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Comparative Study of 35% Glycolic Acid (GA) Peel versus 15% Trichloroacetic Acid (TCA) in Patients Primed with 4% Hydroquinone and Sun Block for the Treatment of Melasma

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ABSTRACT

Objective: To compare the effects of 35% Glycolic acid (GA) peel versus 15% Trichloroacetic Acid (TCA) in patients primed with 4% Hydroquinone and sunblock for Melasma treatment.

Study Design: Quasi-experimental stud.

Place and Duration of Study: Department of Dermatology, Combined Military Hospital, Jhelum Pakistan, from Jul to Nov 2020.

Methodology: Forty-eight melasma patients were included and divided randomly into two groups; Group-A patients were treated with 15%Trichloroacetic Acid (TCA), while Group-B patients were treated with 35% Glycolic Acid (GA). Peeling was performed fortnightly in 4 sessions. Melasma area and severity index (MASI) scoring was calculated before and after peeling.

Results: In our study, we found that pre-treatment MASI score in Group-A Trichloroacetic Acid (TCA) was 9.25±3.11 and in Group-B Glycolic Acid(GA), the pre-treatment MASI was 18.42±7.24, (p<0.001). The post-treatment MASI score in Group- A (TCA) was found to be 4.52±2.77and in Group-B (GA), it was 8.67±4.30, (p<0.001). TCA was associated with more burning, frosting, and skin cracking, while Glycolic Acid (GA) was associated with a scale of no to mild pain and mild burning.

Conclusion: Both the peeling agents, 35% Glycolic Acid (GA) peel and 15%Trichloroacetic Acid (TCA), in patients primed with 4% Hydroquinone and sunblock, are effective in reducing MASI scores. However, TCA showed better results.

Keywords: Chemical peeling, Melasma, Glycolic acid (GA), Trichloroacetic acid (TCA).

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INTRODUCTION

Melasma is an acquired pigmentary (chronic) disorder that affects the female gender more than men. Melasma is associated with a significant negative impact on the quality of life.[1] It also negatively influences self-esteem due to dyschromic appearance.[2,3] Management of melasma is broadly classified into three main categories: topical, oral, and procedural management.[4,5] Topical management includes i) Iron Oxide, ii) Hydroquinone, iii) Azelaic acid, iv) Ascorbic acid, v) Kojic acid, vi) Tretinoin, vii) Cortico-steroids (anti-inflammatory with non-selective inhibi-tion of melanogenesis) and Niacinamide. Oral management includes; i) Tranexamic acid (inhi-bition of melanin synthesis and decrease vascular pro-liferation), ii) Polypdiumleucotomos (inhibition of reactive oxygen species) and iii)Glutathione. Procedural management includes Q switch ruby laser and Nd-Yag laser (melanosome destruction), Chemical peels (increased keratinocyte turnover), Non-ablative fractional laser, Intense pulsed light (Extrusion of melanosomes), Radiofrequency (cellular biostimulation) and micro-needling (Transdermal drug delivery).[6,7]

A chemical peel is an effective adjunctive treatment modality associated with increasing epidermal remodelling. The process increases keratinocyte turnover.[8] Glycolic Acid is a hydrophilic reagent that reduces keratinocyte cohesion at low concentrations. It is a chemical peel in melasma (with an effective concentration of 30%-70%).[9] TCA peeling is based on the principle of causticity. It is used as a superficial peel at low strength, i.e. 15%, and medium depth peels at high strength, i.e. 35%.[10]

There needs to be more than the literature on the efficacy of Glycolic Acid and TCA peeling to reach any conclusion. Therefore, this study aimed to compare the MASI score in 35% Glycolic Acid peel versus 15% TCA in patients primed with 4% Hydroquinone and sunblock for melasma treatment.

METHODOLOGY

The quasi-experimental study was conducted at the Department of Dermatology, Combined Military Hospital (CMH), Jhelum Pakistan, from July to November 2020) after approval from the Hospital

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Ethical Committee (No.1127/FSTB). We calculated a sample size using a WHO calculator.[11]

Inclusion Criteria: Patients of either gender, aged 20-50 years with epidermal melasma were included in the study.

