BENHA MEDICAL JOURNAL

Print ISSN 1110-208X

Online ISSN 2357-0016

Original article

A Comparative Study Between the Efficacy of Retinoic Acid 5% Peel Versus Salicylic Acid 30% Peel in the Treatment of Inflammatory Acne Vulgaris

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Received:16 May 2024

Accepted:23 August 2024

Abstract

Background: Acne, a prevalent and distressing skin disorder, affects a significant proportion of the global population, with a prevalence of 85%–90% among adolescents and a potential persistence into adulthood. **Aim**: This study aimed to provide evidence-based insights for optimized therapeutic approaches. **Methods:** This is a randomized controlled clinical trial. It was carried out in the Dermatology outpatient clinic of Benha University during the period from June 2022 to June 2023 on thirty patients with different degrees of inflammatory acne. All patients had six peeling sessions biweekly with retinoic acid 5 % peel on one side of the face and salicylic acid 30% peel on the other side. **Results**: The median scores for acne after treatment with retinoic acid 5% and salicylic acid 30% were consistently lower in each session. The study found no significant differences between treatment regimens at sessions 1, 2, and 3, but retinoic acid showed slightly better results. In sessions 4, 5, and 6, retinoic acid treatment showed better improvement, with a 5% peeling side showing better acne score improvement. Patient satisfaction was significantly different between the two treatments, and there was a significant relationship between acne score before treatment and improvement at the end of treatment. **Conclusions:** Retinoidsic acid 5% peel shows superior efficacy in treating inflammatory acne vulgaris, reducing acne scores and increasing patient satisfaction, making it a preferred therapeutic approach for dermatologists and skincare practitioners.

Keywords: Inflammatory Acne Vulgaris; Chemical Peel; Retinoic Acid; Salicylic Acid.

Introduction

Acne is one of the most common skin disorders and is prevalent in most ethnic populations. It affects 85%–90% of adolescents and may persist in adulthood .Acne may present with a variety of lesions and with variable severity degrees. It can appear as comedones, papules, pustules , cysts, nodules, and disfiguring scars which result in an unneglectable negative impact on both patients' physical and mental health . It can negatively affect an individual's appearance and self-esteem, thereby causing anxiety, depression, poor quality of life and even suicidal thought (1).

Complex factors attributed to the pathogenesis of acne, include pilosebaceous duct hyperkeratinization, Cutibacterium acne dysbiosis, increased sebum production, and inflammatory mediators (2).

Acne vulgaris treatments include systemic therapies (oral antibiotics and retinoids), topical therapies and physical modalities (laser therapy and chemical peeling) (3).

Chemical peeling is a skin resurfacing procedure that is commonly used, fast, safe and effective. It causes a manageable injury to the skin, thus resulting in subsequent regeneration of a new epidermal (4).

Superficial chemical peels are considered as primary or adjunctive treatments for acne. Their addition to the regimen is preferred due to the quick decrease in lesional count as well as the improvement of overall skin texture. A series of chemical peels can give significant improvement over a short period of time, leading to better patient satisfaction and clinical results (5).

Retinol is a proven ingredient for the management of acne due to its ability to enhance exfoliation, increase epidermal thickness, increase matrix metalloproteinase (MMP) activity while increasing collagen. Retinoic acid peel can improve acne scars and post inflammatory hyperpigmentation but its efficacy in treatment of inflammatory acne vulgaris has not been recorded (6).

The aim of this study was to compare retinoic acid 5% peel versus salicylic acid 30% peel in the treatment of inflammatory acne vulgaris.

Patients and Methods

This was a randomized controlled clinical trial. The study included 30 patients having different degrees of inflammatory acne attending Dermatology outpatient clinic of Benha University Hospitals, during the period from June 2022 to June 2023 . All patients had six biweekly peeling sessions with retinoic acid 5 % peel on one side of the face and salicylic acid 30% peel on the other side. The study was done after being approved by the Research Ethics Committee, Faculty of Medicine, Benha University (MS 11-7-2022). An informed written consent was obtained from patients. Every patient received an explanation of the purpose of the study prior to the treatment.

Inclusion criteria: Patients > 18 years old with inflammatory acne lesions that approved to participate in the study.

