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Comparison Study Between Chemical Peeling with 70% Glycolic Acid and Intradermal Tranexamic Acid for the Treatment of Melasma

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ABSTRACT

Objective: To compare the efficacy of 70% Glycolic acid peeling with Tranexamic acid mesotherapy in treating melasma.
Study Design: Quasi-experimental study
Place and Duration of Study: Department of Dermatology, CMH-Abbottabad Pakistan, Jun to Nov 2021.
Methodology: The 54 patients aged 20-50 years were enrolled and randomly assigned into two groups. In Group-A, 27 patients prescribed 70% Glycolic acid every two weeks for 12 weeks (6 sessions) and in Group-B, 27 patients injected every week for 12 weeks (12 sessions) with Intradermal Tranexamic acid (4mg/ml). All patients had a clinical examination using the mMASI scale. On follow-up, evaluation was carried out on the 1st, sixth, and 12th weeks.
Results: The majority of 35(65%) patients had mild MASI scores. The paired t-test results of Group A and Group B were both significant, while the post-treatment mean of Group A and B was insignificant.
Conclusion: The study concludes that Glycolic acid and TXA are equally efficient in treating melasma. Moreover, Tranexamic acid reduced the recurrence of melasma, but topical application of Glycolic acid showed more compliance.

Keywords: 70% Glycolic Acid, melisma, mMASI (modified Melasma Area and Severity Index), Tranexamic acid (TXA)

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INTRODUCTION

Melasma is an acquired skin disorder characterized by hyper-melanosis. Melasma is a term that originates from the Greek root "melas" (black colour) and was formerly known as chloasma. Melasma is more common in sun-exposed tissues such as the cheeks, chin, upper lip, and forehead. Melasma is a common dermatological disorder, having a prevalence of 45% in pregnant Pakistani women. It affects 40% of Asian women throughout their reproductive years.[1,2]

Melasma causes an increase in melanin pigment synthesis owing to a surge in the number of melanosomes, which are membrane-bound cell organelles inside melanocytes where melanin biosynthesis occurs and is transported to keratinocytes. Except in rare situations, the number of melanocytes will not be enhanced. Melanocytes will grow in size, and dendrites will become more visible. Even though the specific causation is unknown, some elements are thought to have a role in the pathophysiological mechanisms of melisma.[3] Among these, sun exposure (UV light) is the most powerful primary trigger for its growth, explaining melasma's propensity for certain body areas. Other major determinants include genetic predisposition and female hormones - both endogenous (that is, during pregnancy) and exogenous (that is, during pregnancy) (contraceptives and hormone replacement therapy). Thyroid problems, medications, and cosmetics can all be aggravating factors. Evaluation and prevention of triggering variables are essential to avoid recurrence.[4]

Glycolic acid's peeling effect is due to its chemo exfoliation capabilities, which aid the elimination of keratinocytes, reducing melanin and speeding up skin regeneration.[5] TA suppresses UV-stimulated plasmin action in keratin cells by blocking plasminogen attachment to the keratin cells, resulting from lower free arachidonic acid levels or reduced capacity of prostaglandins production, which reduces melanocyte tyrosinase activity.[6,7]

This study aims to compare the efficacy of these two drugs in treating melasma to assess which drug has a better outcome in melasma patients with evidence-based management. It will also help to determine the compliance of each drug.

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METHODOLOGY

The quasi-experimental study was conducted at the Dermatology Unit of the CMH, Abbottabad Pakistan, from June to November 2021 after Ethical Review Board approval (CMHAtd-ETH-22-Derm-22). The sample size was determined using the WHO sample size calculator, with the ratio of sample size B: A of 1 and assumed MASI score in Group A (Tranexamic Acid) Mean=9.37±2.18, in Group B (Glycolic acid 70%) Mean=10.25±2.93.[8]

Inclusion Criteria: Patients suffering from melasma who attended the Dermatology department were included.

