

Comparative Study on Buffered 50% Glycolic Acid and 0.5% Salicylic Acid Solution Vs Jessener's Solution in Egyptian Patients with Acne Vulgaris.

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ABSTRACT

Background: Acne vulgaris is a chronic inflammatory disorder of the pilosebaceous unit that is associated with significant psychosocial repercussions. Chemical peeling is a documented option in the treatment of active acne. Glycolic acid belongs to the group of α -hydroxy acids is used as a superficial or medium depth peel in acne treatment Jessner's solution (JS) peel is formulated by Dr. Max Jessner to minimize complication from resorcinol, namely contact dermatitis. Salicylic acid also decreases in inflammatory lesions.

Aim of the Study: This study aimed to compare the efficacy and adverse effects of buffered glycolic acid 50% +0.5% salicylic acid solution versus jessner's solution in treatment of mild and moderate acne vulgaris.

Patients and Methods: The study included 30 patients with mild to moderate degree acne vulgaris, they were collected from Zagazig university outpatient clinic of dermatology, venerology and andrology from January 2020 to September 2020 after approval of the Institutional Review Board (IRB) number 5831. Twenty four patients completed this study and 6 patients did not complete the study. Patient face was divided into left and right treated sides ,the left side was treated by buffered 50% glycolic acid (ph 3) + 0.5% salicylic acid solution and the right side was treated by jessner's solution.

Results: Our study's results showed that that 54.2%, of acne lesion excellent improvement and 25.0% good improvement after Buffered 50% glycolic acid and 0.5% salicylic acid treated side compared to 41.7% ,16.7% respectively of Jessner's solution treated side the difference statistically insignificant $p>0.05$. While 16.7% , of acne lesion moderate improvement and 4.1% poor improvement after Buffered 50% glycolic acid and 0.5% salicylic acid treated side

compared to 20.8% ,20.8% respectively of Jessner's solution treated side the difference statistically insignificant $p>0.05$

Conclusion: Our Findings demonstrated that using buffered glycolic acid 50% and salicylic acid in treatment of mild to moderate degree acne vulgaris is more effective with less adverse effects than using jessner's solution.

Keywords: Acne Vulgaris, Glycolic Acid, Salicylic Acid, Jessener's Solution and Egyptian Patients.

Introduction

Acne vulgaris is a chronic inflammatory disorder of the pilosebaceous unit that is associated with significant psychosocial repercussions. The elements of acne pathophysiology follicular epidermal hyperproliferation, androgen induced increased sebum production, inflammation, and bacterial colonization of hair follicles by cutibacterium acnes are the main targets for acne treatment modalities. Acne lesions most frequently occur on the face, chest, and back, and can cause severe inflammation and scarring that often carries negative social stigmata and can lead to impairment of quality of life [1].

Being a cosmetic problem causes psychosocial and emotional distress and affects life's quality due to self-perception of poor health. Current treatment options for this condition target the factors that contribute to pathophysiology of disease and include systemic and topical antimicrobials, retinoids and adjuvanttherapeutic agents like peels⁴. Although retinoids and antimicrobials are considered the mainstay anti acne management, the other relatively newer adjunctive treatment options i.e. laser, chemical peels and photodynamic therapies are rising day by day because of emergence of drug resistance, side effect profiles, patients satisfaction and better efficacy [2].

Chemical peel was used way back during the Egyptian days. It acts by destroying the outer damaged layers of skin and accelerating its repair process. It is classified into superficial, medium, and deep peel. The level of injury depends on the concentration of the acid, type of vehicle use, contact time, and buffering. Superficial peel (i.e., salicylic acid 30% and Jessner's solution) causes an injury to the epidermis. Superficial peels are generally used to treat acne vulgaris while deep peels are used for acne scarring. Other indications for chemical peel include postinflammatory hyperpigmentation, solar lentigines, melasma, and ephelides [3].

Chemical peeling is a documented option in the treatment of active acne. The mechanism of action lies in causing desquamation by targeting the corneosomes and keratinocytes, enhancing breakdown and decreasing cohesiveness. It also increases epidermal activity of enzymes, leading to epidermolysis and exfoliation and induces improvement of skin texture and pore size and reduces sebum production [4].