Exclusion criteria: Patients excluded were those on isotretinoin therapy, pregnant or lactating or patients planning to become pregnant during the course of study, patients who spend excessive time in the sun and those having hypersensitivity to chemical peel substances.

Methodology:

All patients were subjected to the following:

Complete history taking: a detailed patient history, which included personal history: age, sex and occupation, present history: onset, course and duration of the disease, history of any drug and/or acne treatment intake, past history of previous treatments, keloid formation, recurrent herpes and sensitivity to drugs or sun exposure and family history of similar condition.

Dermatological examination: to determine:

- Fitzpatrick skin phototype

The Fitzpatrick classification system categorizes patients into 6 distinct skin types based on their reactions to sun exposure.

Type I: Individuals with white skin, blue eyes, freckles, and light hair. Their skin tends to develop sunburn with sun exposure and does not tan easily.

Type II: Individuals with fair skin, light-coloured hair, and hazel, green, or blue eyes. They can tan with some difficulty but are prone to frequent sunburn.

Type III: Individuals with average skin, regardless of eye or hair color. They tend to tan gradually and sometimes face mild sunburn after sun exposure.

Type IV: Individuals with brown skin who tan easily and rarely experience sunburn.

Type V: Individuals with dark brown skin who tan very easily and seldom develop sunburn.

Type VI: Individuals with black skin who rarely experience sunburn and tan effortlessly.

- Characteristic of patient skin:

Thick oily skin or thin dry skin.

- Acne severity:

Acne severity was assessed as mild, moderate, severe and very severe correlated with numbers of inflammatory lesions. It is based on number of papules and pustules on the half of the face: 0-5 for mild, 6-20 for moderate, 21- 50 for severe, >50 for very severe (7).

Treatment procedure:

Preparation: Before proceeding with the procedure, informed consent from the patient was obtained, photo documentation for preoperative and postoperative comparisons and post-peel expectations were discussed with the patient.

Procedure: The patient was positioned supine with the head of bed elevated to 45 degrees for the procedure, patients skin was cleaned with isopropyl alcohol to eliminate residual debris or makeup, petrolatum jelly was applied to areas prone to potential

chemical substance pooling such as the lateral canthi and sides of nose and mouth, the chemical peel was applied on forehead and temples then cheeks and chin, and was evenly distributed using a brush, after two minutes another layer was applied, each side was randomly selected by choosing a sealed opaque envelope containing a card labeled with either retinoic acid 5% or salicylic acid 30 % represented the treatments for right and left split face side, after formation of white precipitate, salicylic acid side was washed using tape water, and an emollient was used to the whole face to soothe the skin, patients were asked to wash the retinoic acid side after six hours and applying the emollient, additional peels were administered at subsequent visits with two weeks interval and a final follow-up visit two weeks after the last peel.

Post peel instructions: patients were advised to follow the following post-peel instructions to ensure proper healing of their skin and achieve the best possible results: individuals should avoid picking or peeling the desquamating skin, stay clear of direct sun exposure, use a gentle cleanser with a patting motion, avoiding rubbing or using a washcloth when washing their face in the morning and before bed, gently pat dry with a towel after washing their face, also, they were advised to apply a non-comedogenic moisturizer after cleansing and a sunscreen to their skin in the morning.

Evaluation of the treatment efficacy: evaluation was done after each session and at the end of six treatment sessions by: photography with standardized position and good illumination, clinical assessment by lesion counting and grading according to Hayashi score to document improvement, patient satisfaction assessment by a 10- point visual analogue scale (VAS, 0-10; the 0 level is defined as “not satisfied,” while a level of 10 is defined as “completely satisfied”.

Statistical analysis

Statistical analysis was done by SPSS v25 (IBM©, Armonk, NY: IBM Corp). Descriptive statistics included mean and standard deviation (± SD) for numerical data and frequency/percentage for non-numerical data. Student T Test was used to assess the statistical significance of the difference between two study group means, Chi-Square test was used to examine the relationship between two qualitative variables, Fisher Exact or Monte Carlo test: was used to examine the relationship between two qualitative variables when the expected count is less than 5 in more than 20% of cells. A p-value considered significant if $p < 0.05$ at a 95% confidence level.

