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Comparative evaluation of effectiveness and safety of 92% lactic acid peel versus 35% glycolic acid peel in facial melasma and its impact on melasma quality of life score

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ABSTRACT

Background: Melasma is a prevalent acquired skin hyperpigmentation condition. This condition typically manifests on the face and can considerably impair an individual's self-image and self-esteem. Consequently, patients may find themselves avoiding social interactions due to feelings of social embarrassment. Therefore, prompt treatment of melasma is essential in enhancing patients' self-confidence. **Aims and Objectives:** The objective is to evaluate the effectiveness and safety of 92% lactic acid (LA) peels in comparison to 35% glycolic acid (GA) for the treatment of melasma, as well as their impact on the quality of life related to melasma. **Materials and Methods:** In this research, individuals with facial melasma were randomly divided into two groups, each comprising 20 participants. They underwent treatment with either a 92% LA peel or a 35% GA peel, administered at 3-week intervals over an 18-week duration. The results were evaluated 3 weeks after the last treatment session. Assessment methods utilized, including the Melasma Area and Severity Index (MASI) scoring and Melasma Quality of Life (MELASQOL) scores, to gauge treatment outcomes in both groups. Furthermore, any adverse effects were recorded. **Results:** The results were statistically significant regarding the reduction in mean and percentage decrease of the MASI and MELASQOL scores in both groups when compared to baseline. However, no significant differences were observed between the two groups, and only minimal adverse effects were reported. **Conclusion:** Both the 92% LA peel and the 35% GA peel have been shown to be effective and safe in reducing facial melasma, as well as enhancing MELASQOL scores, with comparable results observed in both treatment groups.

Key words: Melasma; Glycolic acid; Lactic acid; Melasma area and severity index scoring; Melasma quality of life scores

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INTRODUCTION

Melasma is a prevalent skin condition characterized by hyperpigmented patches, commonly observed in Indian women of reproductive age.[1] Although it primarily affects females, men also experience this disorder, accounting for approximately 10% of cases.[2] Individuals with melasma often face psychological challenges, as the condition typically manifests on the face, leading to diminished self-esteem and a tendency to avoid social interactions due to feelings of embarrassment over their visible blemishes.[3] A variety of treatment options are available for managing melasma, including the use of sunscreens, topical depigmentation agents, antioxidants, oral tranexamic

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acid, chemical peels, platelet-rich plasma, and laser and light therapies.[4,5] Glycolic and lactic acid (LA) peels, both classified as alpha hydroxy acids, are frequently employed as peeling agents in the treatment of melasma.[6] Glycolic acid (GA), in particular, is utilized as a superficial peel with concentrations ranging from 20% to 70%.[6] The two peels function through the controlled exfoliation of the stratum corneum, which promotes the regeneration of new stratum corneum and enhances collagen production.[7] Furthermore, LA possesses moisturizing properties that contribute to a smoother skin texture.[8] While numerous studies have been conducted on glycolic and LA in relation to melasma, there is a lack of research concerning the association of these acids with the quality of life scores in melasma patients. This gap in the literature motivates us to conduct this study to evaluate their effectiveness, safety, and impact on Indian subjects with facial melasma.

Aims and objectives

The aim of the study is to assess the impact of GA peel and lA peel for the treatment of melasma. The objective of this study is to evaluate the effectiveness and safety of a 92% LA peel in comparison to a 35% GA peel for the treatment of melasma. This will be measured using the Melasma Area and Severity Index (MASI) score. Additionally, the study aims to see the effect of LA peel versus GA peel on the Melasma Quality of Life (MELASQOL) scores.

MATERIALS AND METHODS

The study was an 18-week, prospective, single-centre, randomized interindividual investigation that received approval from the local ethics committee and was conducted in accordance with the principles set forth in the Declaration of Helsinki (approval number: IEC/Th/17/SVD/307). Written informed consent was obtained from all patients involved in the study. A total of forty patients aged over 18 years, diagnosed with epidermal facial melasma (as determined by Wood's lamp examination) and exhibiting a MASI score exceeding 10, were included, provided they had not undergone any treatment in the preceding 4 week.