Glycolic acid belongs to the group of α -hydroxy acids (acids derived from fruit) and is used as a superficial or medium depth peel in acne treatment. Similar to other α -hydroxy acids, it

leads to a thickened epidermis and dermis with increased collagen and mucopolysaccharide synthesis, and dispersion of melanin. GA has also been shown to decrease inflammation through bactericidal effects on cutibacterium acnes, partially explaining its benefits in both inflammatory and non-inflammatory acne [5].

Jessner's solution (JS) peel is composed of 14 g resorcinol, 14 g salicylic acid, 14 mL of lactic acid, and ethanol quantum satis 100 mL. It is formulated by Dr. Max Jessner to minimize complication from resorcinol, namely contact dermatitis. Apart from minimizing the complication, the combination is meant to enhance the effect as a keratolytic agent. Only a few articles have compared JS with other chemical peels for acne vulgaris, with inconsistent results. To the best of our knowledge, there is none that had described JS efficacy on post acne hyperpigmentation [3].

Salicylic acid peels soften the stratum corneum and cause skin shedding by loosening the intracellular matrix and corneocyte connections which can lead to an improvement in non-inflammatory comedones. SA also inhibits the arachidonic acid cascade leading to a decrease in inflammatory lesions [1].

These chemical properties explain its popularity and success in acne patients. Five to 30% SA is used for superficial peeling in acne therapy. At these concentrations, this peel is safe and self-limited; hence, no neutralizing agents are required [6].

This study aimed to compare the efficacy and adverse effects between buffered glycolic acid 50% +0.5% salicylic acid solution versus jessner's solution in treatment of mild and moderate acne vulgaris.

Methods:

Pre operational:

- ◆ A medical consent was taken from all patients in this study and from parents of young patients after explaining to them all details about the nature of the study.
- ◆ A proper history was taken.
- ◆ A dermatological examination had been done for all.
- ◆ Acne severity was assessed as mild ,moderate and severe according to Global Acne Grading System (GAGS) as following:

Factor	Location
2	Forehead
2	Right cheek

2	Left cheek
1	Nose
1	Chin
3	Chest and upper back

Note: Each type of lesion is given a value depending on severity: no lesions = 0, comedones = 1, papules = 2, pustules = 3 and nodules = 4. The score for each area (Local score) is calculated using the formula: Local score = Factor × Grade (0-4). The global score is the sum of local scores, and acne severity was graded using the global score. A score of 1-18 is considered mild; 19-30, moderate; 31-38, severe; and >39, very severe [7].

Operation:

Patient face was cleaned with alcohol pads.

Patient face was divided into left and right treated sides, the left side was treated by buffered 50% glycolic acid (ph 3) + 0.5% salicylic acid solution and the right side was treated by jessner's solution.

- ◆ **At the left side** the chemical peel was applied by cotton tipped applicator as a layer of salicylic acid solution followed by layer of buffered glycolic acid. After two minutes other layers were applied.
- ◆ **At the right side** the chemical peel was applied by cotton tipped applicator as a layer of jessner's solution, after two minutes, another layer was applied.
- ◆ **After 2** minutes, an emollient was used to the whole face to soothe the skin.

Treatment sessions ranged from 2 to 6 sessions with 2 weeks interval.

Follow up:

Before every session and after the end of sessions (maximum 6 sessions) patients were evaluated by using the acne severity index (ASI) and recorded in the data collection list. ASI was calculated as follows:

$$\text{ASI} = (0.25 \times \text{comedones}) + \text{papules} + (2 \times \text{pustules})$$

ASI was calculated at each visit with the above formula. The ASI was proposed 100% in the first visit regardless of the severity of acne lesions and the percentage decrease in the next visits was considered as the recovery percentage. The average of percentages in both groups were obtained and analyzed. The followings were considered: Improved more than 75% = excellent, improved

50–75% = good response, improved 25–50% = moderate response, and improved <25% = poor response [8].

During sessions, side effects was recorded as erythema, inflammation, burn and post inflammatory hyperpigmentation.

Patient satisfaction also was recorded at the end of the treatment time as satisfied or not satisfied.

Post operational:

Daily emollients and sunscreen with SPF 30 or higher were requested after the procedure for 3 months.

