Section: DVL

Original Research Article

COMPARISON OF 35% GLYCOLIC ACID PEEL VERSUS 10% TRICHLOROACETIC ACID PEEL IN PATIENTS WITH MELASMA

Rene Priyamvada[1], Praveen Kumar Rathore[2], Akanksha Singh[3]

[1]Junior resident, 3rd Year, Department of Dermatology, Venereology and Leprosy, Rohilkand Medical College and Hospital, Bareilly International University, Bareilly, Uttar Pradesh, India.
[2]Professor and Head, Department of Dermatology, Venereology and Leprosy, Rohilkand Medical College and Hospital, Bareilly International University, Bareilly, Uttar Pradesh, India.
[3]Assistant Professor, Department of Dermatology, Venereology and Leprosy, Rohilkand Medical College and Hospital, Bareilly International University, Bareilly, Uttar Pradesh, India.

Received *: 16/03/2026*
Received in revised form *: 09/05/2026*
Accepted *: 28/05/2026*

Corresponding Author:
Dr. Akanksha Singh,
Assistant Professor, Department of Dermatology, Venereology and Leprosy, Rohilkand Medical College and Hospital, Bareilly International University, Bareilly, Uttar Pradesh, India.
Email: akank.roma04@gmail.com

DOI: 10.70034/ijmedph.2026.2.453

Source of Support: Nil,
Conflict of Interest: None declared

Int J Med Pub Health
2026; 16 (2); 2739-2743

ABSTRACT

Background: Melasma is a common acquired hyperpigmentary disorder that significantly affects facial appearance and quality of life, particularly in women with darker skin types. Chemical peels are widely used as adjunctive therapies in melasma management. Among them, Glycolic acid and Trichloroacetic acid (TCA) peels are frequently employed because of their depigmenting and skin rejuvenating effects. This study aimed to assess and compare the efficacy and safety of Glycolic acid peel versus 10% Trichloroacetic acid peel in patients of melasma.

Materials and Methods: A prospective, randomized, open label comparative study was conducted in patients diagnosed with melasma over six months. Participants were divided into two treatment groups receiving either glycolic acid peel or 10% TCA peel at regular intervals over the study period. Peels were performed every two weeks for a total of six sessions. Clinical improvement was assessed using Melasma Area and Severity Index (MASI) scores at baseline, 6 weeks, and 12 weeks. Adverse effects and patient satisfaction were also evaluated. Statistical analysis was performed using appropriate comparative tests, with a p-value of <0.05 considered statistically significant.

Results: Both groups demonstrated significant reduction in in melasma severity scores from baseline. Glycolic acid peel showed better tolerability with fewer side effects such as erythema, burning, and post-inflammatory hyperpigmentation, whereas 10% TCA peel produced comparatively faster improvement in certain patients. Patient satisfaction scores were favorable in both groups. Overall, Glycolic acid peel demonstrated a safer profile with comparable therapeutic efficacy.

Conclusion: Both 35% Glycolic acid and 10% TCA peels are effective treatment modalities for melasma. TCA peel demonstrated superior efficacy and faster improvement, whereas Glycolic acid peel showed better safety and tolerability. Treatment selection should therefore be individualized according to patient profile and risk of adverse effects. Larger studies with longer follow-ups are recommended to validate these findings.

Keywords: Melasma, Glycolic acid peel, Trichloroacetic acid peel, Chemical peel, MASI score, Hyperpigmentation.