Results

The current study was carried out on 30 patients with inflammatory acne, their mean age was 19.5±3.84 years. Women consisted 96.7% of the patients. The majority of the patients were University students (73.3%), followed by nurses (13.3%), housewives (10.0%), and teachers (3.3%).Among the patients, 70.0% had moderate acne, followed by severe acne (16.7%) and mild acne (13.3%). The mean age of onset for this group of individuals with acne was 16.37 years, with a standard deviation of 0.52. The median age of onset is 16 years, ranging

from 11 to 24 years. The average duration of acne is 3.15 years, with a standard deviation of 0.34. The median duration is 3.5 years, ranging from 0.1 to 7 years. The most common lesion types observed in all 30 individuals were comedones, papules, and pustules. Additionally, pigmentation is present in 26.7% of the cases, erythema in 36.7%, and scarring in 30% .

No significant differences were found between right and left sides before treatment with mean acne score 13.77±8.55 and 15.00±9.42 respectively.

Treatment results regarding acne score: The median scores for acne after treatment with retinoic acid 5% and salicylic acid 30% were consistently lower in each session, indicating a reduction in acne severity over time (p<0.001 for both), at sessions 1, 2, and 3 no significant differences were found between both treatment regimens, although retinoic acid showed better results, while in sessions 4, 5 and 6 the p-values were 0.017, 0.002 and 0.001 respectively suggesting a significant difference between the two treatments at that time point, with better improvement attributed to retinoic acid treatment. The side which received Retinoic acid 5% showed significantly better improvement in of acne score at the end of treatment when compared to side at which Salicylic acid 30 % was applied (Table 1,2) (Figure1, 2)

Treatment results regarding patients' satisfaction: Patients were highly satisfied with their treatment on both sides, with mean satisfaction scores of 9 and 8 out of 10, respectively. There was statistically significant difference in patient satisfaction between the retinoic acid 5% peeling side and the salicylic acid 30% peeling side, with better satisfaction associated with retinoic acid treatment. Patient satisfaction was significantly correlated with percentage improvement among all studied patients (p=0.017) (Figure 3). (Table 3).

There was a significant relationship between acne score before treatment and acne score improvement at the end of treatment in retinoic acid 5% peeling side. Of the 26 patients who improved, 80.8% had moderate acne, and 19.2% had severe acne. However, 100% of patients with stable outcomes had mild acne (Table 4).

There was a significant relationship between acne score before treatment and acne score improvement at the end of treatment in salicylic acid 30% peeling side. From the 25 patients who improved, 80% had moderate acne and 20% had severe acne. However, 80% of patients with stable outcomes had mild acne (Table 5)

No significant correlations were found between percentage improvement with age, onset, duration, baseline acne score among all studied patients (p>0.05 for each)

No significant association was found between percent improvement with gender, occupation, skin type, pigmentation, erythema and scar among all studied patients.

Approval Code:Ms 11-7-2022

Table 1: Comparison between retinoic acid 5% peeling side and salicylic acid 30 % peeling side regarding acne score before treatment**.**

Acne score before treatment	Retinoic acid 5% n = 30		Salicylic acid 30 % n = 30		Test	p
Mean ±SD	13.77	8.55	15.00	9.42	U=411.500	0.569
Median	12.00		12.5			
Min-max	4.00	35.00	4.00	46.00		

U, Mann Whitney test; P: Comparing between the two treatments, *: Significant when $p < 0.05$.

Table 2: Comparison between retinoic acid 5% peeling side and salicylic acid 30 % peeling side regarding acne score after treatment.

Acne score after treatment	Retinoic acid 5% n = 30	Salicylic acid 30 % n = 30	Test (U)	P1
Session 1				
mean±SD	11.27±7.19	13.00±7.92	381.500	0.310
Median	10	11.5		
Min-max	2.00-30.00	3.00-37.00		
Session 2				
mean±SD	8.87±5.06	10.80±5.39	348.500	0.132
Median	8	10		
Min-max	2.00-24.00	3.00-22.00		
Session 3				
mean±SD	7.03±4.04	8.87±4.39	327.500	0.068
Median	6	8		
Min-max	2.00-18.00	3.00-19.00		
Session 4				
mean±SD	5.40±3.44	7.33±3.77	289.500	0.017*
Median	4.5	7		
Min-max	1.00-16.00	2.00-16.00		
Session 5				
mean±SD	4.07±3.27	6.07±3.56	246.000	0.002*
Median	3	5		
Min-max	1.00-16.00	2.00-16.00		
Session 6				
mean±SD	3.17±2.59	4.87±2.79	230.500	0.001*
Median	2	4		
Min-max	1.00-10.00	1.00-12.00		
Test (Friedman Test)	143.0	139.4		
P2	<0.001*	<0.001*		

U, Mann Whitney test; P1: Comparing between the two treatments, p2, comparison through different time points; *: Significant when $p < 0.05$.