Statistical Analysis

All data were collected, tabulated and statistically analyzed using SPSS 20.0 for windows (SPSS Inc., Chicago, IL, USA2011). Quantitative data were expressed as the mean \pm SD & (range), and qualitative data were expressed as number & (percentage). Percent of categorical variables were compared using Chi-square test or fisher exact test when appropriate. All tests were two sided. P-value < 0.05 was considered statistically significant (S), and p-value \geq 0.05 was considered statistically insignificant (NS).

Results

Mean age of studied group was 20.04 years with range (15-30) years and 87.5% of studied group was females and 12.5% males with female to male ratio (7:1) (Table (1) (Fig. 1)

Table (1): Demographic of studied group (n.24):

Variables		
Age per years		
Mean \pm SD		20.04 \pm 3.2
(range)		15-30
Sex (no %)		
Females	21	87.5
Males	3	12.5
Females/ males ratio		7:1

Results showed that that 54.2%, of acne lesion excellent improvement and 25.0% good improvement after Buffered 50% glycolic acid and 0.5% salicylic acid treated side compared to 41.7% ,16.7% respectively of Jessner's solution treated side the difference statistically

insignificant $p > 0.05$. While 16.7% , of acne lesion moderate improvement and 4.1% poor improvement after Buffered 50% glycolic acid and 0.5% salicylic acid treated side compared to 20.8% ,20.8% respectively of Jessner's solution treated side the difference statistically insignificant $p > 0.05$ (Table 2).

Table (2): Comparison improvement of acne lesion after Buffered 50% glycolic acid and 0.5% salicylic acid treated side compared to Jessner's solution treated side (n=24):

	Buffered 50% glycolic acid and 0.5% salicylic acid treated side		Jessner's solution treated side		χ^2	p-value
	n.	%	n.	%		
Effect of treatment						
Excellent improvement	13	54.2	10	41.7	0.75	0.38
Good improvement	6	25.0	4	16.7	0.5	0.48
moderate improvement	4	16.7	5	20.8	f	0.99
Poor improvement	1	4.1	5	20.8	f	0.18
χ^2 Chi square test f= Fisher exact test $p > 0.05$ in significant						

Results clarified that t, there was statistically insignificant difference between improvement of acne lesion treated with Buffered 50% glycolic acid and 0.5% salicylic acid therapy side and demographic, clinical parameters of studied patients $p > 0.05$ (Table 3).

Table (3): Relation between improvements of acne lesion treated with Buffered 50% glycolic acid + 0.5% salicylic acid and demographic data and clinical parameters of studied patients (n.24).

Variables	Buffered 50% glycolic acid and 0.5% salicylic acid therapy side				n	f p-value
	Excellent / good improvement		moderate/ poor improvement			
Age per years						
<20 years	7	63.6	4	36.4	11	0.14

≥20 years	12	92.3	1	7.7	13	
Sex						
Females	17	81.0	4	19.0	21	0.52
Males	2	66.7	1	33.3	3	
Skin type						
II	1	100.0	0	.0	1	$\chi^2=3.8$
III	12	92.3	1	7.7	13	0.15
IV	6	60.0	4	40.0	10	
Acne degree						
Mild	10	90.9	1	9.1	11	0.33
moderate	9	69.2	4	30.8	13	
Session						
2-3 session	9	64.3	5	35.7	14	0.053
4-6 session	10	100.0	0	.0	10	
Side effect of treatment						
Yes	5	71.4	2	28.6	7	0.61
No	14	82.4	3	17.6	17	

χ^2 Chi square test f= Fisher exact test $p>0.05$ insignificant

Results showed that 66.7 % of patients had good level of satisfaction, whereas 33.3% of patients had poor level of satisfaction (Table 4).

Table (4): Patients satisfaction from acne treatment (n.24).

Satisfaction level	n.	%
satisfied	16	66.7
not satied	8	33.3

Results showed that there was statistically significant difference of total number of complications of Buffered 50% glycolic acid and 0.5% salicylic acid treated side compared to Jessner's solution treated side $p < 0.05$ (Table 5).