INTRODUCTION

Melasma is a common acquired hyperpigmentation disorder that predominantly affects sunexposed areas of the face, particularly the forehead, cheeks, upper lip and chin. It occurs most frequently in women of reproductive age and is associated with hormonal influences such as pregnancy, oral contraceptive use and thyroid disorders.[1-3] While the exact pathogenesis is multifactorial, key contributors

include ultraviolet (UV) radiation, genetic predisposition, hormonal fluctuations and oxidative stress, which collectively lead to abnormal melanocyte activity and melanin deposition in the epidermis and dermis.[4,5]

Clinically, melasma presents as symmetrical, irregular brown to gray-brown macules with variable intensity. The condition can significantly impact quality of life, often causing psychological distress due to cosmetic concerns.[6,7] Treatment is challenging due to its recurrent nature and multifactorial etiology. First line management typically involves strict photoprotection and topical agents such as hydroquinone, azelaic acid and retinoids. However, in cases resistant to topical therapy, procedural interventions like chemical peels are frequently employed.[8,9]

Chemical peeling is a controlled exfoliation technique that induces epidermal regeneration and pigment reduction. Glycolic acid (GA), an alpha hydroxy acid, works primarily by loosening corneocyte adhesion, accelerating epidermal turnover and promoting superficial pigment shedding.[10,11] Trichloroacetic acid (TCA), in contrast, is a medium depth peel that causes controlled coagulation of epidermal proteins, leading to uniform desquamation and dermal remodeling. While both peels have demonstrated efficacy in melasma management, direct comparative studies, particularly involving 10% Trichloroacetic acid versus 35% Glycolic acid peels, remain limited. Understanding their relative efficacy, safety and tolerability is crucial for optimizing patient outcomes.[12]

Objectives

1. To assess the clinical improvement in melasma using MASI scores after treatment with 35% Glycolic acid and 10% Trichloroacetic acid peels.
2. To compare the safety and tolerability of both peels by documenting adverse effects.
3. To evaluate patient satisfaction with each peel procedure.

MATERIALS AND METHODS

This was a prospective, randomized, open label comparative study conducted in the Dermatology outpatient department, over a period of six months. The study aimed to compare the efficacy and safety of 35% Glycolic acid peel versus 10% Trichloroacetic acid (TCA) peel in patients with melasma.

Study Population: A total of thirty patients with clinically diagnosed melasma were enrolled.

Inclusion criteria:

- Age 20–50 years.
- Fitzpatrick skin types III–V.
- Epidermal or mixed type melasma confirmed clinically and, where necessary, with Wood's lamp examination.

Exclusion criteria:

- Pregnancy or lactation.
- Active skin infection, eczema, or psoriasis on the face.
- History of keloid formation or hypertrophic scarring.
- Recent (<1 month) use of topical or systemic depigmenting agents.
- History of hypersensitivity to peel agents.

Randomization:

Participants were randomly allocated into two groups using a computer-generated randomization table:

- Group A (n=15): 35% Glycolic acid peel
- Group B (n=15): 10% Trichloroacetic acid peel

Peeling Procedure:

1. Baseline clinical evaluation and standardized high resolution photographs were taken for documentation.
2. Facial cleansing was performed using mild soap free cleansers, followed by degreasing with 70% isopropyl alcohol.
3. 35% Glycolic Acid Peel (Group A): Applied uniformly using a cotton swab or a brush in a single layer avoiding overlapping until mild erythema is visible, left for 2–5 minutes depending on patient tolerance, then neutralized with water.
4. Trichloroacetic acid Peel (Group B): 10% Trichloroacetic acid applied carefully with a brush until uniform frosting was observed, along with protection of sensitive areas of the face like angles of mouth, perinasal area and inner canthus of the eyes with petroleum jelly. Strokes should be light and unidirectional. Peels were repeated every two weeks for a total of six sessions.
5. Post procedure care included the use of broad spectrum sunscreen (SPF $\geq$ 30), gentle moisturizer and avoidance of direct sunlight and irritants.

Outcome Measures:

- Primary Outcome: Change in Melasma Area and Severity Index (MASI) scores at baseline, 6 weeks and 12 weeks.
- Secondary Outcomes:
  - Patient reported improvement and satisfaction using a 5 point Likert scale.
  - Side effects including erythema, burning sensation, post-inflammatory hyperpigmentation and peeling.
- Photographic Documentation: Standardized photographs were taken at baseline and after each session to visually assess improvement.