Exclusion Criteria included pregnant, lactating women, individuals with active cutaneous viral infections, any history of hypersensitivity to the study formulation, patients currently using oral or topical retinoids, oral contraceptives, hormone replacement therapy, those with unrealistic expectations, and suffering from any active dermatoses such as atopic dermatitis, eczema, or seborrheic dermatitis.[9]

A total of forty patients diagnosed with epidermal melasma, as confirmed by Wood's lamp examination, participated in this study.[10] The participants were randomly assigned into two groups of twenty individuals each, based on a computer-generated randomization chart. Group 1 received treatment with 92% LA, while Group 2 was treated with 35% GA. A thorough medical history was obtained from each patient. The clinical response was evaluated using the MASI score, which was recorded at the initial visit prior to the commencement of treatment and subsequently at three-week intervals.[11] Additionally, the MELASQOL scale was assessed using a standardized questionnaire consisting of ten questions, both at baseline and at the conclusion of the 18-week period.[3,12] The results were evaluated by calculating the changes in mean MASI and mean MELASQOL scores of the patients and percentage decrease in MASI and MELASQOL score from the respective baseline value by comparing within each group and in between the two groups after completion of therapy. All patients were examined at each visit for any side effects.

Prior to the treatment, a sensitivity test was conducted on both groups by applying the peeling agent to the post-auricular area and allowing it to remain for 15–20 min. A total of six peeling sessions were conducted at 3-week intervals over the course of 18 weeks.

In both groups, patients were positioned supine on the table with their heads slightly elevated, and a drape sheet was placed around their necks. They were instructed to close their eyes. The facial area was cleansed using a cleaning solution (acetone solution) to eliminate any debris. The peeling solution was then uniformly applied with standard cotton-tipped applicators, starting with the forehead, followed by the malar region, and concluding with the chin. After a duration of 2–3 min, an erythematous reaction was observed, after which neutralization was performed using cold water, followed by gentle drying with gauze. Both groups were advised to follow strict photoprotection protocols and to avoid the use of abrasives, exfoliative sponges, or masks. Follow-up assessments and serial photographs were taken at baseline and subsequently at the end of the 3rd, 6th, 9th, 12th, 15th, and 18th weeks.

Statistical analysis

The data was meticulously coded and subsequently input into a Microsoft Excel spreadsheet. The analysis was performed using the Statistical Package for Social Sciences (SPSS version 20, IBM SPSS Statistics Inc., Chicago, Illinois, USA) software for Windows. Descriptive statistics were computed, which encompassed the calculation of percentages, means, and standard deviations. To compare quantitative data between two groups, the independent t-test was utilized, while the paired t-test was employed to evaluate quantitative data before and after observations.

The Chi-square test was used for comparisons of qualitative data involving two or more groups. A significance level was set at P≤0.05.

RESULTS

The demographic characteristics of the study participants are summarized in Table 1. At the baseline, there were no significant differences between the two groups in terms of age, sex distribution, duration of the disease, initial MASI score, and initial MELASQOL score (P>0.05), suggesting that the groups were comparable before the treatment commenced.[3] The outcomes for both groups were evaluated using MASI, MELASQOL, and the percentage reductions in mean quantitative scores. Clinical photographs taken before and after treatment for one patient from each group are depicted in Figures 1 and 2 (92% LA peel) and Figures 3 and 4 (35% GA peel). An analysis of the changes in mean MASI score indicated a statistically significant improvement in both groups from baseline to 18 weeks of therapy, with a P<0.001, as shown in Figures 5 and 6. However, at the end of the treatment, no significant difference was found in the mean MASI score between the two groups (P<0.82), as presented in Table 2. Furthermore, the analysis of the percentage decrease in MASI score also demonstrated a statistically significant difference in both groups from baseline to 18 weeks of therapy, with a P<0.001, as illustrated in Figures 7 and 8. Nonetheless, there was no significant difference in the percentage decrease in MASI score at the end of the therapy between the two groups (P<0.43), as indicated in Table 3. A statistical difference in the MELASQOL score was observed from baseline to 18 weeks of therapy in both groups, as presented in Table 4. However, when comparing the two groups regarding the reduction in mean MELASQOL score and the percentage decrease in MELASQOL score, the results were not statistically significant at the conclusion of the therapy (P=0.66 and P=0.57, respectively), as illustrated in Figures 9 and 10. Regarding side effects, as detailed in Table 5, one patient from Group 1 and three patients from Group 2 reported erythema, one patient from Group 1 and one patient from Group 2 experienced pruritus, and two patients from Group 2 reported a burning and stinging sensation. There was no statistically significant difference in side effects between the two groups (P>0.05).

