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COMPARATIVE EFFICACY OF GLYCOLIC ACID PEEL VERSUS MODIFIED JESSNER PEEL AS AN ADJUVANT TO TOPICAL TRIPLE COMBINATION (HYDROQUINONE, TRETINOIN, FLUOCINOLONE ACETONIDE) THERAPY IN MELASMA

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Abstract

Background: *Melasma is a chronic pigmentation disorder with a significant effect on quality of life. Chemical peels are extensively employed as adjuvants to conventional depigmenting treatments in order to boost efficacy and response to treatment. The current study compares the safety and efficacy of 50% glycolic acid peel vs. modified Jessner peel (14% lactic acid, 14% salicylic acid, 8% citric acid) each employed as adjuvants to triple combination therapy for facial melasma.*

Objective: *To assess and compare the clinical effectiveness, tolerability, patient satisfaction, and recurrence rates of glycolic acid and modified Jessner peels along with topical triple therapy in melasma patients.*

Methods: *This prospective observational cohort study was conducted at the Dermatology Department of CMH Abbottabad from September 2024 to March 2025. A total of 60 patients with facial melasma were enrolled and equally divided into two groups. Group A was treated with 50% glycolic acid peel and Group B with modified Jessner peel, both given every second week for six sessions in combination with daily application of triple combination cream (hydroquinone 4%, tretinoin 0.05%, and fluocinolone acetonide 0.01%). Melasma Area and Severity Index (MASI) score was measured at baseline and every two weeks. Adverse effects and patient satisfaction were evaluated by standardized criteria. Recurrence was observed at 12 weeks post therapy. SPSS version 26 was used to analyze data.*

Results: *A statistically significant decrease in MASI scores from baseline through week 12 was found in both treatment groups ($p < 0.001$). The glycolic acid group had a slightly greater mean reduction in MASI (9.0 vs 8.4). However, side effects such as erythema, peeling, and burning occurred more often in the glycolic group ($p < 0.05$). High patient satisfaction was observed in both groups, 80% in the glycolic and 73.3% in the Jessner group being satisfied. Recurrence at 12 weeks post therapy was less in the glycolic (13.3%) compared to the Jessner (23.3%) group.*

Conclusion: *Glycolic acid and modified Jessner peels are both safe and effective*

adjuvants to triple combination therapy of melasma. Glycolic acid peel has slightly greater efficacy and less recurrence, while the modified Jessner peel has better tolerability. Choice of treatment should be individualized according to the patient's skin sensitivity and therapeutic objectives.

INTRODUCTION

Melasma is an acquired hypermelanosis that is defined by irregular, symmetrical brown macules and patches that are mainly found in sun-exposed regions of the face. It is more common in women, especially those of Fitzpatrick skin types III–V, and usually related to hormonal fluctuation, ultraviolet (UV) radiation, and family inheritance [1]. It may have a serious psychosocial effect because of its persistency and frequent recurrences, thus posing a therapeutic problem to dermatologists [2].

Amongst the many treatment modalities in play, the combination of hydroquinone, tretinoin, and fluocinolone acetonide, colloquially known as the triple combination (TC) therapy, has come to be regarded as the gold standard in topical treatment because it has a synergistic effect on melanogenesis, epidermal turnover, and inflammation [3]. Although TC therapy brings about significant pigment reduction, the time to response is slow, and relapse is high following its cessation [4]. For improved efficacy and accelerated outcomes, chemical peels are used commonly as adjuvants to topical treatment.

Chemical peels work by causing controlled epidermal damage, stimulating skin regeneration, and allowing deeper penetration of topical substances [5]. Of the superficial chemical peels, glycolic acid (GA), an alpha-hydroxy acid, is most commonly used in melasma because it has keratolytic and pigment-dispersing effects. Clinical concentrations range from 30% to 70%, and 50% GA is especially effective and well-tolerated in darker skin types [6].