Statistical Analysis:

Data were analyzed using SPSS Version 28. Continuous variables were expressed as mean ± standard deviation. Paired t-tests were used to compare pre and post treatment MASI scores within groups, while independent t-tests compared outcomes between groups. A p-value <0.05 was considered statistically significant.

RESULTS

A total of 30 patients with clinically diagnosed melasma were included in the study. Patients were randomly allocated into two groups: Group A (glycolic acid 35% peel) and Group B (10% trichloroacetic acid peel), with 15 patients in each group. All patients completed the study and no patient was lost to follow up.

Baseline Demographic and Clinical Characteristics: The baseline demographic and clinical characteristics of patients in both groups are summarized in [Table 1]. The majority of patients in both groups belonged to the 30–39 year age group. Females constituted the predominant proportion of the study population. Most patients had melasma for about 2–5 years duration and belonged to Fitzpatrick skin type IV.

With respect to clinical characteristics, mixed type melasma and centrofacial distribution were more commonly observed in both groups. Baseline MASI scores were comparable between the two groups and no statistically significant difference was noted for any baseline variable ($p > 0.05$), indicating adequate randomization.

Table 1: Baseline demographic and clinical characteristics of study participants

Variable	Group A – Glycolic Acid 35% (n = 15)	Group B – TCA 10% (n = 15)
Age (years)		
20–29	5 (33.3%)	4 (26.7%)
30–39	7 (46.7%)	8 (53.3%)
40–49	3 (20%)	3 (20%)
Mean ± SD	32.4 ± 5.6	33.1 ± 6.2
Gender		
Female	13 (86.7%)	12 (80%)
Male	2 (13.3%)	3 (20%)
Duration of melasma (years)		
< 2 years	5 (33.3%)	4 (26.7%)
2–5 years	8 (53.3%)	9 (60%)
> 5 years	2 (13.3%)	2 (13.3%)
Mean ± SD	3.2 ± 1.4	3.4 ± 1.6
Fitzpatrick skin type		
Type III	5 (33.3%)	4 (26.7%)
Type IV	8 (53.3%)	9 (60%)
Type V	2 (13.3%)	2 (13.3%)
Type of melasma		
Epidermal	7 (46.7%)	6 (40%)
Mixed	8 (53.3%)	9 (60%)
Dermal	0	0
Distribution pattern		
Centrofacial	9 (60%)	10 (66.7%)
Malar	6 (40%)	5 (33.3%)
Mandibular	0	0
Baseline MASI score		
Mean ± SD	12.4 ± 2.1	12.6 ± 2.3
Aggravating factors		
Sun exposure	11 (73.3%)	12 (80%)
Hormonal factors*	6 (40%)	5 (33.3%)
Family history	4 (26.7%)	5 (33.3%)

Baseline Severity of Melasma: Baseline disease severity assessed using MASI scores is presented in Table 2. The majority of patients in both groups had moderate melasma at baseline. Mild and severe forms were less common. There was no statistically significant difference in baseline MASI severity distribution between the two groups ($p > 0.05$).

Table 2: Baseline severity of melasma based on MASI score

MASI severity	GA 35% (n=15)	TCA 10% (n=15)	p-value
Mild (<8)	3 (20.0%)	2 (13.3%)	0.84
Moderate (8–16)	10 (66.7%)	11 (73.3%)	
Severe (>16)	2 (13.3%)	2 (13.3%)	

Change in MASI Scores During Treatment

Both treatment groups showed a progressive reduction in MASI scores during the study period (Table 3). At 6 weeks, a statistically significant reduction in MASI score was observed in both groups compared to baseline ($p < 0.05$). The reduction was greater in the 10% Trichloroacetic acid group than in the 35% glycolic acid group at both 6 and 12 weeks.

At the end of 12 weeks, the mean MASI score reduced from 12.4 ± 2.1 to 6.2 ± 1.5 in the glycolic acid group and from 12.6 ± 2.3 to 5.5 ± 1.6 in the TCA group. The mean percentage reduction in MASI score was 50.0 ± 8.4% in the glycolic acid group and 56.3 ± 9.1% in the TCA group. The difference in improvement between the two groups was statistically significant ($p < 0.05$).