Exclusion Criteria: Patients having a history of hormone therapy, contraceptive pills (within the previous 12 months), bleeding problems or concurrent use of anticoagulants, topical treatment such as Hydroquinone (one month prior to the research), active herpes simplex, Facial warts, active dermatoses, pregnant or lactating females, and patients with unrealistic expectations were excluded.

Informed consent was obtained from patients for follow-up and to ensure the confidentiality of data and anonymity of pictures taken during the examination. Before being selected for the study, the patients underwent a medical checkup, and their history of infestations, antibiotic medication, age, gender, and weight were all noted for analysis. Photos were taken for further clinical evaluation.

For randomization, the 54 participants were divided into two groups, i.e. Group-A, containing 27 patients who had been treated every two weeks for 12 weeks (6 sessions) with 70% Glycolic acid to assess chemical peeling and cold water was used for neutralization and Group-B: containing 27 patients treated with an intradermal injection of 0.05 mL of Tranexamic acid solution with distilled water (4 mg/mL) into the melasma lesion at 1 cm distance using a sterile insulin syringe, every week for 12 weeks (12 sessions).

Patients were followed up six weeks after the final treatment to see if there were any problems or recurrences by the experienced practitioners blinded to the treatment received from June-Nov 2021. Final results for clinical improvement were made in accordance with the following criteria; 1) mMASI, 2) Clinical pictures.

Statistical Package for Social Sciences (SPSS) version 26.0 was used for the data analysis. Quantitative variables were expressed as Mean±SD and qualitative variables were expressed as frequency and percentages. To determine statistical significance, a paired t-sample test was applied for pre-and post-treatment effectiveness evaluation. The *p*-value lower than or up to 0.05 was considered as significant.

RESULTS

A total of 60 subjects after the initial follow-up assessment, 6-patients were unable to come back into the study and were thus omitted; the remaining 54 patients, among which 38(70%) females, 16(30%) males; were randomly assigned into two groups. Figure-1 depicts the pre-and post-treatment images of Group-A patients to show the effect of the Glycolic acid at 70%.

Figure-1: Group-A Chemical Peeling Glycolic acid 70%
(a & b) Pre-treatment at (1st session)
(c & d) post-Treatment at (6th session)

Figure-2 represents the pre-and post-treatment images among Group-B patients treated with intradermal Tranexamic acid.

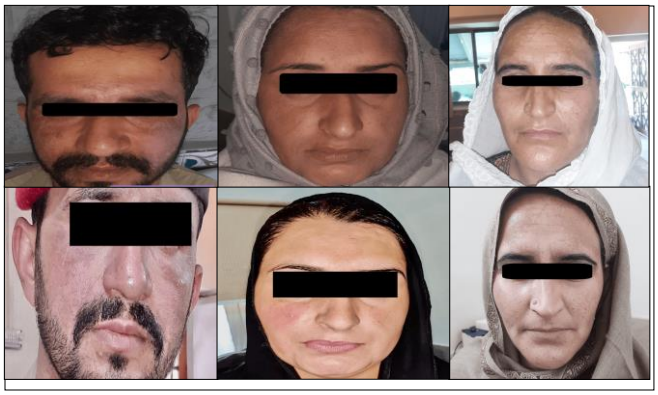

Figure-2: Group-B Intra-Dermal Tranexamic 4mg/ml
(a, b, c) Pre-treatment at (1st session)
(d, e, f) post-Treatment at (12th week)

Table-I displays the demographic profile of the two treatment groups. Most 30(56%) patients werre from 30-40 years old. 43(79%) patients have mixed types of melasma, while a pattern of melasma reported 28(52%) malar and 21(39%) Centro-facial; most of the patients, 30(56%), have Fitzpatrick skin type IV. Most of the patients were classified as mild using the MASI severity score.