Table (5): Side effects frequency after Buffered 50% glycolic acid and 0.5% salicylic acid treated side compared to Jessner's solution treated side (n=24):

	Buffered 50% glycolic acid and 0.5% salicylic acid treated side		Jessner's solution treated side		χ^2	p-value
	n.	%	n.	%		
Erythema	1	4.1	5	20.8	f	0.18
Inflammation	1	4.1	2	8.3	f	0.99
Burn	0	0	2	8.3	f	0.49
PIH	0	0	2	8.3	f	0.49
Total number of side effects						
Yes	2	8.4	11	45.8	8.5	0.003(S)
No	22	91.6	13	54.2		
χ^2 Chi square test f= Fisher exact test (S) $p < 0.05$ significant						

Figure (1): Female patient, 20 years old, with moderate degree acne vulgaris, treated by jessner's solution, showing excellent improvement.

Discussion

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. The appropriate peel is chosen based on the patient's skin type, acne activity, and type of acne scars.

Combination peels minimize side effects. In acne scars, chemical peels may be combined with other procedures to achieve better clinical results.

A series of chemical peels can lead to significant improvement over a short period, leading to patient satisfaction and maintenance of clinical results [9].

Our study was conducted to evaluate the efficacy and safety of buffered glycolic acid 50% + 0.5% salicylic acid solution in the treatment of mild to moderate inflammatory acne vulgaris and comparing it with jessner's solution.

In this study we included 30 patients with mild and moderate degree acne vulgaris, the total number of patients who underwent the study were 24 as 6 patients didn't complete the course of treatment and were excluded from the results. This may be related to poor patient compliance as some of them was living far away from the hospital. Seven patients showed frosting after applying only one layer of jessner's solution, so in those patients another layer was not applied.

The mean age of studied group in our study up was 20.04 years with range (15-30) years, this was in agreement with **Bagatin et al.** who revealed that the odds of severe acne are higher in older teenagers compared to younger teenagers or preteens, as sebum production increases during puberty, older teenagers tend to have higher sebum production compared to younger teenagers. 87.5% of studied group was females and 12.5% males with female to male ratio (7:1)[10]. This is in agreement with previous reviews that reported that the prevalence of acne is higher in females than males [11].

Our results revealed that 54.2% of acne lesions showed excellent improvement, 25.0% good improvement, 16.7% showed moderate improvement and 4.1% showed poor improvement after treatment by Buffered 50% glycolic acid and 0.5% salicylic acid solution.

In Jae et al. studied 20 patients with mild and moderate degree acne vulgaris treated by buffered glycolic acid 50% in combination with 0.5 % salicylic acid solution in one side of patients' faces found that 35% of patients had mild improvement and 25% had moderate improvement and 0% had marked and near total improvement so that 40% didn't have any improvement. When comparing this results with our results, was found that our results are better may be due to higher treatment sessions up to 6 sessions in some patients in comparison to 2 fixed sessions for all patients in the other study or due to racial differences [12].

Wiegmann, and Haddad. in a recent study examined the efficacy of a wake up serum that consist of glycolic acid and salicylic acid in 66 patients who applied the serum at night for two weeks and found that Over 90% of the patients reported they had significant overall

improvement in acne with decrease in comedonal and cystic acne. 70%-80% of the patients stated decrease in oiliness, even texture, and smoother looking skin. Their results is in agreement of our result but better than ours may be due to method of application as they used serum form daily for 2 weeks which lead to better results [13].

We found that 54.2% of acne lesion showed excellent improvement and 25.0% good improvement after Buffered 50% glycolic acid and 0.5% salicylic acid treated side compared to side compared to 41.7% ,16.7% respectively of Jessner's solution treated side the difference statistically insignificant $p>0.05$. While 16.7% , of acne lesion moderate improvement and 4.1% poor improvement after Buffered 50% glycolic acid and 0.5% salicylic acid treated side compared to 20.8% ,20.8% respectively of Jessner's solution treated side the difference statistically insignificant $p>0.05$.

In Jae et al. in the same study mentioned before ,treated 20 patients with jessner's solution peeling in another half of their faces found that 40% had mild improvement , 20% had moderate improvement , 5% had marked improvement and 35% didn't have any improvement [12].our results are better may be due to higher treatment sessions up to 6 sessions in some patients in comparison to 2 fixed sessions for all patients in the other study or due to racial differences.