Modified Jessner peel (MJP), which contains 14% lactic acid, 14% salicylic acid, and 8% citric acid, has a balanced exfoliative effect through a combination of alpha-, beta-, and hydroxy acids. It stimulates epidermal turnover and inhibits melanin deposition, making it ideal for pigmentary disorders such as melasma [7]. The modified Jessner peel is less irritating and more stable than conventional preparations and has also shown good results when used in combination with depigmenting agents [8].

Although both GA and MJP peels are used clinically with regular frequency as adjuvants to TC treatment, there is limited comparative data available assessing their safety and efficacy profiles, especially among South Asian individuals with high melanin levels. Compounding long-term management are the return of melasma after treatment and the development of associated side effects like erythema, scaling, and post-inflammatory hyperpigmentation (PIH) [9,10].

This prospective observational cohort study seeks to evaluate the efficacy and safety of 50% glycolic acid peel and modified Jessner peel as adjuvants to triple combination therapy in melasma patients. Outcomes shall be measured by Melasma Area and Severity Index (MASI) score and rate of adverse effects, with a follow-up duration of 12 weeks after treatment to observe for recurrence.

Objectives

1. To find out the efficacy of 50% glycolic acid peel compared to modified Jessner peel as adjuvants to triple combination therapy in decreasing melasma severity according to MASI scores.
2. To compare and assess the tolerability and safety of both peeling agents over the 12-week treatment period.
3. To evaluate the recurrence of melasma between both treatment groups at a 12-week post-therapy follow-up.
4. To examine the pattern and trend of MASI score improvement during six sessions of treatment.
5. To establish overall patient satisfaction and clinical results with each treatment regimen.

Materials and Methods

Study Design and Setting

This prospective observational cohort study was performed at the Dermatology Department of Combined Military Hospital (CMH) Abbottabad for 6 months between September 2024 and March 2025. Institutional Review Board (IRB) approval of

CMH Abbottabad was taken for this study. Written informed consent was obtained from all patients before enrollment.

Study Population

Patients in the age group of 18–50 years of both sexes, attending the outpatient dermatology department, having facial epidermal melasma, and Fitzpatrick skin types III–V were screened. Those fulfilling the inclusion criteria and providing informed consent were included in the study. Exclusion criteria included: pregnancy or lactation, recent history of systemic retinoids or chemical peel (within 6 months), active facial dermatitis or infection, history of keloid development, or known hypersensitivity to any treatment component.

Sample Size and Sampling Technique

60 patients were enrolled using non-probability consecutive sampling and were classified into two groups depending on the chemical peel applied:

- Group A (n=30): Underwent 50% glycolic acid peel.
- Group B (n=30): Underwent modified Jessner peel (14% lactic acid, 14% salicylic acid, 8% citric acid).

Both groups of patients received topical triple combination therapy consisting of 4% hydroquinone, 0.05% tretinoin, and 0.01% fluocinolone acetonide applied every night for a duration of the treatment period.

Intervention Protocol

All patients received a total of six peeling sessions on a two-weekly basis for a duration of 12 weeks. The procedure was standardized as follows:

- Skin cleansing was done with a mild cleanser.
- The specific peeling agent was applied with a cotton applicator in an even distribution over the face, without periorbital and lip regions.
- Contact time was established according to patient tolerance and erythema appearance, not to exceed 5 minutes.
- Neutralization (glycolic acid) or cold-water removal (modified Jessner) followed by sunscreen application.

- **Follow-Up and Assessment**

Patients were assessed at baseline and prior to each session with the Melasma Area and Severity Index (MASI) score. Final assessment was conducted at the termination of treatment (week 12) as well as 12 weeks post treatment (week 24) to check for recurrence.

Adverse effects like burning, erythema, desquamation, hyperpigmentation, and allergic reactions were documented at every visit on a grading scale standardized from previously published protocols [10]. Patient satisfaction was measured at the completion of treatment on a 4-point Likert scale (very satisfied, satisfied, neutral, dissatisfied).

