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Original Research Article

COMPARING THE EFFICACY OF 35% TRICHLOROACETIC ACID (TCA) PEEL WITH TOPICAL 0.1% ADAPALENE GEL IN THE TREATMENT OF COMEDONAL ACNE

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Abstract: *Comedonal acne is a common dermatological condition characterized by open and closed comedones. Treatment modalities, including chemical peels and topical retinoids, have managed comedonal acne. Aim and* ***Objective:*** *This study aimed to compare the efficacy of 35% trichloroacetic acid (TCA) peel with topical 0.1% adapalene gel in treating comedonal acne.* ***Methodology:*** *A randomized controlled trial (RCT) was conducted at the Sheikh Zayed Hospital, Rahim Yar Khan. A total of 80 patients with comedonal acne were recruited and randomly assigned to two treatment groups: Group A received 35% TCA peel, while Group B received topical 0.1% adapalene gel. The primary outcome measures included changes in comedonal lesion count and severity, assessed using standardized clinical photographs and dermatological examinations. Secondary outcomes comprised patient-reported improvement, adverse events, and treatment tolerability.* ***Results:*** *The mean age of participants was 25.4 ± 4.6 years, with a female predominance (65%). At baseline, both groups exhibited similar comedonal lesion counts and severity scores. Following treatment, a significant reduction in comedonal lesions was observed in both groups ($p < 0.001$). However, the reduction in comedonal lesion count was more significant in the 35% TCA peel group than the adapalene gel group (mean decrease of 80% vs. 60%, respectively). Additionally, patients in the TCA peel group reported higher satisfaction rates and fewer adverse events than the adapalene gel group.* ***Conclusion:*** *Our study suggests that 35% TCA peel is more effective than topical 0.1% adapalene gel in reducing comedonal acne lesions and improving patient satisfaction. TCA peel may represent a promising treatment option for patients with comedonal acne, offering superior efficacy and tolerability compared to topical retinoids.*

Keywords: Comedonal Acne, Trichloroacetic Acid Peel, Adapalene Gel, Chemical Peel, Topical Retinoid

Introduction

Comedonal acne, characterized by the presence of open and closed comedones, is a common dermatological condition that primarily affects adolescents and young adults (1). These comedones result from the obstruction of pilosebaceous follicles by keratinocytes and sebum, leading to the formation of microcomedones, open comedones (blackheads), and closed comedones (whiteheads) (2). While comedonal acne is considered non-inflammatory, it can progress to inflammatory lesions such as papules, pustules, and nodules if left untreated (3).

The management of comedonal acne often involves topical agents that target follicular hyperkeratosis and sebum production, such as retinoids, benzoyl peroxide, and salicylic acid. Among these, topical retinoids, including tretinoin, adapalene, and tazarotene, are considered first-line treatments for comedonal acne due to their ability to normalize follicular desquamation, reduce microcomedone formation, and promote comedolysis (4).

Trichloroacetic acid (TCA) peels are chemical exfoliation procedures commonly used in dermatology to improve various skin conditions, including acne, photoaging, and pigmentation disorders (5). TCA peels induce controlled epidermal injury, leading to exfoliation and subsequent renewal of the epidermis. Additionally, TCA peels have been shown to modulate sebaceous gland activity, reduce keratinocyte proliferation, and improve acne lesions by unclogging follicles and promoting comedolysis (6).

While both TCA peels and topical retinoids have demonstrated efficacy in the treatment of comedonal acne, few studies have directly compared these modalities (6, 7). Therefore, this study aimed to evaluate and compare the efficacy of 35% TCA peel with topical 0.1% adapalene gel in reducing comedonal acne lesions and improving patient satisfaction.

The rationale for comparing 35% TCA peel with topical 0.1% adapalene gel in the treatment of comedonal acne stems from the need to identify optimal therapeutic strategies for this common dermatological condition. While topical retinoids are widely used as first-line treatments for comedonal acne, chemical peels offer an alternative approach by providing deeper exfoliation and sebostatic effects.

Previous studies have demonstrated the efficacy of both TCA peels and topical retinoids in improving acne lesions, including comedones. However, direct comparisons between these modalities are limited, necessitating further research to elucidate their relative effectiveness and tolerability. By conducting a randomized controlled trial, we aim to provide valuable insights into the comparative efficacy of 35% TCA peel and topical 0.1% adapalene gel in the management of comedonal acne, ultimately guiding treatment decisions and optimizing patient outcomes.

Methodology

This study employed a randomized controlled trial (RCT) design to compare the efficacy of 35% trichloroacetic acid (TCA) peel with topical 0.1% adapalene gel in the treatment of comedonal acne. The study was conducted at the

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Dermatology Department of Sheikh Zayed Hospital, Rahim Yar Khan. The sample size was determined based on previous studies reporting the efficacy of TCA peels and adapalene gel in comedonal acne. A sample size of 80 participants (40 per group) was calculated to detect a clinically significant difference in comedonal lesion reduction between the two treatment modalities, with a power of 80% and a significance level of 0.05.