Table 3: Comparison between retinoic acid 5% peeling side and salicylic acid 30 % peeling side regarding improvement of acne score after session 6 and patient satisfaction.

	Retinoic acid 5% n = 30	Salicylic acid 30 % n = 30	Test	p
Improvement (%)				
mean±SD	76.48±10.46	63.68±15.73	t=3.711	0.001*
Median	78.89	67.71		
Min-max	50.00-93.75	27.27-87.50		
Patient satisfaction				
Mean ± SD.	9.20 ± 0.48	7.76 ± 0.44	t= 12.008	<0.001*
Median	9.0	8.0		
Min. – Max.	8.0 – 10.0	7.0 –8.0		

SD.: Standard deviation, Min.: Minimum, Max.: Maximum, t: Student t test; P: Comparing between the two studied treatments, *: Significant when p < 0.05.

Table 4: Relation between outcome of acne score after session 6 and acne score before treatment in retinoic acid 5% peeling side.

	Outcome of acne score after session 6				Test	p
	Stable n = 4		Improve n = 26			
	n	%	n	%		
Acne score before treatment						
Mild	4	100.0	0	0.0	X^2= 18.438	MC <0.001*
Moderate	0	0.0	21	80.8		
Severe	0	0.0	5	19.2		

X^2: Chi–Square. MC: Monte Carlo, P: Comparing between stable and improve, *: Significant when p < 0.0

Table 5: Relation between outcome of acne score after session 6 and acne score before treatment in salicylic acid 30 % peeling side.

	Outcome of acne score after session 6				Test	p
	Stable n= 5		Improve n= 25			
	n	%	n	%		
Acne score before treatment						
Mild	4	80.0	0	0.0	X^2= 15.279	MC <0.001*
Moderate	1	20.0	20	80.0		
Severe	0	0.0	5	20.0		

Figure 1: Significant difference in the therapeutic response in favor of Lt Side treated with retinol peel at the end of treatment

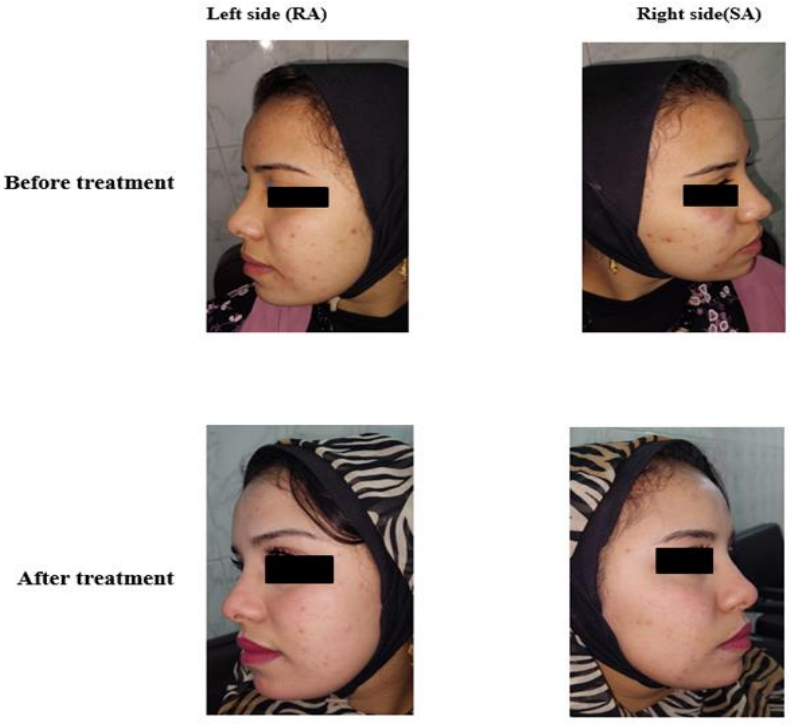

Figure 2: Significant difference in the therapeutic response in favor of Lt Side treated with retinol peel at the end of treatment

