

EFFICACY OF SALICYLIC ACID–MANDELIC ACID PEEL VERSUS ACETIC ACID PEEL IN THE TREATMENT OF ACNE VULGARIS: A SPLIT-FACE COMPARATIVE STUDY

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ABSTRACT

Background: Acne vulgaris is a chronic inflammatory disorder of the pilosebaceous unit that commonly affects adolescents and adults, often resulting in post-inflammatory hyperpigmentation, scarring, and significant psychosocial distress. Chemical peels have emerged as effective adjunctive treatment modalities because of their keratolytic, comedolytic, anti-inflammatory, and sebostatic properties. Among the available agents, the combination of salicylic acid and mandelic acid (SAMA peel) and acetic acid-based Black peel are widely used; however, comparative evidence regarding their efficacy and safety remains limited.

Aim and Objectives: To compare the efficacy and safety of 20% salicylic acid–mandelic acid (SAMA) peel versus 8% acetic acid (Black peel) in the treatment of mild to severe acne vulgaris.

Materials and Methods: A prospective observational split-face comparative study was conducted on 30 patients with mild to severe acne vulgaris from March 2023 to December 2023 at a tertiary care hospital. SAMA peel was applied to the right side of the face, while Black peel was applied to the left side at 15-day intervals for six sessions. Patients were evaluated over 12 weeks using the Michaelson Acne Score (MAS), adverse effects, and patient satisfaction. Statistical analysis was performed using SPSS version 22.0.

Results: Among the 30 participants, females predominated (24/30), and Grade II acne was the most common presentation (23/30). Oily skin (26 patients) and stress (21 patients) were the most frequent associated risk factors. The mean MAS decreased from 37.3 to 9.2 on the SAMA-treated side and from 34.2 to 7.7 on the Black peel-treated side after 12 weeks. Most patients were satisfied with both treatments, with no participant reporting dissatisfaction. SAMA peel was associated with more dryness (6 vs. 2), erythema (4 vs. 0), and burning (2 vs. 0), whereas irritation occurred equally in both groups (1 each).

Conclusion: Both SAMA peel and Black peel were effective and well-tolerated treatment modalities for mild to severe acne vulgaris. While both demonstrated significant clinical improvement and high patient satisfaction, Black peel showed a comparatively better safety profile with fewer treatment-related adverse effects, making it a promising alternative for the management of acne vulgaris.

Keywords: Acne vulgaris, Chemical peel, Salicylic acid, Mandelic acid, SAMA peel, Black peel, Acetic acid peel, Michaelson Acne Score, Split-face study, Acne treatment.

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INTRODUCTION

Acne vulgaris is one of the most common chronic inflammatory disorders of the pilosebaceous unit, characterized by the development of comedones, papules, pustules, nodules, cysts, and, in severe cases, permanent scarring (1). It results from a complex interplay of increased sebum production, follicular hyperkeratinization, colonization by *Cutibacterium acnes*, and inflammatory mediators (2). Although acne is not a life-threatening disease, it has a substantial impact on quality of life, self-esteem, and psychosocial well-being, particularly among adolescents and young adults (3). Persistent acne lesions and post-acne sequelae, including

hyperpigmentation and scarring, often lead to anxiety, depression, and social withdrawal, emphasizing the need for safe and effective treatment strategies (4).

Management of acne vulgaris includes topical retinoids, benzoyl peroxide, antibiotics, hormonal therapy, isotretinoin, and various procedural interventions. However, prolonged use of topical and systemic medications may be associated with adverse effects, poor patient compliance, and the emergence of antimicrobial resistance (5). Consequently, chemical peeling has become an important adjunctive therapeutic modality for acne management because it provides rapid clinical improvement, enhances patient satisfaction, and

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minimizes dependence on long-term pharmacological therapy (6). Chemical peels act by inducing controlled exfoliation of the epidermis, promoting desquamation, accelerating epidermal turnover, reducing follicular obstruction, and improving skin texture (7). They also facilitate the removal of comedonal plugs, decrease sebum accumulation, reduce microbial colonization, and stimulate dermal remodeling. These mechanisms contribute not only to the reduction of active acne lesions but also to the improvement of post-inflammatory hyperpigmentation and superficial acne scars (1). Owing to their relatively simple application, cost-effectiveness, and favorable safety profile, superficial chemical peels are increasingly used in dermatological practice (6).

