Original Article

A Comparative Study of Topical 4% Kojic Acid Versus 25% Glycolic Acid Peel in Patients With Melasma at a Tertiary Care Centre

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Abstract

Background: Melasma is a common facial hyperpigmentary disorder with frequent recurrence and variable treatment response. The objective is to compare the efficacy and safety of topical 4% kojic acid with 25% glycolic acid peels in moderate-to-severe melasma. **Material and Methods:** In this prospective comparative study, 60 adults were allocated to topical 4% kojic acid once nightly or 25% glycolic acid peel every 3 weeks for six sessions. Participants were followed for 18 weeks. The primary outcome was change in Melasma Area and Severity Index (MASI). Patient-reported severity and adverse effects were also assessed. **Results:** Both treatments significantly reduced MASI scores. At week 18, mean MASI was 10.45 ± 2.24 with kojic acid and 7.33 ± 1.87 with glycolic acid. Mean percentage MASI reduction was 48.47 ± 5.24% and 62.78 ± 6.30%, respectively ($p<0.001$). All participants in the glycolic acid group achieved a good response compared with 53.3% in the kojic acid group. Patient-reported severity was also lower with glycolic acid. Adverse effects were more frequent with glycolic acid, particularly desquamation, burning, dryness, and erythema. **Conclusion:** Glycolic acid peels produced greater improvement than topical kojic acid but were less well tolerated.

Keywords: Melasma, Kojic Acid, Glycolic Acid Peel, MASI, Chemical Peeling.

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Introduction

Melasma is a common acquired hyperpigmentary condition, which involves the development of symmetrical brown-to-gray macules and patches on sun-exposed areas of the face. It is predominantly a disease of females of reproductive age and common in darker Fitzpatrick skin types and tends to have a chronic, relapsing course.[1] Benign, it can significantly affect a woman's self-esteem, social interaction and quality of life due to its facial localization and permanent appearance.[2]

Initiated by UV and visible light, its pathogenesis is multifactorial and includes genetic susceptibility, hormonal factors and altered interactions between melanocytes, keratinocytes, fibroblasts and dermal vascular structures.[3] These processes help to explain the variability in treatment response and the high rate of recurrence. Thus, the recurrent and continued use of photoprotection and various topical depigmenting agents (including chemical peels) or other procedural therapies is generally required for management.[4]

The Melasma Area and Severity Index (MASI) is a clinical measurement that quantifies melasma by considering the size, intensity, and uniformity of melanin staining in facial areas. The MASI has been extensively used in therapeutic investigations and has shown good reliability when used longitudinally.[5]

Kojic acid is a tyrosinase inhibitor which works by inhibiting melanin production, and is found in topical depigmenting formulations. It has been demonstrated clinically that kojic acid alone can help improve melasma; the effectiveness may fluctuate depending on concentration, formulation and the use of other ingredients.[6,7] Well tolerated but can result in erythema, irritation and contact sensitivity.

The alpha-hydroxy acid glycolic acid is used extensively as a superficial chemical peel. It disrupts the adhesive ability of the corneocytes, speeds up epidermal turnover and makes the epidermal melanin more dispersive. For melasma, especially for dark skin phototypes serial glycolic acid peels have shown to be beneficial.[8] The value of these products as an additional treatment has not been consistent across studies, however, they are important to consider for adverse effects of burning, erythema, dryness, desquamation, and post-inflammatory hyperpigmentation do remain present.[9]

So far, there is limited direct comparison between topical kojic acid and low concentration glycolic acid (GA) peels, especially in Indian patients with moderate to severe melasma. This study,

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therefore, compared topical 4% Kojic acid to serial 25% glycolic acid peels for 18 weeks. Longitudinal MASI scores, percentage MASI reduction, categorized clinical response and patients' visible severity were analyzed as efficacy measures, and a systematic evaluation was conducted for treatment-related adverse effects. This study's goal was to identify the efficacy of using glycolic acid peeling for better clinical results and also if glycolic acid peeling offers superior clinical results or whether the benefits are offset by a higher risk of local side effects.