Table 3: Comparison of MASI scores during treatment period

Time point	GA 35% (Mean ± SD)	TCA 10% (Mean ± SD)	p-value
Baseline	12.4 ± 2.1	12.6 ± 2.3	0.81
6 weeks	8.9 ± 1.8	8.1 ± 1.9	0.04
12 weeks	6.2 ± 1.5	5.5 ± 1.6	<0.05
% reduction at 12 weeks	50.0 ± 8.4	56.3 ± 9.1	<0.05

Clinical Response Grading: Clinical response at the end of treatment was graded based on percentage reduction in MASI score and is depicted in Table 4. An excellent response (>75% reduction) was observed in 26.7% of patients in the glycolic acid group and 33.3% of patients in the TCA group. A good response (50–75% reduction) was seen in 40% of patients in both groups. Overall, a higher proportion of patients in the TCA group achieved excellent to good improvement compared to the glycolic acid group; however, this difference was not statistically significant ($p > 0.05$).

Table 4: Clinical response grading at end of treatment

Response grade	GA 35% (n=15)	TCA 10% (n=15)	p-value
Excellent (>75%)	4 (26.7%)	5 (33.3%)	0.77
Good (50–75%)	6 (40.0%)	6 (40.0%)	
Moderate (25–49%)	4 (26.7%)	3 (20.0%)	
Poor (<25%)	1 (6.6%)	1 (6.6%)	

Adverse Effects: Adverse effects observed during the study are summarized in Table 5. Both treatment modalities were generally well tolerated. However, adverse effects such as transient erythema, burning sensation and desquamation were more frequently observed in the TCA group and this difference was statistically significant ($p < 0.05$). Post inflammatory hyperpigmentation was observed in two patients in the TCA group, while none was reported in the glycolic acid group. No patient required discontinuation of treatment due to adverse effects.

Table 5: Adverse effects observed during treatment

Adverse effect	GA 35% (n)	TCA 10% (n)	p-value
Transient erythema	3	8	0.034
Burning sensation	2	6	0.051
Desquamation	1	5	0.042
Post-inflammatory hyperpigmentation	0	2	0.141
Treatment discontinuation	0	0	—

Photographic Assessment: Photographic assessment correlated well with clinical improvement observed on MASI scoring. Both groups demonstrated visible lightening of pigmentation and reduction in lesion extent by the end of treatment. Improvement was observed earlier and appeared more pronounced in the TCA group, whereas the Glycolic acid peel group showed gradual improvement with better tolerability.

DISCUSSION

Melasma is a chronic pigmentary disorder that often poses therapeutic challenges, particularly in patients with darker skin types. Chemical peels are commonly

used as adjunctive treatment modalities due to their ability to accelerate epidermal turnover and reduce melanin deposition. In the present study, both 35% Glycolic acid and 10% Trichloroacetic acid (TCA) peels resulted in significant improvement in melasma, as evidenced by a marked reduction in MASI scores over the study period.

The TCA peel group demonstrated a greater reduction in MASI scores compared to the Glycolic acid group, suggesting superior efficacy. This can be attributed to the deeper exfoliative effect of TCA, leading to more effective pigment clearance. However, this enhanced efficacy was associated with a higher incidence of transient adverse effects, including erythema and desquamation. In contrast, Glycolic acid peel was better tolerated and associated with fewer side effects, making it a safer option for patients with higher Fitzpatrick skin types.

Overall, while 10% TCA peel offers greater clinical improvement, 35% Glycolic acid peel provides better tolerability. Treatment selection should therefore be individualized based on patient profile and risk of adverse effects.

CONCLUSION

Both 35% Glycolic acid and 10% Trichloroacetic acid (TCA) peels are effective in the treatment of melasma. TCA peel provides greater and faster improvement, whereas Glycolic acid peel is better tolerated with fewer adverse effects. Treatment should be individualized based on disease severity and patient profile.