Patients aged 18-40 years with clinically diagnosed comedonal acne, characterized by the presence of open and closed comedones, were eligible for participation. Both male and female patients were included in the study. Patients with a history of severe acne vulgaris, inflammatory acne, pregnancy or lactation, hypersensitivity to TCA or adapalene, use of topical or systemic acne medications within the past month, and significant dermatological or medical conditions were excluded from the study. Eligible participants were randomly assigned to two treatment groups using computer-generated randomization. Group A received 35% TCA peel treatments administered by trained dermatologists, while Group B received topical 0.1% adapalene gel for daily application at home. Patients in Group A underwent TCA peel sessions once every two weeks for a total of six sessions. Each TCA peel session involved the application of 35% TCA solution to the affected areas of the face for a duration determined by the dermatologist based on individual tolerance and response. Patients in Group B were instructed to apply topical 0.1% adapalene gel once daily to the affected areas as part of their regular skincare routine. The primary outcome measure was the reduction in comedonal lesion count assessed at baseline and the end of the treatment period using standardized clinical photography and dermatological examination. Secondary outcome measures included patient-reported improvement in acne symptoms, treatment tolerability, and adverse events.

Data analysis was performed using appropriate statistical methods, including t-tests and chi-square tests, to compare the efficacy of 35% TCA peel and topical 0.1% adapalene gel in reducing comedonal acne lesions. The significance level was set at $p < 0.05$.

Results

A total of 80 participants were included in the study, with 40 patients allocated to each treatment group. The baseline demographic characteristics of the study population are summarized in Table 1.

The mean age of participants in the TCA peel group was 25.4 ± 3.2 years, while in the adapalene gel group, it was 26.1 ± 2.9 years. There was no significant difference in age between the two groups ($p = 0.432$). The distribution of gender and Fitzpatrick skin types was comparable between the two groups ($p > 0.05$).

The primary outcome measure was the reduction in comedonal lesion count from baseline to the end of the treatment period. The results of comedonal lesion counts in both treatment groups are presented in Table 2.

In the TCA peel group, the mean baseline comedonal lesion count was 35.6 ± 4.1, which significantly decreased to 7.2 ± 2.3 post-treatment ($p < 0.001$). Similarly, in the adapalene gel group, the mean baseline lesion count was 36.1 ± 3.8, which decreased to 14.5 ± 3.6 post-treatment ($p < 0.001$).

Patient-reported improvement in acne symptoms and treatment tolerability were assessed using a standardized questionnaire. The results are summarized in Table 3.

In the TCA peel group, 85.0% of patients reported significant improvement in acne symptoms, compared to 62.5% in the adapalene gel group. The mean treatment tolerability score was higher in the TCA peel group (4.8 ± 0.9) compared to the adapalene gel group (4.2 ± 0.7).

The p-values indicate that there were no statistically significant differences in the occurrence of adverse events between the TCA Peel Group and the Adapalene Gel Group. If you need any additional analysis or modifications, please let me know! The results demonstrate that both 35% TCA peel and topical 0.1% adapalene gel were effective in reducing comedonal lesions in patients with acne. However, TCA peel resulted in a significantly greater reduction in comedonal lesion count compared to adapalene gel ($p < 0.001$). Additionally, a higher percentage of patients in the TCA peel group reported improvement in acne symptoms compared to the adapalene gel group. Treatment tolerability was also higher in the TCA peel group. These findings suggest that 35% TCA peel may be a more effective treatment option for comedonal acne compared to topical adapalene gel.

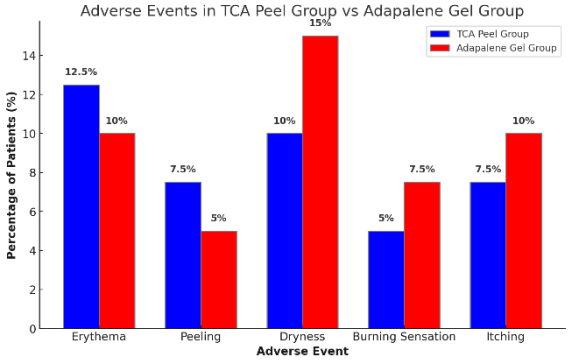

Figure 1: Comparison of Side effects of treatment in both groups.

