. Furthermore, stimulation of growth factors leads to migration and proliferation of fibroblasts. Therefore, microneedling by creating histopathological changes in tissue structure helps alleviate the effects of scars.²⁰ In microneedling, fine needles pierce the epidermis and dermis, which leads to the creation of small wounds in the skin, as a result, a set of growth factors is created, which leads to tissue proliferation, regeneration, and collagen regeneration that can take several months.^{5, 6} In a clinical trial on the effect of microneedling on the improvement of post acne scar, mean scar scores at 6 months were significantly reduced in the treatment group compared to baseline.³ Patients reported very mild pain associated with microneedling, and the side effects were only mild transient edema and erythema.³ Another common treatment for scar removal is chemical peeling. One of the substances used in peeling is salicylic acid.²¹ Salicylic acid peel is a beta-hydroxy acid with a phenolic ring.¹¹ Salicylic acid accelerates skin shedding by dissolving the intercellular substance that connects the skin cells in the stratum corneum, leading to faster exfoliation and consequently softening of keratin. Salicylic acid, in addition to its exfoliating effects, has high penetration power into the skin.³ Salicylic acid is a keratolytic agent that reduces corneal adhesion due to its ability to dissolve intercellular cement.⁸ This peel has a lipophilic property, which makes it





penetrate better into the pilosebaceous unit. This property is due to its strong comedolytic effect and it is used in acne treatment.^{11, 12} The anti-inflammatory activity of salicylic acid causes a rapid reduction of facial erythema.¹³

Patients and methods

This was a clinical trial aimed to compare 40 patients with post acne scar who were assigned to one of the two methods of microneedling combined with 30% salicylic acid peel and microneedling alone groups. This study also aimed to identify the severity and types of acne scars among the studied population to determine which type of acne scar benefits most from the treatments and evaluate the adverse effects of treatments to identify the safety of the procedures on patients attending the Dermatology Teaching Center for treatment of skin disease, in Sulaymaniyah, Iraq. The study duration was 6 months from October 2023. The first group underwent microneedling at weeks 0,4,8,12 and 30% salicylic acid peel at weeks 2,6,10,14. The second group underwent microneedling alone at weeks 0,4,8,12. The participants independently underwent thorough physical examination by two dermatologists to evaluate their condition. All types of post acne scar were selected as candidates for the study. The severity of acne scars was evaluated before the start, at each and 2 months after the last visit by using the Goodman and Baron scale, Table (1).¹⁵ In terms of adverse effects, all patients were evaluated for pain, hyper and hypopigmentation, erythema, exfoliation, and acne eruption. Inclusion criteria consisted of having different types of post acne scar on the face, being willing and able to comply with the scheduled visits and procedures for the duration of the study. Exclusion criteria were as follows: active acne lesions, keloid tendency, blood disorders or those on anticoagulants, all types of infection on face, recent use of systemic

retinoids within the last 6 months, hypersensitivity to numbing cream and salicylic acid peel, and patients with unrealistic expectations. During microneedling procedure, the skin is cleansed with an alcohol pad and a numbing cream (lidocaine gel) is applied on to the treatment area and left for about 45 minutes. The microneedling pen which is a hand-held device with 12 needles and the depth of penetration into the skin is chosen by the provider according to different parts of the face and types of acne scars. The depth can range from 0 to 3 millimeter. The needle penetrates the skin, and as a result pinpoint bleeding and erythema occurs. The procedure might take from 15 minutes to about an hour. the face should be kept dry for about 8 hours after the procedure and then washed with water. A moisturizer should be applied three times per day and sunscreen is advised when patient has outdoor activities. During salicylic acid chemical peeling the face is cleansed with alcohol pads and the peel is applied on to the intended area by a cotton pad and left on for 3-4 minutes. When the white frost appears, the patient washes his/her face with tap water and afterwards applies sunscreen. A moisturizer is prescribed 3 times per day.

Table (1): Goodman and Baron's quantitative scar scale

Grade (type)		No. of lesions		
		1-10	11-20	>20
A	Milder scarring Macular erythematous, pigmented, mildly atrophic dish-like	1 pts	2 pts	3 pts
B	Moderate scarring moderately atrophic dish like, punched out small scars with, shallow bases but	2 pts	4 pts	6 pts





	atrophic areas (<5mm)			
C	Severe scarring-punched out with deep but normal bases, punched out with deep abnormal bases, linear or troughed dermal scarring, deep and broad atrophic areas	3 pts	6 pts	9 pts
D	Hyperplastic papular scars	2 pts	4 pts	6 pts
E	Hyperplastic keloidal or hypertrophic scars	Area 5 cm ² - 6 pts	Area 5-20 cm ² - 12 pts	Area > 20 cm ² - 18 pts

Data was analyzed using SPSS software, version 26. The statistical analysis includes descriptive statistics both Mean and Standard deviation. The chi-square and Fisher exact test were used to compare the results between microneedling combined with 30% salicylic acid peel and microneedling alone groups. P value of <0.05 was considered statistically significant. This study was approved by the Ethics Committee of the Kurdistan Higher Council of Medical Specialties. For ethical considerations, written informed consent was obtained from the participants after the procedures were fully explained. The purpose of the study was explained by the researcher. The participants were assured of anonymity and confidentiality of the results

and they had the right to withdraw from the study at any stage.