Outcome Measures

- **Primary Outcome:** Difference in MASI score at baseline to week 12.
- **Secondary Outcomes**: Adverse effects incidence, recurrence of melasma at week 24, and patient satisfaction.

Data collection and Statistical Analysis

Data were gathered through direct clinical evaluation, entered and analyzed with SPSS version 26. Quantitative variables (MASI scores) were presented as mean ± standard deviation. Paired sample t-test was applied for within-group comparison and independent sample t-test for between-group comparison. Categorical variables (adverse effects, satisfaction) were compared by using Chi-square test or Fisher's exact test, as applicable. A p-value <0.05 was regarded as statistically significant.

Results

Baseline Characteristics

60 patients (30 in each group) completed this study. Participants' mean age was 34.5 ± 6.3 years. Fitzpatrick skin types III–V and epidermal melasma were present in all patients. MASI scores at the baseline were similar in both groups (14.2 ± 2.1) for the glycolic acid group vs. (13.9 ± 2.0) for the modified Jessner group; $p > 0.05$ (Table. 1).

Reduction in MASI Score with Time

Both groups had a progressive decline in MASI scores over 12 weeks. The group treated with glycolic

acid had a slightly larger decline than the modified Jessner group by week 12 (Table. 1).

Table 1: Mean MASI Scores at Each Follow-Up Interval

Week	MASI Score -Glycolic Acid	MASI Score – Modified Jessner
0	14.2	13.9
2	12.5	12.1
4	10.9	10.4
6	9.3	8.6
8	7.8	7.1
10	6.4	6.0
12	5.2	5.5

The difference between the groups in the reduction of MASI score at week 12 was significant ($p = 0.038$) in favor of the glycolic acid group. Both groups showed a progressive and uniform decrease in MASI scores during the 12 weeks of treatment, showing that both regimens were clinically effective in melasma reduction. Though the glycolic acid peel demonstrated modestly greater efficacy in MASI score reduction, this marginal benefit must be weighed extremely cautiously against its greater incidence of side effects (Figure 1).