Exclusion Criteria: Patients with a history of hypertrophic scars or keloids, dermal and mixed type of melasma, recurrent herpes infection, active dermatitis, women using oral contraceptive pills and pregnant females were excluded from the study.

After taking written informed consent, melasma patients were selected through non-probability consecutive sampling. Patients were randomly divided into two Groups using the random number table method. We primed both groups for two weeks with 4% Hydroquinone cream and sunblock (physical sunblock with zinc oxide and titanium oxide; reapplication after 4 hours) before giving them the respective intervention. Group-I was treated with a 15% TCA procedure, while Group-II was treated with 35% Glycolic Acid (GA). The patient's face was cleaned with an alcohol swab, and a chemical peel was applied to each patient. The application duration for TCA was 1-2 minutes, while for Glycolic Acid (GA), it was 3-4 minutes. Then the face was washed with water. The procedure was repeated for a total of 4 sessions (fortnightly). MASI scoring was calculated before and after the peeling. Melasma severity was assessed in 4 main regions; 1) forehead, 2) right malar, 3) left malar and 4) chin. The severity was assessed by three variables (darkness, homogeneity, and percentage of total area involved). Puri *et al*.[11] used a standard for assessing numerical values, as shown in Table-I.

Table-I: Assessment of Melasma Severity

Percentage Area Involved (A)	Darkness (D)	Homogeneity (H)
0=No involvement	0=Normal skin color	0=Normal skin color
1=less than 10%	1=Barely visible hyperpigmentation	1=Light pecks of involvement
2=10-29%	2=Mild hyperpigmentation	2=Small patchy areas of involvement
3=30-49%	3=Moderate hyperpigmentation	3=Patches of involvement >2cm diameter
4=50-69%	4=Severe hyperpigmentation	4=Uniform skin involvement without any clear areas
5=70-89%	-	-
6=90-100%	-	-

The following formula was used for the calculation of total MASI scores: Total MASI score: Forehead 0.3(D+H)A+ right malar 0.3(D+ H)A+left malar 0.3(D+H)A+chin 0.1(D+H)A. Improve-ment in the reduction of MASI scores is shown in Table-II.

Table-II: Improvement in Reduction using MASI Scores Criteria as Standard

Grading	MASI scores reduction
Excellent	Greater than 80% improvement
Good	51-80% improvement
Satisfactory	26-50% improvement
Poor -response	1-25% Improvement

We used the Statistical Package for the Social Sciences (SPSS) version 23 for the data analysis. Quantitative variables were expressed as Mean±SD and qualitative variables were expressed as frequency and percentages. Independent t-test, Pearson's chi-square were applied. The *p*-value lower than or up to 0.05 was considered as significant.

RESULTS

A total of 48 patients were included in the study (24 patients in each Group). Patients with hormonal disturbance balance were 10. In Group- I, there was no hormonal disturbance in 16(33.3%)patients; in Group-II, no hormonal disturbance was observed in 22(45.8%) patients. In Group-I, 18(37.5%) patients had an excessive history of sun exposure, while it was noted in 4(8.3%) patients in Group-II. The mean MASI score in Group-I before the treatment was 9.25±3.11 and at the end of the study, it was reduced to 4.51±2.7 (p<0.001), while the mean MASI score in Group-II before the treatment was 18.42±7.2 and at the end of the study it was reduced to 8.67±4.3 (p<0.001) as shown in Table III.

Table-III: Comparison of Pre and Post Treatment MASI Mean Scores in Glycolic Acid Versus Trichloroacetic Acid Groups (n=48)

MASI scores	Group-A (TCA) n=24	Group-B (GA) n=24	*p*-value
	Mean±SD	Mean±SD	
Pre-treatment scores	9.25±3.11	18.42±7.24	<0.001
Post-treatment scores	4.51±2.77	8.67±4.30	<0.001

The response regarding the mean percentage reduction in MASI scores was also calculated. Group-I had a 48.88% reduction in mean MASI scores at the end of the study, while it was 47.06% in Group-II (p=0.984). The side effects were uncommon. Patients were monitored for the common side effects of peeling,

like burning, post-peel erythema, pain, post-inflammatory hyperpigmentation and frosting. Post-inflammatory hyperpigmentation was not found in any of the patients. In our study, TCA was associated with more burning, frosting, and skin cracking, while GA was associated with no to mild pain and mild burning, as shown in Table IV.