Salicylic acid is a lipophilic beta-hydroxy acid with excellent comedolytic, keratolytic, anti-inflammatory, and sebostatic properties. Its lipid solubility enables deeper penetration into sebaceous follicles, making it particularly effective in patients with oily skin and inflammatory acne (8). Mandelic acid, an aromatic alpha-hydroxy acid derived from bitter almonds, penetrates the skin more gradually because of its larger molecular size, resulting in uniform exfoliation with reduced irritation (9). It possesses antibacterial activity and is considered suitable for sensitive skin and individuals with darker skin types due to its lower risk of post-inflammatory hyperpigmentation (10). The combination of salicylic acid and mandelic acid (SAMA peel) integrates the complementary advantages of both agents, offering effective lesion reduction while maintaining good tolerability (11). Black peel, an acetic acid-based combination peel, is a relatively newer chemical peeling formulation containing black acetic acid, citric acid, lactic acid, salicylic acid, potassium iodide, and biosulfur (12). This formulation combines keratolytic, antibacterial, anti-inflammatory, and seboregulatory effects that target multiple pathogenic mechanisms involved in acne vulgaris (13). Potassium iodide assists in dissolving sebaceous material within acne lesions, while biosulfur contributes antimicrobial activity and regulation of sebaceous gland function. Together, these constituents provide a multimodal approach to acne treatment with minimal downtime (14).

Despite the increasing use of both SAMA peel and Black peel in clinical practice, direct comparative evidence regarding their efficacy and safety remains limited. A split-face comparative design provides an effective method of minimizing inter-individual variability by allowing each patient to serve as their own control (12). Therefore, the present study was undertaken to compare the efficacy and safety of 20% salicylic acid and mandelic acid peel with 8% acetic acid (Black peel) in the treatment of mild to severe acne vulgaris. The findings are expected to

provide valuable evidence to guide clinicians in selecting an appropriate chemical peeling agent that offers optimal therapeutic outcomes with minimal adverse effects and improved patient satisfaction.

AIMS AND OBJECTIVES

Aim

To compare the efficacy and safety of 20% salicylic acid–mandelic acid peel (SAMA peel) versus 8% acetic acid peel (Black peel) in the treatment of mild to severe acne vulgaris.

Objective

- To compare the clinical efficacy of 20% salicylic acid–mandelic acid peel (SAMA peel) and 8% acetic acid peel (Black peel) in reducing acne lesions in patients with mild to severe acne vulgaris.
- To compare the safety profiles of the two peels by assessing treatment-related adverse effects.
- To evaluate patient satisfaction following treatment with both peeling agents.

MATERIALS AND METHODS

This prospective observational split-face comparative study was conducted in a tertiary care hospital from March 2023 to December 2023. A total of 30 patients with mild to severe acne vulgaris who fulfilled the eligibility criteria were enrolled after obtaining written informed consent. A detailed clinical history and dermatological examination were performed for every participant to evaluate skin type, acne lesions, post-acne hyperpigmentation, and acne scars. Acne severity was graded using the Khunger and Kumar grading system. Before initiating treatment, a pre-peel sensitivity test was carried out by applying the peeling agent over a 1×1 cm area in the right retroauricular region to exclude any hypersensitivity reaction.

A split-face protocol was followed in which 20% salicylic acid–mandelic acid (SAMA) peel was applied to the right half of the face, while 8% acetic acid (Black peel) was applied to the left half. Prior to application, the face was cleansed with spirit and degreased with acetone. The endpoint for SAMA peel application was the appearance of pseudofrost or cessation of the transient stinging sensation, whereas the Black peel was left in place for 10 minutes before completion of the procedure. All participants underwent six treatment sessions at 2-week intervals, followed by a final evaluation at the 12th week. A post-peel moisturizer and sunscreen were prescribed after each session. Treatment efficacy was assessed by acne lesion counts at baseline and during each follow-up visit, while adverse effects including erythema, burning, dryness, and irritation, as well as patient satisfaction, were recorded throughout the study.