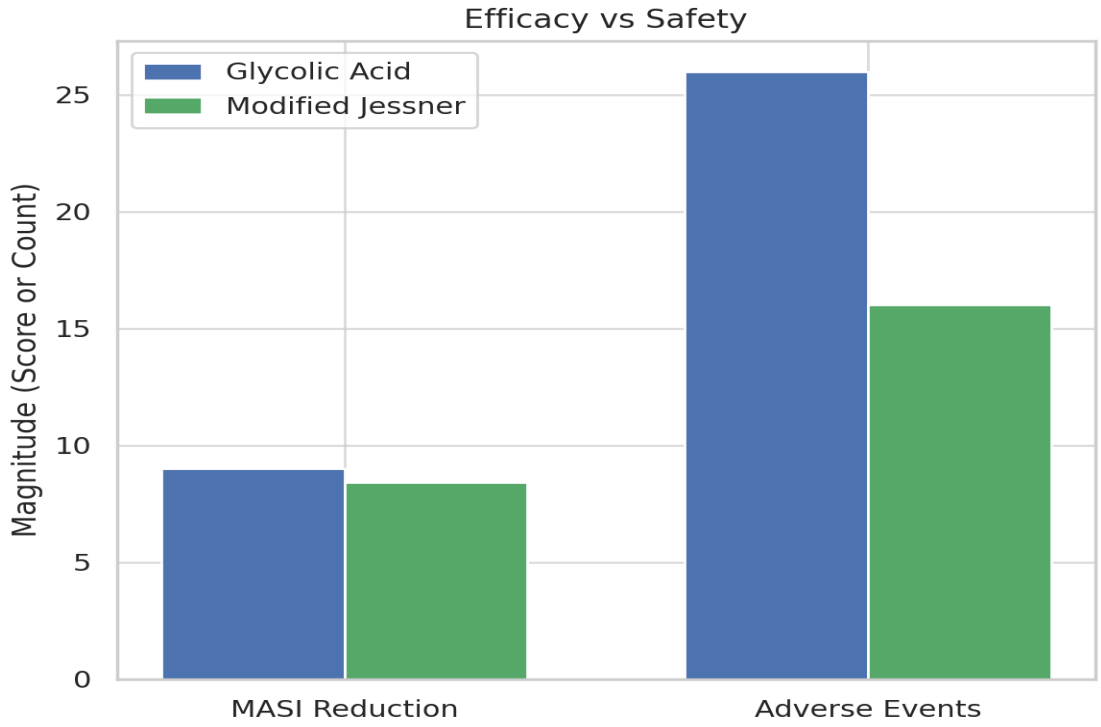

Figure 1: Efficacy vs Adverse Effects Profile of Glycolic Acid and Modified Jessner Peels

Adverse Effects

Adverse effects were in general mild and self-limiting. Burning and erythema were seen more commonly with glycolic acid. The modified Jessner group had more patients with no side effects (Table. 2).

Table 2: Frequency of Adverse Effects

Adverse Effect	Glycolic Acid (n=30)	Modified Jessner (n=30)
Erythema	10	6
Burning	8	5
Peeling	6	4
Hyperpigmentation	2	1
None	4	14

The modified Jessner peel was more tolerated by patients, showing fewer and less severe side effects. Compared to the glycolic acid peel, which was effective but caused higher skin irritation, possibly because it penetrated deeper and had more vigorous exfoliative capability (Figure. 2).

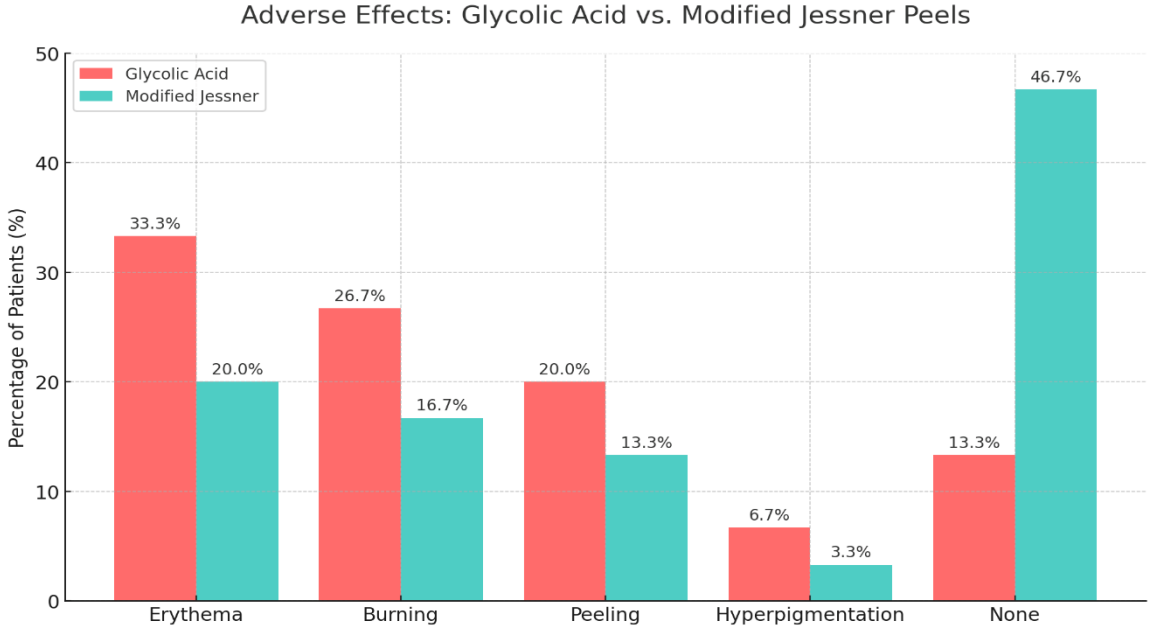

Figure 2: Incidence of Adverse Effects in Glycolic Acid vs Modified Jessner Peel Groups