Materials and Methods

Study design and participants: This prospective, parallel-group comparative interventional study was conducted in the outpatient Department of Dermatology, Venereology and Leprosy, Jorhat Medical College and Hospital, Jorhat, Assam, over a 1-year period. Adults aged 18–50 years with clinically diagnosed moderate-to-severe melasma who were willing to participate were eligible. Pregnant or lactating women, patients with hypersensitivity to either study intervention, active facial infection, or receipt of any treatment for melasma during the preceding 3 months were excluded.

A feasibility-based sample of 60 participants was enrolled consecutively during the study period. The final sample comprised 30 participants receiving a topical 4% kojic acid formulation and 30 receiving 25% glycolic acid peel.

At enrollment, demographic and clinical information was recorded, including age, sex, occupation, duration of melasma, previous treatment, triggering factors, sun exposure, cosmetic use, and relevant family and hormonal history. Cutaneous examination documented the clinical distribution of melasma as centrofacial, malar, or mandibular. Fitzpatrick skin phototype was recorded, and Wood's lamp examination was used to classify melasma as epidermal, dermal, or mixed.

Treatment protocol: Participants in the topical-treatment group applied a thin layer of the formulation containing 4% kojic acid to the affected areas once nightly after cleansing for 18 weeks.

Participants in the chemical-peel group underwent a 25% glycolic acid peel every 3 weeks for six sessions. The peel was applied uniformly to the affected areas, maintained for 3–5 minutes according to clinical response, and subsequently neutralized and washed with water. A gentle moisturizer and broad-spectrum sunscreen were advised after each procedure.

All participants received standardized counselling regarding photoprotection, including avoidance of excessive sunlight, use of protective clothing, and daily application of a broad-spectrum sunscreen with a sun-protection factor of at least 30.

Follow-up and outcome assessment: Participants were evaluated at baseline and at 3-week intervals through week 18. Standardized frontal and lateral facial photographs were obtained under similar lighting conditions at baseline and follow-up visits.

Melasma severity was assessed using the Melasma Area and Severity Index (MASI). The MASI incorporates the area of involvement, darkness, and homogeneity in four facial regions weighted as follows: forehead, 30%; right malar region, 30%; left malar region, 30%; and chin, 10%. Total MASI scores range from 0 to 48, with higher scores indicating greater disease severity.

The primary outcome was the change in MASI score from baseline to week 18. Longitudinal MASI scores at weeks 3, 6, 9, 12, 15, and 18 were also evaluated. Absolute and percentage reductions in MASI were calculated for each participant. Treatment response at week 18 was categorized according to percentage MASI reduction as excellent (>75%), good (50%–75%), fair (25%–<50%), or poor (<25%). Week-18 MASI severity was classified as mild (<13), moderate (13–<25), severe (25–<37), or very severe (≥37).

Patient-reported visible melasma severity was measured at each follow-up visit using a 10-cm visual analog scale ranging from 0, indicating no visible melasma, to 10, indicating very severe melasma. Lower scores represented greater patient-perceived improvement.

Safety was assessed at every visit by recording erythema, burning sensation, pruritus, dryness, desquamation, post-inflammatory hyperpigmentation, hypopigmentation, contact dermatitis, and any other treatment-related event.

Statistical analysis: All continuous variables were summarized with mean ± SD and categorical variables were presented as n (%). The mean differences and 95% CI between treatment groups for continuous variables were computed using Welch's independent sample t test as appropriate. The chi-square test, Fisher's exact test or the Fisher–Freeman–Halton exact test were used to compare categorical variables based on cell frequencies. Changes in MASI and visual analogue scale scores over time were evaluated using two-way mixed repeated-measures analysis of variance, with treatment group as the between-participant factor and time as the within-participant factor. Group, time, and group-by-time interaction effects were assessed, and partial eta squared was reported as the effect-size measure. Odds ratios were calculated for adverse-effect comparisons where estimable. All tests were two-sided, and a p value <0.05 was considered statistically significant. Statistical analyses were performed using IBM SPSS Statistics version 20.0.

Ethical considerations: The study was approved by the Institutional Ethics Committee of Jorhat Medical College and Hospital (approval no. SMEJ/JMCH/MEU/841/Pt-III/2023/4832; November 18, 2024). Written informed consent was obtained from all participants before enrollment, and confidentiality was maintained throughout the study.