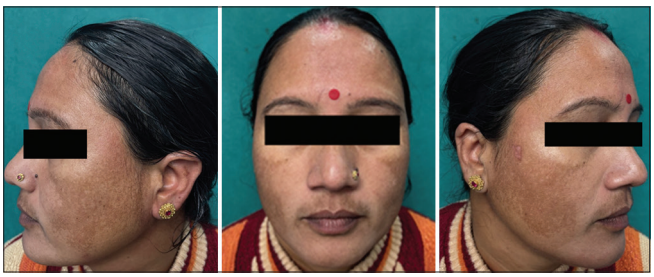

Figure 1: At baseline (92% lactic acid peel)

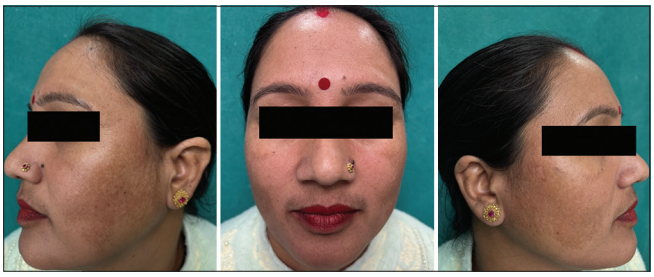

Figure 2: At the end of 18 weeks therapy (92% lactic acid peel)

DISCUSSION

Melasma is a recurrent hyperpigmentary disorder of the skin that affects areas exposed to sunlight, such as the face, neck, arms, and forearms, often in a symmetrical pattern.[2] The pathogenesis of melasma is multifactorial, with various contributing factors including genetic predisposition, pregnancy, ultraviolet radiation, the use of oral contraceptives, hormonal imbalances, stress, vascular influences, cosmetic products, and idiopathic causes in approximately one-third of cases.[13] The use of a Woods lamp examination is instrumental in distinguishing the types of melasma based on the depth of skin involvement, categorizing them as epidermal, dermal, mixed, or indeterminate.[14] The condition can lead to significant cosmetic concerns, adversely affecting patients' emotional and psychological well-being, which in turn can diminish their health-related quality of life.[15] To address this, Balkrishnan et al., introduced a novel questionnaire known as the MELASQOL score, designed to assess and

Table 1: Baseline data of the patients in the study

Demographic data	Group 1 (92% LA peel)	Group 2 (35% GA peel)	P-value
Age in years (Mean±SD)	31.85±5.69 years	32.80±5.25 years	0.58
Sex ratio (Male: Female)	19:1	18:2	0.5
Duration of disease in years (Mean±SD)	4.81±3.1 years	6.77±5.04 years	0.14
Baseline MASI score (Mean±SD)	23.88±5.56	23.51±5.82	0.83
Baseline MELASQOL score (Mean±SD)	54.35±6.62	55.9±8.09	0.51

LA: Lactic acid, GA: Glycolic acid, MASI: Melasma area and severity index, MELASQOL: Melasma quality of life

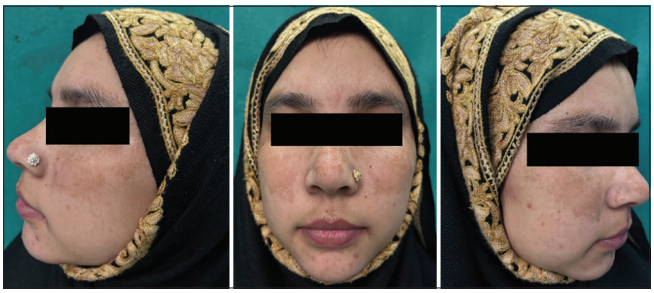

Figure 3: At baseline (35% glycolic acid peel)