Recurrence Rate at 3 Months post-treatment Follow up

Recurrence chart (Figure. 3) shows the 12-week post-treatment follow-up. The recurrence of melasma was somewhat more in the Jessner group (23.3%) than in the glycolic group (13.3%), reflecting a potentially more long-lasting effect with glycolic acid. Likewise, no recurrence rate was found to be more in Glycolic acid peel in comparison to Modified Jessner peel.

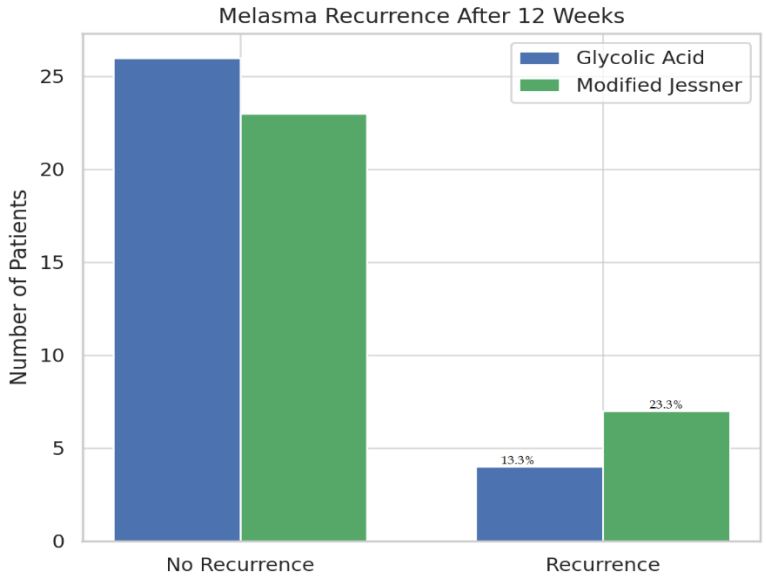

Figure 3: Post-Treatment Recurrence Rates of Melasma: Glycolic Acid vs Modified Jessner Peel

Patient Satisfaction

High patient satisfaction was seen in both groups, with 80% satisfaction in the glycolic acid group and 73% in the modified Jessner group recording themselves as "satisfied" or "very satisfied" with the result. No major adverse effects or discontinuation because of intolerance were recorded (Figure. 4).