Results

Participant characteristics: The analysis included 60 participants with complete 18-week data, with 30 participants in each treatment group. Overall, 53 (88.3%) participants were women, and the mean age was 34.32 ± 5.50 years. Centrofacial melasma was the predominant clinical pattern, observed in 44 (73.3%) participants, while epidermal melasma was the most frequent Wood's lamp type in 33 (55.0%). Baseline demographic and clinical characteristics, including baseline

MASI scores, were comparable between the groups [Table 1].

Table 1: Baseline demographic and clinical characteristics of the study participants

Characteristic	4% kojic acid (n=30)	25% glycolic acid peel (n=30)	Total (N=60)	Test statistic	p value
Age, years	34.47 ± 5.78	34.17 ± 5.30	34.32 ± 5.50	t(57.6)=0.21	0.835
Sex, n (%)				Fisher exact	1.000
Female	27 (90.0)	26 (86.7)	53 (88.3)		
Male	3 (10.0)	4 (13.3)	7 (11.7)		
Duration of melasma, months	23.00 ± 7.32	23.17 ± 6.09	23.08 ± 6.68	t(56.1)=−0.10	0.924
Occupation, n (%)				FFH exact	0.956
Student	5 (16.7)	4 (13.3)	9 (15.0)		
Job	7 (23.3)	6 (20.0)	13 (21.7)		
Business	5 (16.7)	4 (13.3)	9 (15.0)		
Housewife	9 (30.0)	9 (30.0)	18 (30.0)		
Farmer	3 (10.0)	4 (13.3)	7 (11.7)		
Non-working	1 (3.3)	3 (10.0)	4 (6.7)		
Fitzpatrick phototype, n (%)				FFH exact	0.940
III	8 (26.7)	7 (23.3)	15 (25.0)		
IV	15 (50.0)	17 (56.7)	32 (53.3)		
V	6 (20.0)	5 (16.7)	11 (18.3)		
VI	1 (3.3)	1 (3.3)	2 (3.3)		
Clinical pattern, n (%)				FFH exact	0.817
Centrofacial	21 (70.0)	23 (76.7)	44 (73.3)		
Malar	7 (23.3)	6 (20.0)	13 (21.7)		
Mandibular	2 (6.7)	1 (3.3)	3 (5.0)		
Wood's lamp type, n (%)				FFH exact	1.000
Epidermal	16 (53.3)	17 (56.7)	33 (55.0)		
Dermal	4 (13.3)	4 (13.3)	8 (13.3)		
Mixed	10 (33.3)	9 (30.0)	19 (31.7)		
Baseline MASI score	20.08 ± 2.20	19.47 ± 1.53	19.77 ± 1.90	t(51.7)=1.25	0.218
Baseline MASI category, n (%)				Fisher exact	1.000
Moderate (13.0–24.9)	29 (96.7)	30 (100.0)	59 (98.3)		
Severe (25.0–36.9)	1 (3.3)	0 (0.0)	1 (1.7)		

Values are mean ± SD or n (%). Welch independent-samples t tests were used for continuous variables. Fisher exact or Fisher–Freeman–Halton (FFH) exact tests were used for categorical variables with sparse cells. MASI, Melasma Area and Severity Index.

Treatment efficacy: MASI scores declined progressively in both groups, with a greater reduction in the 25% glycolic acid peel group from the first follow-up onward [Figure 1 and Table 2]. At week 18, the mean MASI score was 7.33 ± 1.87 in the glycolic acid peel group and 10.45 ± 2.24 in the kojic acid group, corresponding to a between-group difference of −3.12 points (95% CI −4.19 to −2.06; t(56.2)=−5.86, p<0.001). The mean percentage reduction in MASI at week 18 was 62.78 ± 6.30% with glycolic acid peel and 48.47 ± 5.24% with kojic acid, a difference of 14.31 percentage points (95% CI 11.31–17.30; t(56.1)=9.57, p<0.001). A significant group-by-time interaction confirmed the greater longitudinal improvement with glycolic acid peel.