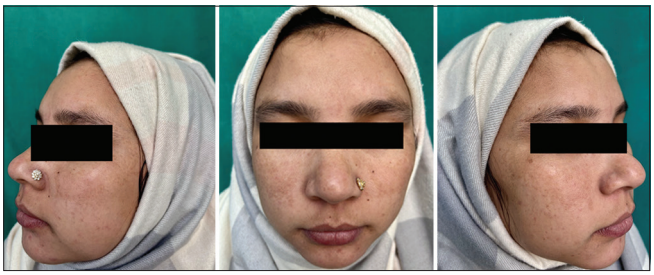

Figure 4: At the end of 18 weeks therapy (35% glycolic acid peel)

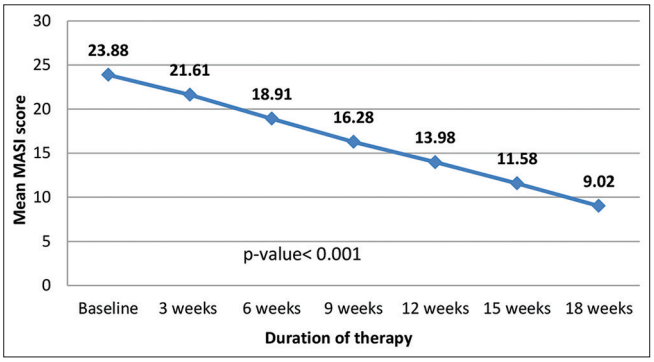

Figure 5: Mean melasma area and severity index scores at various time intervals in group 1 (92% lactic acid peel)

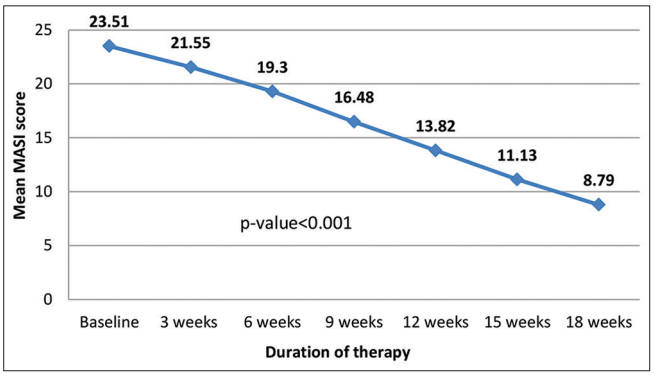

Figure 6: Mean melasma area and severity index scores at various time intervals in group 2 (35% glycolic acid peel)

monitor improvements in patients' quality of life during treatment.[16]

Managing melasma poses challenges due to its persistent and recurrent nature. Effective treatment strategies focus

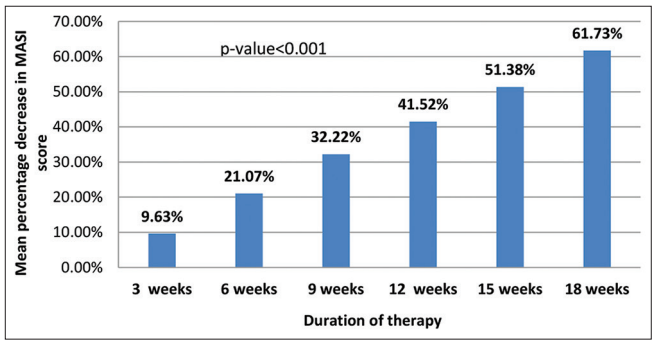

Figure 7: Mean percentage decrease in melasma area and severity index scores at various weeks of therapy as compared to baseline in group 1 (92% lactic acid peel group)

Table 2: Mean MASI score over the weeks in the two groups

Duration in weeks	Group 1 (92% LA peel group) (Mean±SD)	Group 2 (35% GA peel group) (Mean±SD)	P-value
3 weeks	21.61±5.22	21.55±5.88	0.97
6 weeks	18.91±4.84	19.30±5.82	0.81
9 weeks	16.2±4.51	16.48±5.42	0.90
12 weeks	13.98±3.84	13.82±4.84	0.90
15 weeks	11.58±3.31	11.13±4.27	0.71
18 weeks	9.02±2.65	8.79±3.71	0.82