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The inclusion criteria comprised patients with mild to severe acne vulgaris who had not received any topical or systemic acne treatment during the preceding two months. Patients with very severe acne vulgaris, those receiving systemic retinoids within the previous six months, individuals with herpes simplex infection, impetigo, fungal infection of the face, or known hypersensitivity to any peel constituent were excluded. Statistical analysis was performed using SPSS version 22.0. Qualitative variables were expressed as frequencies and percentages, whereas quantitative variables were presented as mean $\pm$ standard deviation. The Chi-square test was used to compare qualitative variables, and the paired t-test was applied to compare mean values before and after treatment. A p-value of <0.05 was considered statistically significant.

RESULTS

Table 1. Baseline Demographic and Clinical Characteristics of the Study Participants (n = 30)

Variable	Category	Number (n)
Gender	Male	6
	Female	24
Age (years)	10–19	0
	20–29	6
	30–39	16
	40–49	5
	>50	3
Acne Grade	Grade 1	3
	Grade 2	23
	Grade 3	4

In the present study, a total of 30 participants with acne vulgaris were included. Among them, 6 participants were male and 24 were female. With respect to age distribution, no participant belonged to the 10–19 years age group, 6 participants were in the 20–29 years age group, 16 participants were in the 30–39 years age group, 5 participants were in the 40–49 years age group, and 3 participants were older than 50 years. Based on acne grading, 3 participants had Grade 1 acne, 23 participants had Grade 2 acne, and 4 participants had Grade 3 acne.

Table 2. Distribution of Risk Factors Among Study Participants

Risk Factor	Number (n)
Oily face	26
Obesity	4

Seborrheic dermatitis of scalp	17
Steroid abuse	4
Family history	13
Stress	21
Consumption of food with high glycemic index	19

In the present study, oily face was the most common risk factor and was observed in 26 participants. Stress was present in 21 participants, while consumption of food with a high glycemic index was reported in 19 participants. Seborrheic dermatitis of the scalp was noted in 17 participants, and a positive family history of acne was present in 13 participants. Obesity and steroid abuse were each reported in 4 participants.

Table 3. Comparison of Michaelson Acne Score (MAS) Between SAMA Peel and Black Peel

MAS Score	SAMA Peel	Black Peel	P value
At presentation	37.3	34.2	0.003
At 12th week	9.2	7.7	—
Reduction in MAS	28.1	26.5	—

In the present study, the mean Michaelson Acne Score (MAS) at presentation was 37.3 for the SAMA peel-treated side and 34.2 for the Black peel-treated side, with a p-value of 0.003. At the 12th week, the mean MAS decreased to 9.2 in the SAMA peel group and 7.7 in the Black peel group. The reduction in MAS was 28.1 in the SAMA peel group and 26.5 in the Black peel group.

Table 4. Patient Satisfaction Score Following Treatment

Satisfaction Score	SAMA Peel (Right Side)	Black Peel (Left Side)
Very satisfied	6	7
Satisfied	20	19
Not satisfied	0	0

In the present study, following treatment with the SAMA peel on the right side of the face, 6 participants were very satisfied, 20 participants were satisfied, and no participant was not satisfied. Following treatment with the Black peel on the left side of the face, 7 participants were very satisfied, 19 participants were satisfied, and no participant was not satisfied.

Table 5. Comparison of Treatment-Related Side Effects

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Side Effect	SAMA Peel	Black Peel
Dryness	6	2
Erythema	4	0
Burning	2	0
Irritation	1	1

In the present study, dryness was reported in 6 participants treated with the SAMA peel and in 2 participants treated with the Black peel. Erythema was observed in 4 participants in the SAMA peel group and in no participants in the Black peel group. Burning sensation was reported in 2 participants treated with the SAMA peel and in no participants treated with the Black peel. Irritation was observed in 1 participant each in both the SAMA peel and Black peel groups.

DISCUSSION

The present prospective observational split-face comparative study evaluated the efficacy and safety of 20% salicylic acid–mandelic acid (SAMA) peel and 8% acetic acid (Black peel) in the treatment of mild to severe acne vulgaris. The study included 30 patients, with females constituting the majority of the study population. Most participants belonged to the 30–39-year age group, and Grade II acne was the most common clinical presentation. Oily skin, stress, and consumption of a high glycemic index diet were the predominant associated risk factors, highlighting the multifactorial nature of acne vulgaris. These findings are consistent with the current understanding of acne pathogenesis described by Sutaria et al. (2023) and Leung et al. (2021), who emphasized the contribution of excessive sebum production, follicular hyperkeratinization, microbial colonization, and inflammatory mechanisms in the development of acne (1,5).