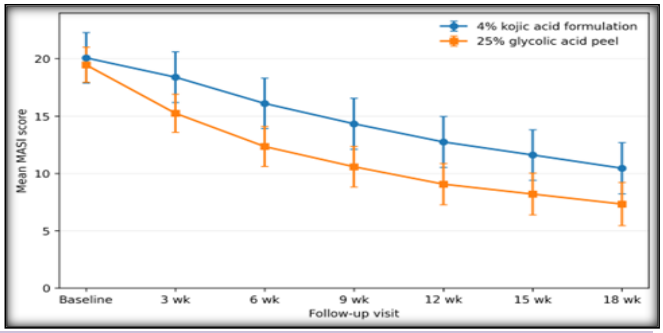

Figure 1. Mean MASI scores from baseline to week 18 by treatment group. Error bars represent standard deviations; n=30 per group. Lower scores indicate improvement.

Table 2: MASI trajectory and between-group treatment effects

Time point/outcome	4% kojic acid (n=30)	25% glycolic acid peel (n=30)	Difference, glycolic−kojic (95% CI)	Test statistic	p value
Baseline	20.08 ± 2.20	19.47 ± 1.53	-0.61 (-1.59 to 0.37)	t(51.7)=-1.25	0.218
Week 3	18.39 ± 2.22	15.25 ± 1.67	-3.15 (-4.16 to -2.13)	t(53.8)=-6.21	<0.001
Week 6	16.10 ± 2.20	12.34 ± 1.75	-3.76 (-4.79 to -2.73)	t(55.2)=-7.32	<0.001
Week 9	14.33 ± 2.22	10.58 ± 1.77	-3.75 (-4.78 to -2.71)	t(55.3)=-7.23	<0.001
Week 12	12.74 ± 2.22	9.06 ± 1.80	-3.68 (-4.73 to -2.63)	t(55.6)=-7.05	<0.001
Week 15	11.61 ± 2.20	8.20 ± 1.82	-3.41 (-4.45 to -2.37)	t(56.0)=-6.54	<0.001
Week 18	10.45 ± 2.24	7.33 ± 1.87	-3.12 (-4.19 to -2.06)	t(56.2)=-5.86	<0.001
Absolute MASI reduction, baseline to week 18	9.63 ± 0.45	12.14 ± 0.66	2.51 (2.22 to 2.81)	t(51.3)=17.17	<0.001

Percentage MASI reduction at week 18	48.47 ± 5.24%	62.78 ± 6.30%	14.31 (11.31 to 17.30)	t(56.1)=9.57	<0.001

Values are mean ± SD. Differences are calculated as 25% glycolic acid peel minus 4% kojic acid. Welch independent-samples t tests were used for visit-specific comparisons. Mixed repeated-measures ANOVA: group effect $F(1,58)=35.80$, $p<0.001$, partial $\eta^2=0.382$; time effect $F(6,348)=22720.79$, $p<0.001$, partial $\eta^2=0.997$; group×time interaction $F(6,348)=458.71$, $p<0.001$, partial $\eta^2=0.888$.

Patient-reported improvement and clinical response: Patient-reported melasma severity decreased in both groups and remained lower in the glycolic acid peel group at every assessment [Table 3]. At week 18, the mean VAS score was 2.19 ± 0.56 with glycolic acid peel compared with 3.29 ± 0.57 with kojic acid (mean difference −1.10, 95% CI −1.39 to −0.81; $t(58.0)=-7.53$, $p<0.001$). A good clinical response was achieved by 30 (100.0%) participants in the glycolic acid peel group and 16 (53.3%) in the kojic acid group, while 14 (46.7%) participants in the kojic acid group had a fair response. By week 18, mild-category MASI scores were present in 30 (100.0%) and 24 (80.0%) participants, respectively.