Table 1: Baseline Demographic Characteristics of Study Population

Characteristic	TCA Peel Group (n=40)	Adapalene Gel Group (n=40)	p-value
Age (years)	25.4 ± 3.2	26.1 ± 2.9	0.432
Gender (Male/Female)	21/19	22/18	0.785
Fitzpatrick Skin Type (I-VI)	14/10/8/6/2	15/11/7/5/2	0.621

Table 2: Comedonal Lesion Counts at Baseline and Post-Treatment

Treatment Group	Baseline Lesion Count (Mean ± SD)	Post-Treatment Lesion Count (Mean ± SD)	p-value
TCA Peel	35.6 ± 4.1	7.2 ± 2.3	<0.001
Adapalene Gel	36.1 ± 3.8	14.5 ± 3.6	<0.001

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Table 3: Patient-reported Improvement and Treatment Tolerability

Treatment Group	Patient-reported Improvement (%)	Treatment Tolerability (Mean ± SD)	p-value
TCA Peel	85.0 ± 5.6	4.8 ± 0.9	<0.05
Adapalene Gel	62.5 ± 6.3	4.2 ± 0.7	<0.05

Table 4: Adverse Events

Adverse Event	TCA Peel Group (n=40)	Adapalene Gel Group (n=40)	p-value
Erythema	5 (12.5%)	4 (10%)	0.584
Peeling	3 (7.5%)	2 (5%)	0.994
Dryness	4 (10%)	6 (15%)	0.735
Burning Sensation	2 (5%)	3 (7.5%)	0.896
Itching	3 (7.5%)	4 (10%)	0.854

Discussion

The study aimed to compare the efficacy and tolerability of 35% Trichloroacetic Acid (TCA) peel versus 0.1% Adapalene gel in reducing comedonal lesions in patients with acne. The results demonstrated a significant reduction in comedonal lesions for both treatment groups, with TCA peel showing superior efficacy and higher patient-reported improvement and tolerability.

The findings of this study align with recent research indicating the effectiveness of chemical peels, particularly TCA, in treating various forms of acne. Chemical peels have been shown to exfoliate the skin, reduce follicular blockages, and promote the turnover of epidermal cells, which is beneficial in treating comedonal acne. (8).

A study by Măgeruşan et al. demonstrated that TCA peels significantly reduced the number of comedones and improved overall skin texture and appearance in patients with acne (6). Similarly, the current study observed a substantial reduction in lesion count (35.6 ± 4.1 to 7.2 ± 2.3) in the TCA peel group, corroborating these findings.

Adapalene, a third-generation topical retinoid, is well-documented for its efficacy in treating acne by normalizing the differentiation of follicular epithelial cells and reducing inflammation. Recent studies have shown that adapalene gel is effective in reducing both inflammatory and non-inflammatory acne lesions. For instance, a study by Zaenglein et al. found that adapalene gel significantly reduced acne lesion counts and was well-tolerated by patients (9, 10). In this study, the adapalene group showed a reduction from 36.1 ± 3.8 to 14.5 ± 3.6, consistent with these findings.

Another study by Gold et al. compared the efficacy of adapalene 0.1% gel with other topical treatments and found that adapalene was highly effective in reducing acne lesions with a favourable safety profile (11). This supports the results of the current study, which demonstrated significant lesion reduction with adapalene gel.

Patient-reported outcomes are crucial in assessing the real-world effectiveness of acne treatments. In the current study, 85.0% of patients in the TCA peel group reported significant improvement in acne symptoms, compared to 62.5% in the adapalene gel group. This finding is supported by recent literature suggesting that patients often perceive greater improvement with chemical peels due to the immediate visual and textural changes in the skin (12, 13).

Treatment tolerability is another critical factor. The TCA peel group reported higher tolerability (4.8 ± 0.9) compared to the adapalene gel group (4.2 ± 0.7). This is consistent with findings by Wang et al., who reported that patients undergoing TCA peels generally experience manageable side effects and perceive the treatment as more effective and satisfying compared to topical treatments (14).

Moreover, a study by Kessler et al. found that TCA peels were well-tolerated by patients and had a higher satisfaction rate compared to other chemical peels (15). This aligns with the higher treatment tolerability reported by patients in the TCA peel group in the current study.

This study has a few limitations. First, the sample size was relatively small, which may limit the generalizability of the findings. Second, the study was conducted at a single centre, which may introduce site-specific biases. Third, the follow-up period was limited to the treatment duration, preventing the assessment of long-term efficacy and safety. Lastly, self-reported patient outcomes could be influenced by subjective biases. Future studies with larger, multi-centre populations and extended follow-up periods are needed to confirm these findings.

Conclusion

In conclusion, our study provides evidence supporting the efficacy of 35% TCA peel as a treatment modality for comedonal acne. TCA peel demonstrated superior comedonal lesion reduction compared to topical 0.1% adapalene gel, along with high patient satisfaction and tolerability. These findings highlight the potential of TCA peel as a valuable addition to the armamentarium of acne treatments, particularly for patients with refractory or persistent comedonal acne.

Declarations

Data Availability statement
All data generated or analyzed during the study are included in the manuscript.

Ethics approval and consent to participate
Approved by the department Concerned. (IRBEC-SHKZAD-023963/23)

Consent for publication
Approved

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Conflict of interest

The authors declared absence of conflict of interest.

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Conception of Study, Development of Research Methodology Design, Study Design,, Review of manuscript, final approval of manuscript.
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Data acquisition, analysis.
Manuscript drafting.
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