The primary objective of the present study was to compare the efficacy of SAMA peel and Black peel. The Michaelson Acne Score (MAS) demonstrated a marked reduction following treatment with both peeling agents. The mean MAS decreased from 37.3 to 9.2 on the SAMA-treated side and from 34.2 to 7.7 on the Black peel-treated side after six treatment sessions over 12 weeks, indicating substantial clinical improvement with both modalities. These findings suggest that both peels effectively reduced acne severity, with Black peel showing a lower final Michaelson Acne Score. Nofal et al. (2018) similarly reported that combination chemical peels produced superior improvement in acne lesions by targeting multiple pathogenic mechanisms simultaneously (14). Likewise, Castillo and Keri (2018) concluded that chemical peels are valuable adjunctive therapies for acne vulgaris because they

reduce follicular obstruction, promote epidermal turnover, and improve inflammatory lesions with good patient acceptance (6).

The efficacy observed with the salicylic acid–mandelic acid combination in the present study is supported by Dayal et al. (2020), who compared a 45% mandelic acid peel with a 30% salicylic acid peel in mild-to-moderate acne vulgaris and reported significant clinical improvement with both agents (11). The combination of salicylic acid and mandelic acid used in the present study likely provided complementary keratolytic, comedolytic, antibacterial, and anti-inflammatory effects, contributing to the marked reduction in acne severity. Furthermore, Arif (2015) described salicylic acid as an effective peeling agent because of its lipophilic nature, enabling deeper penetration into sebaceous follicles and effective reduction of inflammatory acne lesions (8).

The favorable performance of Black peel observed in the present study is comparable with the findings of Puri et al. (2024), who compared Black peel with 25% trichloroacetic acid peel in a split-face study and demonstrated that Black peel was an effective and safe treatment for mild-to-moderate acne vulgaris (12). In the present study, Black peel achieved comparable efficacy with fewer adverse effects, suggesting that its combination of acetic acid, salicylic acid, biosulfur, potassium iodide, and other constituents may provide effective acne control while maintaining good tolerability.

Patient satisfaction was high with both treatment modalities, with most participants reporting satisfaction or being very satisfied, and none expressing dissatisfaction. Adverse effects were mild and transient. Dryness, erythema, and burning occurred more frequently on the SAMA-treated side, whereas Black peel showed fewer treatment-related adverse effects, with irritation occurring equally in both groups. These findings agree with Samargandy and Raggio (2023), who stated that superficial chemical peels are generally safe procedures when performed appropriately and are associated mainly with mild, self-limiting adverse effects (7).

Overall, the findings of the present study demonstrate that both SAMA peel and Black peel are effective treatment options for mild to severe acne vulgaris. Although both peels produced significant clinical improvement and excellent patient satisfaction, Black peel exhibited a comparatively better safety profile while maintaining similar therapeutic efficacy. These results support the use of both chemical peels in routine dermatological practice, with Black peel representing a promising alternative because of its favorable balance between efficacy and tolerability.

CONCLUSION

The present study demonstrated that both 20% salicylic acid–mandelic acid (SAMA) peel and 8% acetic acid (Black peel) are effective and well-tolerated treatment modalities for patients with mild to severe acne vulgaris. Both peels produced a substantial reduction in Michaelson Acne Score after six treatment sessions over a 12-week period, indicating significant clinical improvement. Patient satisfaction was high with both treatment modalities, with no participant reporting dissatisfaction. Although SAMA peel was associated with a higher incidence of mild adverse effects such as dryness, erythema, and burning, these reactions were transient and manageable. Black peel demonstrated a comparatively better safety profile with fewer treatment-related side effects while achieving comparable therapeutic efficacy. Overall, the findings suggest that both chemical peels are valuable treatment options for acne vulgaris; however, Black peel may be considered a promising alternative because of its favorable tolerability and comparable effectiveness in improving acne severity and patient satisfaction.

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