Table 3. Patient-reported melasma severity and week-18 clinical response

Outcome	4% kojic acid (n=30)	25% glycolic acid peel (n=30)	Difference, glycolic−kojic (95% CI)	Test statistic	p value
Patient-reported severity VAS					
Week 3	6.53 ± 0.67	5.30 ± 0.41	-1.23 (-1.52 to -0.94)	t(48.4)=-8.54	<0.001
Week 6	5.39 ± 0.66	4.03 ± 0.45	-1.36 (-1.65 to -1.06)	t(50.9)=-9.32	<0.001
Week 9	4.63 ± 0.62	3.35 ± 0.48	-1.28 (-1.57 to -0.99)	t(54.7)=-8.88	<0.001
Week 12	3.98 ± 0.58	2.77 ± 0.52	-1.21 (-1.49 to -0.92)	t(57.4)=-8.47	<0.001
Week 15	3.68 ± 0.58	2.49 ± 0.56	-1.19 (-1.48 to -0.89)	t(57.9)=-8.06	<0.001
Week 18	3.29 ± 0.57	2.19 ± 0.56	-1.10 (-1.39 to -0.81)	t(58.0)=-7.53	<0.001
Week-18 response					
Mild MASI category, n (%)	24 (80.0)	30 (100.0)	—	Fisher exact	0.024
Moderate MASI category, n (%)	6 (20.0)	0 (0.0)	—		
Good response, n (%)	16 (53.3)	30 (100.0)	—	$\chi^2(1)=18.26$	<0.001
Fair response, n (%)	14 (46.7)	0 (0.0)	—		

VAS scores ranged from 0 (no visible melasma) to 10 (very severe melasma); lower scores indicate improvement. Mixed repeated-measures ANOVA for VAS: group effect $F(1,58)=72.53$, $p<0.001$, partial $\eta^2=0.556$; time effect $F(5,290)=18198.32$, $p<0.001$, partial $\eta^2=0.997$; group×time interaction $F(5,290)=25.12$, $p<0.001$, partial $\eta^2=0.302$. Response categories were defined by percentage MASI reduction: excellent >75%, good 50–75%, fair 25–49%, and poor <25%; no excellent or poor responses occurred.

Safety outcomes

Adverse effects were more frequent with glycolic acid peel. At least one adverse effect was recorded in 30 (100.0%) participants receiving glycolic acid peel and 9 (30.0%) receiving kojic acid ($\chi^2(1)=32.31$, $p<0.001$). Desquamation, burning, dryness, and erythema were significantly more frequent in the glycolic acid peel group, whereas the frequency of pruritus did not differ significantly [Figure 2 and Table 4]. Post-inflammatory hyperpigmentation, hypopigmentation, and contact dermatitis were not observed in either group.

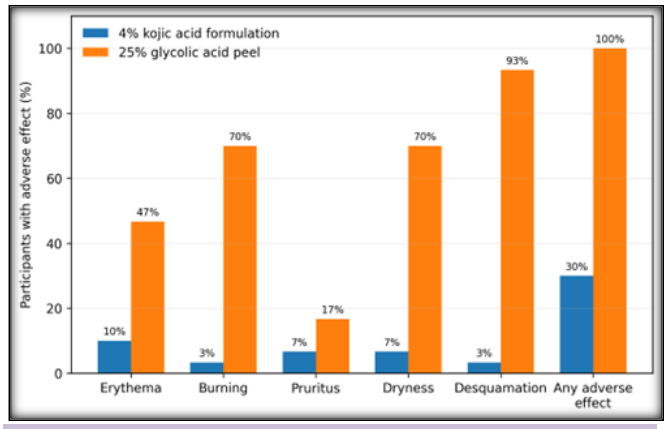

Figure 2: Frequency of adverse effects by treatment group. Bars represent the percentage of participants with each recorded event; n=30 per group.

Table 4: Adverse effects by treatment group

Adverse effect	4% kojic acid n (%)	25% glycolic acid peel n (%)	Total n (%)	Test statistic	p value
Erythema	3 (10.0)	14 (46.7)	17 (28.3)	Fisher exact; OR=0.13	0.003
Burning	1 (3.3)	21 (70.0)	22 (36.7)	Fisher exact; OR=0.01	<0.001
Pruritus	2 (6.7)	5 (16.7)	7 (11.7)	Fisher exact; OR=0.36	0.424
Dryness	2 (6.7)	21 (70.0)	23 (38.3)	Fisher exact; OR=0.03	<0.001
Desquamation	1 (3.3)	28 (93.3)	29 (48.3)	Fisher exact; OR=0.002	<0.001
Any adverse effect	9 (30.0)	30 (100.0)	39 (65.0)	$\chi^2(1)=32.31$	<0.001

OR values compare the odds of an event in the 4% kojic acid group with those in the 25% glycolic acid peel group. Post-

inflammatory hyperpigmentation, hypopigmentation, and contact dermatitis were not recorded in either group.