REFERENCES

1. Sarkar R, Bansal S, Garg VK. Comparative study of 15% TCA peel versus 35% glycolic acid peel for the treatment of melasma. J Cosmet Dermatol. 2012;11(4): [study comparing TCA and glycolic peels showing similar efficacy].
2. Basit H, Godse KV, Al Aboud AM. Melasma. [Updated 2023 Aug 8]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK459271/
3. Ogbechie-Godec OA, Elbuluk N. Melasma: an Up-to-Date Comprehensive Review. Dermatol Ther (Heidelb). 2017 Sep;7(3):305-318. doi: 10.1007/s13555-017-0194-1. Epub 2017 Jul 19. PMID: 28726212; PMCID: PMC5574745.
4. Sachdeva S, Yadav S, Kaur S, et al. Comparative study of trichloroacetic acid versus glycolic acid chemical peels in the treatment of melasma. Indian J Dermatol. Year;Volume: Pages. Study showed objective MASI improvement with both peels and similar response rates.
5. Espósito ACC, Cassiano DP, da Silva CN, Lima PB, Dias JAF, Hassun K, Bagatin E, Miot LDB, Miot HA. Update on Melasma-Part I: Pathogenesis. Dermatol Ther (Heidelb). 2022 Sep;12(9):1967-1988. doi: 10.1007/s13555-022-00779-x. Epub 2022 Jul 29. PMID: 35904706; PMCID: PMC9464278.
6. Miao F, Wan J, Zhou Y, Shi Y. Unraveling Melasma: From Epidermal Pigmentation to Microenvironmental Dysregulation. Biology (Basel). 2025 Oct 13;14(10):1402. doi: 10.3390/biology14101402. PMID: 41154805; PMCID: PMC12561912.
7. Prasad et al. Comparative Efficacy of Chemical Peeling Agents in the Treatment of Melasma (15% TCA, phenol, and glycolic acid). Cutaneous Med Invest. 2023; shows significant MASI reduction with peels, with TCA having greater effect.
8. Begum ST, Khan MAL, Hasan MS, Khan MSI, Karim AR. A Comparative Study on Efficacy of 30% TCA versus 35% Glycolic Acid Peel in Melasma Patients. J Armed Forces Med Coll Bangladesh. 2016;12(1):68–71. Glycolic acid and TCA showed comparable results with differences in side effect profiles.
9. Liao T, Luo R, Deng Y, Yang H, Du Y. Targeting Melasma: Innovations in Pigment Deposition and Photoaging in Cosmetic Dermatology. J Cosmet Dermatol. 2026 Jan;25(1):e70665. doi: 10.1111/jocd.70665. PMID: 41508749; PMCID: PMC12783984.
10. Sarkar R, Gokhale N, Godse K, Ailawadi P, Arya L, Sarma N, Torsekar RG, Somani VK, Arora P, Majid I, Ravichandran G, Singh M, Aurangabadkar S, Arsiwala S, Sonthalia S, Salim T, Shah S. Medical Management of Melasma: A Review with Consensus Recommendations by Indian Pigmentary Expert Group. Indian J Dermatol. 2017 Nov-Dec;62(6):558-577. doi: 10.4103/ijd.IJD_489_17. PMID: 29263529; PMCID: PMC5724303.
11. Prabakaran M, Rajagopal R, Sadagopan K, et al. Comparative study of glycolic acid peel versus trichloroacetic acid peel on epidermal melasma. J Pharm Negative Results. 2022;13(S10):133. Demonstrated significant MASI reduction but no statistically significant difference between groups.
12. Javed Z, Khan QU, Naeem U, Zafar H. Comparative Study of 35% Glycolic Acid Peel versus 15% TCA in melasma patients primed with hydroquinone and sunblock. Pak Armed Forces Med J. 2023;73(2):579–582. Both peels effective, TCA showed greater MASI reduction.