Table-I: Demographic Profile of the Patients (n=54)

Characteristic	Categories	Frequency (%)
Age Groups	20-30 years	20(37%)
	31-40 years	30(56%)
	41-50 years	04(7%)
Gender	Male	16(30%)
	Female	38(70%)
Type of Melasma	Mixed	43(79%)
	Epidermal	11(21%)
Pattern of Melasma	Centro-facial	21(39%)
	Malar	28(52%)
	mandibular	05(9%)
Filtzpatrick skin type	Type III	05(9%)
	Type IV	30(56%)
	Type V	19(35%)
Severity of mMASI score	Mild	35(65%)
	Moderate	19(35%)

Table-II displays the Modified Melasma severity index scale pre- and post-treatment score, both were significant, showing drugs were effective for treating melasma. To find out which drug was more effective in treating melasma, we compare the post-treatment mean value of both Groups A and B, which was insignificant.

Table-II: Modified Melasma Severity Index Scale (n=54)

Modified MASI score	Group A (GA) Mean+SD	Group B (TXA) Mean+SD	*p*-value
Pre-treatment	3.62+2.77	4.65+1.79	0.11
Post-Treatment	2.62+2.09	2.30+1.72	0.54
Paired t-test *p*-value	0.001	0.001	
On Follow-up	2.53+2.05	1.62+1.31	0.05

DISCUSSION

In our study, 43(79%) patients have mixed types of melasma. In contrast, in the majority, a pattern of melasma, 28(52%) malar and 21(39%) Centro-facial reported (figure-1 & 2), patients with Fitzpatrick skin type were like 30(56%) type IV or 19(35%) type V. Most patients were classified as mild using the MASI score for severity. Modified melasma severity index scale pre-and post-treatment scores, interpreted as Glycolic acid at 70% and Tranexamic acid, are equally effective in treating melasma.

In the current study, 79% of patients suffered a mixed type of melasma, the majority malar 28(52%) and Centro-facial 21(39%) pattern of melasma, and Fitzpatrick skin type was reported in 30(56%) of patients, which is similar to the study conducted by Kaushik *et al*.[9] Our results show that Tranexamic acid and Glycolic acid are equally effective in treating melasma, similar to the study conducted by Parikh *et al*.[10]

In some studies, oral Tranexamic acid is much better than glycolic acid, as reported by Ilknur *et al*.[11] The normal effective dose for melasma is 250–500 mg taken 2–3 times per day, which is substantially lower than the amount used to control bleeding. Our findings are consistent with prior trials in which effective lightening was reported with oral Tranexamic acid treatment, with some adverse effects of gastritis and oligomenorrhea that resolved when medication was discontinued. Nausea, diarrhoea, orthostatic responses, colour vision problems, and other common side effects have been observed. After a three-month follow-up, the recurrence was seen in two individuals, which could be adequately treated again with Tranexamic acid medication.[9,12–14]

A dose-response experiment of various compositions of Glycolic acid peels for melasma found that 3 minutes of Glycolic acid application resulted in clinical improvement.[15] The topical Glycolic acid application caused a lessening in melanin in the epidermis and desquamation.[16] The findings of the current study differ due to applying Glycolic acid solely without any combination. Although Glycolic acid has the lowest molecular weight among the alpha hydroxyl acids, it is more penetrating in the skin, decreasing corneocyte adherence in the upper epidermal layers, generating an epidermolytic effect[17], enabling the ablation of melanized keratinocytes, resulting in melanin pigment reduction and accelerating skin regeneration. Glycolic acid also reduces melanin production in melanocytes.[18]

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LIMITATION OF STUDY

This study was conducted over a relatively short period. Depending on the chronic nature of the disease, large randomized multicenter trials with relatively long follow-ups are required to confirm the results and assess the

efficacy of distinctive modes of treatment. The appropriate course of therapy should be individualized for each patient based on age and medication tolerance.

CONCLUSION

The study concludes that Tranexamic acid and 70% Glycolic acid are equally effective in treating melasma. Moreover, Tranexamic acid reduced the recurrence of melasma compared to 70% glycolic acid. However, Glycolic acid topical application shows more compliance than the intradermal injection of Tranexamic acid.

Conflict of Interest: None.

Authors' Contribution

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

NK & MH: Data acquisition, data analysis, data interpretation, critical review, approval of the final version to be published.

BM & AS: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

RAK & TN: Conception, data acquisition, drafting the manuscript, approval of 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 investigated and resolved.

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