Discussion

Both topical 4% kojic acid and serial 25% glycolic acid peels produced progressive improvement in moderate-to-severe melasma over 18 weeks, but glycolic acid was consistently more effective. At week 18, the mean MASI reduction was 62.78% with glycolic acid compared with 48.47% with kojic acid, and all participants in the glycolic acid group achieved a good clinical response. Patient-reported severity also improved more with glycolic acid at every follow-up. This greater efficacy, however, was accompanied by substantially more adverse effects, establishing a clear efficacy–tolerability trade-off between the two interventions.

The improvement observed with kojic acid is consistent with previous evidence supporting its depigmenting effect. Monteiro et al. compared 0.75% kojic acid with 4% hydroquinone over 12 weeks and found significant improvement with both treatments, although hydroquinone produced earlier and greater lightening.[10] However, kojic acid continued to be clinically effective and was regarded as a suitable alternative topical agent. The nearly half reduction of MASI seen in this study may be due to a longer treatment period (18 weeks) and a higher 4% concentration. These results indicate that kojic acid might offer significant improvement; however, the results may be less dramatic than more aggressive therapies.

Our cohort seems to show an improvement similar to other peel-based improvement regimens. In a randomized study, Mahajan et al. demonstrated that glycolic acid peels with 20% azelaic acid had significant improvement in both MASI and VAS at 6 and 12 weeks post-treatment.[11] Effectiveness was comparable between the two regimens and there was limited adverse effects in both groups. In contrast, our glycolic acid group had a greater difference from the topical comparator and had a higher rate of local reactions. This difference could be caused by the variability of peel concentration, exposure time, concurrent treatments, and the definition of mild adverse effects.

Sarkar et al evaluated 35 glycolic acid, salicylic–mandelic acid and phytic acid peels in 90 Indian melasma patients.[12] The reductions in the MASI were about 62% using glycolic acid, 61% with salicylic–mandelic acid and 45% with phytic acid at 12 weeks. Glycolic acid and salicylic–mandelic acid were then more effective than phytic acid, but the salicylic–mandelic regimen was more tolerable. The 62.36% reduction, when using 35% glycolic acid, is very similar to the 62.78% reduction, with 25% glycolic acid in our study. The similar effect in spite of the reduced concentration might be connected to the duration of the treatment (6 sessions, 18 weeks) and the standard procedure for photoprotection. Their tolerability results also indicate that other, superficial peels may be useful if glycolic acid is too irritating.

The synergistic effect of glycolic acid in combination has also been proven by Dayal et al. who performed a study to compare topical azelaic acid with azelaic acid + glycolic acid peels.[13] The combination resulted in more improvement in MASI scores from 12 weeks and led to more percentage reductions in severity and more improvement in melasma-related quality of life. There were no serious adverse events reported. Our results also show that glycolic acid has a beneficial effect on both objective severity and perceived appearance. No direct measurements of quality of life were made, however, the consistently lower severity scores reported by the patients in the glycolic acid group suggests that the effect of the two groups was clinically meaningful.

Garg et al. evaluated glycolic acid alone, and when combined with trichloroacetic acid (10% and 20%) spot peels.[14] All three treatments resulted in a decrease of MASI scores, however, trichloroacetic acid did not yield a consistently better result, making it an undesirable option due to the possibility of causing an adverse reaction. They conclude that a uniform superficial glycolic acid peel is correlated with its use before progressing to more aggressive or combined peeling procedures. It is especially true when applied to our population with the majority of participants having Fitzpatrick phototypes IV-VI. Even with 25% glycolic acid use burning, dryness, desquamation and erythema were common, suggesting that more aggressive peel combinations may be more burdensome without necessarily being more effective.