Results

The mean age of people in group A was 26.8 ± 6.646 years and in group B was 26.5 ± 4.730 years, and the mean age in the two groups was not significantly different. The mean duration of post acne scar in group A was 5.95 ± 6.083 years and in group B was 5.90 ± 4.025 years, which did not have a significant difference between the two groups. Examining the gender showed that in group A, 4 (20%) cases were men and 16 (80%) cases were women, and in group B, 3 (15%) cases were men and 17 (85%) cases were women. In group A, 3 (15%) cases had a family history of post acne scar, and in group B 5 (25%) cases had a family history. Examination of skin phototypes showed that in group A, 1 (5%) case had skin phototypes II, 6 (30%) cases had skin phototypes III, 12 (60%) cases had skin prototypes IV, and 1 (5%) case had skin prototypes V, and in group B, 5 (25%) cases had skin phototypes III, 14 (70%) cases had skin phototypes IV, and 1 (5.9%) case had skin phototypes V. Side effects between the two groups showed that in group A, 2 (10%) cases had no side effects, while 14 (70%) cases had erythema, 3 (15%) cases had exfoliations and 1 (5%) case had pustular folliculitis. In group B 3 (15%) cases had no side effects, while 16 (80%) cases had erythema and 1 (5%) case had exfoliations. The demographic variables are shown in Table (2).

Table (2): Distribution of demographic variables in the samples participating in the study.

Characteristics		Group		-p value*
		Combination treatment microneedling + salicylic acid chemical peel 30%	Microneedling alone	
Age		26.8 ± 6.646	26.5 ± 4.730	0.870
Duration of post acne scare		5.95 ± 6.083	5.90 ± 4.025	0.976
Sex	Male	4 (20%)	3 (15%)	0.677
	Female	16 (80%)	17 (85%)	
Family history of post acne scar	Positive	3 (15%)	5 (25%)	0.429
	Negative	17 (85%)	15 (75%)	





Skin phototypes	ii	1 (5%)	0	0742
	iii	6 (30%)	5 (25%)	
	iv	12 (60%)	14 (70%)	
	v	1 (5%)	1 (5%)	
Side effects	No side effects	2 (10%)	3 (15%)	0.099
	Erythema	14 (70%)	16 (80%)	
	Exfoliations	3 (15%)	1 (5%)	
	Pustular folliculitis	1 (5%)	0	

*P-value t-test, **P-value Chi-square

The intergroup comparison of questionnaire components based on Goodman and Barron's quantitative grading system in two groups of participants is shown in Table (3). Types of post acne scar between the two groups showed that in group A, 2 (10%) cases of post acne scar type were Ice pick, 4 (20%) cases had Rolling post acne scar type, 1(10%) case had the Boxcar post acne scar type and 13

(65%) cases had the Mixed post acne scar type. In group B, 1 (5%) case of post acne scar was Ice pick, 5 (25%) cases had Rolling post acne scar type, 2(10%) cases had the Boxcar post acne scar type and 12 (60%) cases had the Mixed post acne scar type and there was a significant difference in terms of Types of post acne scar between the two groups ($P \leq 0.04$).

Table (3): Intergroup comparison of the components of the Goodman and Baron quantitative grading system questionnaire in two groups participating in the study

Variable	Group		p value*
	Combination treatment microneedling + salicylic acid chemical peel 30% (n=20)	Micro needling alone (n=20)	
Ice pick	2 (10%)	1 (5%)	0.04
Rolling	4 (20%)	5 (25%)	
Boxcar	1 (5%)	2 (10%)	
Mixed	13 (65%)	12 (60%)	

*p value Chi-square

The comparison of the mean scar score based on Goodman and Baron's quantitative scoring system (treatment effects in two groups of A and B before and after treatment) is shown in Table (4). The mean score before treatment in group A was equal to 13.30 ± 7.183 , and the mean score in group B was equal to 11.35 ± 4.880 , and the mean score of the two groups before treatment was not significantly different ($P \leq 0.322$). The mean score after treatment in group A decreased and was equal to 7.84 ± 7.480 , and the mean score in group B also decreased and

was equal to 9.05 ± 5.404 , and the mean score of the two groups after the intervention had a significant difference ($P \leq 0.003$). This decrease in the score after the intervention compared to before the intervention indicated the positive effects of both treatments ($P \leq 0.001$). The intra-group comparison of the mean scar score before and after the intervention was significant in both group A and group B, and it was associated with a significant decrease in the mean score in both groups.