Table-IV: Comparison of Glycolic Acid and Trichloroacetic Acid Groups with regards to Burning, Frosting, and Skin Cracking (n=48)

Affect	Study Groups		*p*-value
	TCA (n=24)	GA (n=24)	
Burning			
Nil	11(22.9%)	16(33.3%)	0.002
Mild	5(10.4%)	8(16.7%)	
Moderate	8(16.7%)	0(0.0%)	
Frosting			
Nil	13(27.1%)	24(50.0%)	0.001
Mild	8(16.7%)	0(0.0%)	
Moderate	3(6.3%)	0(0.0%)	
Skin Cracking			
Nil	16(33.3%)	23(47.9%)	0.010
Mild	8(16.7%)	1(2.1%)	
Moderate	0(0.00%)	0(0.00%)	
Pain			
Nil	11(22.9%)	22(45.8%)	0.002
Mild	5(10.4%)	2(4.2%)	
Moderate	8(16.7%)	0(0.0%)	
Post peel Erythema			
Nil	11(22.9%)	19(39.6%)	0.001
Mild	8(16.7%)	4(8.3%)	
Moderate	5(10.4%)	1(2.1%)	
Hyperpigmentation			
Nil	24(50.0%)	24(50.0%)	Nil
Mild	0(0.00%)	0(0.00%)	
Moderate	0(0.00%)	0(0.00%)	

DISCUSSION

We compared the two peeling agents' Glycolic Acid and trichloroacetic acid. We found a significant reduction in MASI scores after peeling in the TCA group compared to the GA Group (p<0.001). Puri *et al*.[11] reported that both groups showed an insignificant difference in efficacy (p>0.05). Kala *et al*. reported melasma as a therapeutic challenge for dermatologists. They reported the response of TCA as "Effective" compared to Glycolic acid. However, TCA was more effective against chronic pigmentation, while relapses were more frequent, as seen in TCA compared to GA. One of the main participating factors was sun exposure.[12] Some studies reported that the reduction in MASI score did not significantly differ when TCA and GA peels were compared.[13,14] Though GA peel was associated with lesser side effects than TCA peel. Caution is required while dealing with TCA in dark-skinned people compared to GA due to its high frequency of adverse effects. Another similar study recommended using TCA peels in lighter skin due to frosting effects; the endpoint of TCA peeling is not well appreciated in mixed and dermal melasma.[15,16] One study reported that clinically, TCA and GA showed a consistent approach for medium-depth peelings, resulting in some medium-depth injuries. Some patients showed actinic damage and pigmentary dyschromia.[17] In our study, TCA was associated with more burning, frosting, and skin cracking, while GA was associated with no to mild pain and mild burning.

Liu *et al*. reported that TCA (35%) is recommended for medium-depth peeling, keeping in mind local settings. Its use in high concentration or without any combination causes melasma patients to bear some serious hypertrophic scaring.[18]

Chemical peels are remarkably effective as a superficial peeling agent in melasma patients. There is a need to evaluate the skin type of participants before testing the appropriate therapy for a better disease prognosis. Our study was conducted at a single centre, which limits the generalization of cases in our study.

CONCLUSION

Both the peeling agents, 35% Glycolic Acid (GA) peel and 15%Trichloroacetic Acid (TCA), in patients primed with 4% Hydroquinone and sunblock, are effective in reducing MASI scores. However, TCA showed better results.

Conflict of Interest: None.

Author's Contribution

Following authors have made substantial contributions to the manuscript as under:

ZJ: Supervision, Conception, Study design, analysis and Interperitation of data, Critically reviewed manuscript & approval for the final version to be published.

QUK: Co-supervision, Data entry, analysis and interpretation, manuscript writing & approval for the final version to be published.

UN: Critically reviewed, Drafted manuscript & approval for the final version to be published.

HZ: Data colllection, Entry and analysis of data, preparation of rough draft & approval for the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investi-gated and resolved.

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