Kumari and Thappa did a study that compared the effectiveness of graded glycolic acid peel and trichloroacetic acid peel in 40 women from India suffering from melasma.[15] Both treatments were found to have statistically significant effects on reducing severity, with glycolic acid demonstrating a better efficacy/tolerability profile and trichloroacetic acid a greater discomfort/pigmentary risk. They found that their results were similar to glycolic acid efficacy in darker skin phototypes. This is reassuring, as none of the post-inflammatory hyperpigmentation, hypopigmentation or contact dermatitis was seen in our study. However, 100% of all glycolic acid recipients were affected in some way, highlighting the need for careful application time, rapid neutralization, moisturisation and rigorous photoprotection.

Comparative data is also available recently to put the kojic acid response in perspective. Patil et al. study on Indian women 5% cysteamine and 2% kojic acid showed that both these products gave significant improvements after 16 weeks, however, 5% cysteamine showed a higher reduction in modified MASI and melanin measurements.[16] However, these effects were less than comparator and kojic acid was effective and generally tolerable. In the same way, 4% kojic acid for us had significant, but less impressive, results than glycolic acid. Because of its lower frequency of adverse effects however, it is a useful option for those patients for whom procedural treatment is not suitable or those who prefer a home based treatment.

The clinical characteristics of our cohort were similar to those of melasma patients in South Asian countries. The majority was female, the centrofacial pattern was the most frequent one and Fitzpatrick phototype IV was the most common. More than half of the subjects had epidermal melasma, which could have influenced the positive outcome as this type of melanin can be more readily removed by tyrosinase inhibitors and chemical

exfoliation. There were no significant differences in baseline demographic data, duration of disease, clinical pattern, type of Wood's lamp, MASI scores, or other baseline variables between groups, so the effect of treatment is unlikely to be due to imbalance at baseline. The longitudinal analysis enhances the findings. The glycolic acid had the most significant reduction of MASI after week 3, which remained until week 18. The large G × T interaction suggests that the treatments had different response patterns and not just varying end states at t6. CRI, which mirrored the clinician-assessed improvement, was also similar; increasing levels of patient-reported severity were associated with increasing levels of improvement. A slight decrease in the difference between the between-group MASI scores to week 18 suggests that extended use of kojic acid could yield continued improvement without as fast a pace.

Security is always a mainstay of treatment choice. In 70.0% of cases, burning, 93.3% of cases desquamation and 46.7% of cases erythema occurred. Desquamation in 93.3% of patients and burning and dryness in 70.0% of patients respectively, erythema occurred in 46.7% of patients who used glycolic acid. In comparison, 30% of the kojic acid group suffered some negative effect. The reactions that have occurred in the peel were not necessarily pigmentary but the increased frequency of these reactions could lower comfort, compliance and acceptance when outside the supervision boundary. In this context, glycolic acid might be better suited when quicker and more significant results are desired, while kojic acid may be more suitable if tolerability and convenience are factors.

This study has a number of strengths: the groups were comparable at baseline; there was full follow-up at 18 weeks; objective and subjective assessments were repeated; and adverse effects were systematically recorded. The use of absolute and percentage MASI reduction, response categories, confidence intervals, and repeated-measures analysis allowed for a complete assessment for treatment response.

Limitations are low single center sample, feasibility-focused recruitment, and lack of blinding and allocation concealment. There was no supplementation of dermoscopy, colorimetry or melanin-index measurement to the Woods's lamp examination. The patient perception was measured via a visual analogue scale, instead of a validated Melasma-specific quality-of-life instrument. Furthermore, a control group using sunscreen only and a follow-up after treatment was not included in the study to assess for recurrence and durability. Lastly, there were differences in treatments intensity and patient expectations between the regimen of a daily topical intervention and the supervised procedural intervention.

Conclusion

The 4% kojic acid and 25% glycolic acid peels were effective in moderate-to-severe melasma, with glycolic showing more and quicker clinical and patient-reported improvements. This benefit was balanced by significantly higher local adverse effects. Treatment choice should thus take into account the required speed of improvement and the amount of improvement, tolerability of irritation, convenience, and supervised procedures. Sustained response and recurrence should be compared in longer, randomized (and blinded), post-treatment studies.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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