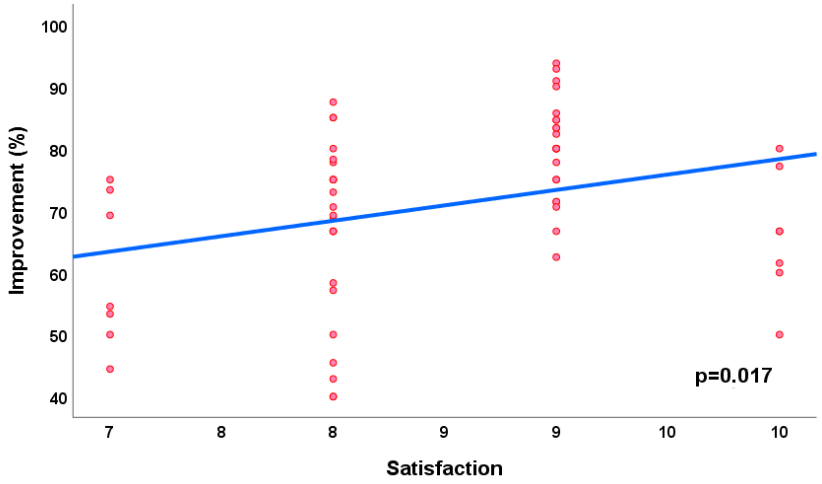

Figure 3: Correlation between improvements with satisfaction after treatment among all studied patients.

Discussion

In line with our study conducted a study on topical retinoids in inflammatory acne. The treatment groups consisted of tazarotene (252 patients), adapalene (178 patients), tretinoin micro sponge (47 patients), tretinoin gel (39 patients), and vehicle (61 patients). Inflammatory acne was improved with all 4 retinoids compared with vehicle.The incidences of clinically significant improvements in the tazarotene, adapalene, and tretinoin micro sponge groups were 24%, 17%, and 21%, respectively (all, $P \leq 0.001$ vs vehicle [7%]) (9).

While both treatments led to a reduction in acne scores, salicylic acid 30% peel showed comparable results in the initial sessions, indicating a relatively similar effectiveness during the early phases of the study. However, the diminishing efficacy in later sessions, as reflected in the statistically significant differences in sessions 4, 5, and 6, highlights a potential limitation of salicylic acid in sustaining long-term improvements compared to retinoic acid. With regards to the side which received Retinoic acid 5%, it showed significantly better improvement in acne score after session 6 when compared to side at which Salicylic acid 30 % was applied.

Compatibly review for the current scenario of acne vulgaris treatment reported that Retinoids have been in use for more than 30 years. There was statistically significant difference in patient satisfaction between the retinoic acid 5% peeling side and the salicylic acid 30% peeling side, with better satisfaction associated with retinoic acid treatment(10)

Additionally, Dayal et al, 2021, performed a study to compare the clinical efficacy and safety of 25% TCA and 30% SA peels in the treatment of mild and moderate acne vulgaris. Both peels led to a significant decrease in individual lesion counts and MAS compared to baseline values, without significant differences between the treatment groups. Thus, the peels had equivalent

efficacy against acne vulgaris. The TCA peel was better in treating non-inflammatory lesions, while the SA peel was better for inflammatory lesions, but the differences were not significant. No serious adverse effects were recorded, but more patients in the TCA peel group experienced burning and stinging sensations. **(11)**

No significant correlations were found between percentage improvement with age, onset, duration, baseline acne score among all studied patients ($p>0.05$ for each). Patient satisfaction was significantly correlated with percentage improvement among all studied patients ($p=0.017$).

Conclusions

Our study provides evidence supporting the superior efficacy of retinoic acid 5% peel as indicated by consistently lower acne scores and higher patient satisfaction. It is a preferred option in the treatment of inflammatory acne vulgaris, especially in cases of moderate to severe acne.

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To cite this article: Bassant Anwar, Ihab Younis, Aliaa Elhusseiny, Eman M Hasan . A Comparative Study Between the Efficacy of Retinoic Acid 5% Peel Versus Salicylic Acid 30% Peel in the Treatment of Inflammatory Acne Vulgaris. BMFJ 2024;41(8):596-605.