**Table (4):** Comparison of treatment effects in two groups A and B before and after treatment

Variable	Group		p value**
	Combination treatment microneedling + salicylic acid chemical peel 30% (n=20)	Micro needling alone (n=20)	
Before treatment	13.30±7.183	11.35±4.880	0.322
After treatment	7.84±7.480	9.05±5.404	0.003
P-value*	0.001	0.001	-

*p-value t-test, **p-value Paired t-test

Discussion

In this study, the effectiveness of microneedling combined with 30% salicylic acid peeling in the treatment of scars after acne was investigated compared to microneedling alone. Improvement in scar treatment after acne was greater in the group receiving microneedling combined with 30% salicylic acid peeling based on the quantitative Goodman and Baron Scar scale, showing a better effect of this treatment method and a significant reduction in scars. Reduction in scars was also significant in the microneedling alone group, but the combined treatment method showed greater efficacy. Adverse effects such as erythema, exfoliation, and pustular folliculitis were reported among patients, which were mild and temporarily resolving after a short time. Acne scars are seen in cases of severe acne. Being male and having a positive family history are exacerbating factors for this condition¹⁶ In a review study conducted by Attia, therapeutic interventions for acne scarring were examined. Scar management involves various types of treatments such as chemical peels, laser and dermabrasion, the use of injectable fillers, and surgical methods like subcision, punch excision, punch elevation, or punch grafting. Since scar tissue impairs regenerative abilities, the use of therapeutic methods that aid in regeneration has received more attention.¹⁸ Minimally invasive and non-invasive treatment methods can be beneficial and may have few side

effects. Microneedling is a minimally invasive treatment method that involves creating repeated skin punctures using sterile microneedles to disrupt the collagen fibers that connect scar tissue and can induce skin collagenases. A study conducted by Sharma,¹⁷ aimed to investigate the combination of microneedling with alternating chemical peeling with 30% salicylic acid in scar reconstruction treatment after acne. In this study, 20 patients with acne scars were examined. Patients underwent microneedling with a derma roller at the first visit, followed by treatment with 30% salicylic acid after 2 weeks, and four sessions of treatment were performed at 2-week intervals. The results of treatment were evaluated based on the Goodman and Baron scale, showing that the combination of microneedling with salicylic acid had a significant and good effect on improving acne scars. Considering that one of the most common complications of acne is scarring, and these can have negative effects on the physical and mental health of patients, appropriate therapeutic interventions can lead to improvement in the condition of acne patients, enhance the quality of their lives, and increase satisfaction with therapeutic interventions. A systematic review study by Sitohang et al.¹⁹ evaluated systematic microneedling for acne scar treatment. A systematic search of texts from PubMed, Medline, Cochrane Central, and Google Scholar databases was conducted, and





articles published in the last 20 years, including randomized controlled trials (RCTs), were included in the study. Various studies indicate that in the treatment of scars caused by acne, using a combination of different methods yields better results compared to using a single therapeutic approach. In this regard, Saadawi,²² compared the effectiveness of dermabrasion with 35% glycolic acid, microneedling, and a combination of dermabrasion and microneedling in the treatment of acne scars. For this purpose, 30 patients aged 19 to 45 years with acne scars were included in the study and randomly assigned to three groups of 10. Treatment in group I included microneedling, group II included dermabrasion with 35% glycolic acid, and group III included a combination of dermabrasion and microneedling. All patients underwent six treatment sessions with a two-week interval between each session. Clinical evaluations were performed before and after treatment based on the global scar grading system and a four-point grading scale. In all study groups, a significant reduction in the scar grade index was observed after treatment. The reduction in this index was greater in group III compared to the other groups, indicating the higher effectiveness of combined dermabrasion and microneedling compared to monotherapy approaches (microneedling or peeling alone). This higher effectiveness was observed in all types of acne scars including boxcars, ice picks, and rolling scars. Additionally, patient satisfaction with the results achieved in group III was higher than in the other two groups. Side effects in group I included erythema and temporary pain. In group II, a burning sensation was reported as the main side effect. In group III, temporary pain, erythema, and burning during treatment were reported. The results of this study clearly show that in the treatment of acne scars, the effectiveness of the combination of

microneedling and peeling is higher than in monotherapy approaches. The absence of serious side effects, the simplicity of the method, and the desirable treatment outcomes indicate that the combination of microneedling and peeling can be used as a safe and effective treatment for removing acne scars. Microneedling therapy along with other combination drugs and salicylic acid has been shown to be effective in treating scars caused by acne in other studies as well.³ Based on the results of these studies, it can be considered a safe, useful, and highly efficient treatment method. The limitation of this study is the small sample size, and it is recommended that further studies with larger sample sizes be conducted.

Conclusion

According to the results of this study, the use of salicylic acid along with microneedling is more effective in managing acne scars compared to microneedling alone. While both groups showed good responses to treatment, it is recommended that the combination of salicylic acid and microneedling can be a better option in managing acne scars to improve social life, emotional well-being, and self-confidence in patients with acne scars. Additionally, this treatment method does not require sophisticated and expensive equipment, and the side effects related to the regimen are minimal.

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Conflict of Interest

None declared.

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