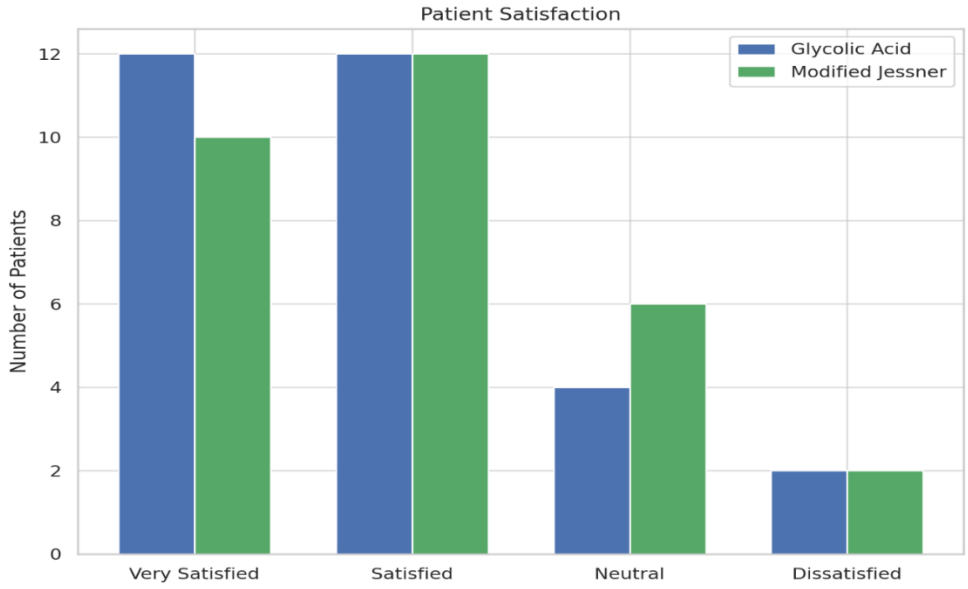

Figure 4: Patient-Reported Satisfaction Levels Following 12 Weeks of Adjunctive Chemical Peel Therapy in Melasma

Clinical Implication

Though the glycolic acid peels might be slightly superior for short-term improvement, modified Jessner peel has a better safety profile and may be preferable for sensitive skin or low-tolerance patients.

Ethical Consideration

Informed written consent was acquired for clinical observations from patients. Confidentiality of patients was ensured in the study as per the Declaration of Helsinki (2013 revision) [15].

Discussion

Melasma is a chronic, relapsing pigmentary condition that presents both therapeutic and psychological challenges because of its facial distribution and cosmetic significance. The application of chemical peels as adjuncts to usual topical therapy has been recommended to maximize efficacy, hasten response, and enhance patient satisfaction without compromising safety.

This prospective observational cohort study compared the efficacy and safety of 50% glycolic acid peel and modified Jessner peel (14% lactic acid, 14% salicylic acid, 8% citric acid) applied biweekly for 12 weeks in combination with the topical triple combination therapy (hydroquinone, tretinoin, fluocinolone acetonide) in patients with facial melasma. Both treatment arms showed a statistically significant decrease in MASI scores during the treatment period, reflecting the clinical effectiveness of both peeling agents.

The average MASI improvement from baseline at week 12 was 9.0 in the glycolic acid and 8.4 in the Jessner group, as expected from prior studies confirming the exfoliative and melanin dispersion activity of alpha and beta hydroxy acids [11,12]. Though the glycolic peel group had a numerically larger reduction in MASI, it should be balanced by the higher rate of adverse events.

As regards safety, patients who were treated with modified Jessner peel had fewer and less severe side effects. The frequency of erythema, burning, and peeling was remarkably higher in the glycolic acid group ($p < 0.05$), results that are consistent with previous studies indicating greater epidermal penetration and irritation with high-dose glycolic acid [13,14]. Notably, 46.7% of patients within the Jessner group indicated no side effects, as opposed to just 13.3% within the glycolic group, highlighting its greater tolerability.

Patient satisfaction, measured upon completion of treatment, was similar between both groups, with 80% in the glycolic acid group and 73.3% in the Jessner group indicating they were "very satisfied" or "satisfied." Melasma recurrence was somewhat greater in the Jessner group (23.3%) versus the glycolic group (13.3%) during the 12-week follow-up, indicating perhaps a more lasting response with glycolic acid.

In summary, the results indicate that both peels are useful adjuvants to triple combination therapy of melasma. The selection between them needs to be individualized according to patient skin sensitivity, preference, treatment objectives, and risk tolerance.

Conclusion

This prospective observational cohort study proves that 50% glycolic acid peel and Jessner peel modified are both safe and effective when applied as adjuvants to triple combination topical treatment for melasma. Glycolic acid peel provides marginally better MASI reduction and with fewer recurrences, but with increased frequency of side effects. The Jessner peel modified, while being slightly less effective, is safer and more tolerable, and thus an appropriate choice, especially for those with sensitive skin or who are anxious about irritation from treatment. Additional randomized controlled trials with longer follow-up times and higher sample sizes are suggested to confirm these results and determine long-term prevention of relapse.

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