In agreement with our study **Bae et al.** studied 13 korean men patients to compare therapeutic efficacy and tolerability of jessner's solution and 30% salicylic acid in treatment of acne vulgaris, Jessner's solution was applied to one side of each patient's face and 30% salicylic acid to the other side in three sessions at 2 week intervals. At the end of the study, results showed good improvement in eight patients (61.5%) for Jessner's solution peels, moderate improvement in two patients (15.4%), mild improvement in one patient (7.7%) and no improvement or worsening in two patients (15.4%) [14].

How et al. studied 36 patients comparing jessner's solution with salicylic acid 30% in the treatment of mild and moderate acne vulgaris found that A total of 13 subjects (38.2%) in the JS arm reported very good outcome, and 13 subjects (38.2%) reported good outcome. Six (17.6%) subjects reported no improvement, whereas only two (5.9%) subjects felt that their acne became worse toward the end of the study. As for the SA arm, 13 (38.2%) reported very good outcome, whereas 16 (47.1%) reported good outcome. Five subjects (14.7%) claimed their acne remained the same toward the end of treatment. No worsening outcome was reported in the SA arm [3].

Nofal et al. concluded that combination peels are safe, effective, and superior to a single peel in the treatment of mild-to-moderate acne vulgaris in skin types III and IV. They achieved a high therapeutic response with a reasonable cost that is maintained for a relatively long periods; thus, patients could avoid the use of systemic antibiotics and adjuvant topical therapy that necessitate high Patients' compliance [4]. This conclusion is in agreement with our

study as using combined peel with buffered GA 50% and SA 0.5 % showed good results and minimal adverse effects.

Regarding patients' satisfaction in this study we found that 66.7 % of patients were satisfied from our treatment, while 33.3% were not satisfied. In comparison with a study by **Rendon et al.** who found that patients' satisfaction in OTC treatments containing BP and SA which were the most frequently used acne treatment during their study , fewer than half were satisfied with their treatment (OTC BP, 47.0% and OTC SA, 43.0%) [15]. In comparison with that study we had better satisfaction percentage from our treatment.

Regarding to adverse effects of treatment with jessner's solution in our study ,there is 5 patients complained of erythema which persist few days, 2 patients complained of inflammation in the form of redness , hotness ,edema and swelling ,while 2 patients exposed to burn in the form of small vesicles end to dark ,thick eschar that later on exfoliate, 2 patients developed pih .

How et al. studied 36 patients comparing jessner's solution with salicylic acid 30% in treatment of mild and moderate acne vulgaris found that burning and stinging most common adverse effects reported were burning and stinging immediately after application of both chemical peels, which were reported after almost all treatments [3].

Exfoliation was the second commonest adverse effect reported. Forty-five (44.1%) subjects had exfoliation in the JS arm, compared to 37 (36.3%) subjects from the SA arm. Majority (35, 77.8%) of the exfoliation in the JS arm was rated as mild and only three (6.7%) reported as severe. Twenty-six (70.2%) subjects who received SA reported mild exfoliation, whereas only two (5.4%) reported severe exfoliation. All the exfoliation resolved within 3–7 days.and Acneiform eruption was the third commonest adverse event.

Ilknur et al. in their study of 24 patients received 12 serial peels (GA and AFA, at concentrations from the lowest to the highest) on the two halves of the face at 2-week intervals for 6 months, found that during the peeling sessions, not in all concentrations but at least in one concentration, of the 24 patients, all had erythema, 22 had edema and seven had frosting with GA [16]. There is a disagreement with our study as there is minimal adverse effects that may be due to buffered form of GA .

Anwar et al. studied 60 patients using glycolic acid peeling 10 % weekly for 6 weeks and found that, Glycolic acid has been found to be safe and cost effective treatment even in 10% strength without prior priming and without any post treatment sequela like hyper pigmentation, frosting or burning [2].

Conclusion: Based on our findings, it can be proposed that using buffered glycolic acid 50% and salicylic acid in treatment of mild to moderate degree acne vulgaris is more effective with less adverse effects than using jessner's solution.

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