LA: Lactic acid, GA: Glycolic acid, MASI: Melasma area and severity index

Table 3: Mean percentage decrease in MASI scores in group 1 (92% LA peel) and Group 2 (35% GA peel)

Duration in weeks	Group 1 (92% LA peel group) (Mean±SD)	Group 2 (35% GA peel group) (Mean±SD)	P-value
3 weeks	9.63±3.41	8.83±3.22	0.44
6 weeks	21.07±6.305	18.86±5.23	0.23
9 weeks	32.22±6.56	31.06±6.51	0.57
12 weeks	41.52±7.15	42.47±7.6	0.68
15 weeks	51.38±7.9	54.09±8.03	0.30
18 weeks	61.73±9.09	63.84±7.71	0.43

LA: Lactic acid, GA: Glycolic acid, MASI: Melasma area and severity index, MELASQOL: Melasma quality of life

on photoprotection, suppression of melanocyte activity, inhibition of melanin production, removal of existing melanin, and degradation of melanin granules.[17] Chemical peels have gained popularity for treating melasma, with options such as GA, lactic acid, trichloroacetic acid, salicylic acid, pyruvic acid, amino fruit acid, ferulic acid, Jessner's peel, black peel, red peel, yellow peel, and tretinoin peel.[6]

Lactic acid is an alpha hydroxy acid with the highest molecular weight and slower penetration rate. This contributes to reduced irritation and fewer side effects, making it suitable for patients with sensitive and dry skin

Table 4: Mean MELASQOL scores at baseline and at the end of 18 weeks therapy in Group 1 (92% LA peel group) and Group 2 (35% GA peel group)

Mean MELASQOL scores (Mean±SD)	Group 1 (92% LA peel group)		Group 2 (35% GA peel group)	
	At baseline	At the end of 18 weeks	At baseline	At the end of 18 weeks
P-value with respect to baseline	54.35±6.62	33.7±8.12 <0.001	55.9±8.09	34.6±4.51 <0.001

LA: Lactic acid, GA: Glycolic acid, MELASQOL: Melasma quality of life

Table 5: Side effects

Side effects	Group 1 (92% LA peel)	Group 2 (35% GA peel)
Erythema	1	3
Pruritus	1	1
Post inflammatory hyperpigmentation	0	0
Burning and stinging sensation	0	2
Scaling	0	0

LA: Lactic acid, GA: Glycolic acid

due to its inherent moisturizing properties as a humectant. Its application varies based on its concentration; lower percentages are utilized for moisturizing purposes, while higher concentrations serve as peeling agents.[8]

GA, another alpha hydroxy acid, is the most extensively researched peel for treating melasma. Its strength ranges from 30% to 70% in peeling solutions. Both lactic and GAs facilitate superficial exfoliation of the stratum corneum by disrupting corneocyte adhesion, which accelerates corneocyte turnover and enhances collagen production. The outcomes of these processes can result in firmer, smoother, and clearer skin. Alpha hydroxy acids are widely employed in the treatment of melasma, with GA being the most common choice; however, it is more expensive compared to lactic acid peels.[6,8] Despite its lower cost, humectant properties, and milder nature, lactic acid is less frequently used as a peeling agent than GA, which is associated with more side effects.[6,8] There remains a lack of studies comparing the effectiveness of lactic acid to GA in Indian patients with melasma. This gap in research prompted us to conduct a study to evaluate their effectiveness and their impact on the MELASQOL score among the treated subjects. In our study, the majority of participants were aged between 21 and 40 years. The average age of individuals in group 1 (92% lactic acid group) was 31.85±5.69 years, while in group 2 (35% GA group), it was 32.80±5.25 years. The difference in average age between the two groups was statistically insignificant (P=0.58). The study included 1 male and 19 females in group 1 and 18 female and 2 male in group 2.

In group 1, the mean MASI score decreased to 21.61±5.22, 18.91±4.84, 16.2±4.51, 13.98±3.84, 11.58±3.31, and 9.02±2.65 at the conclusion of the 3rd, 6th, 9th, 12th, 15th,

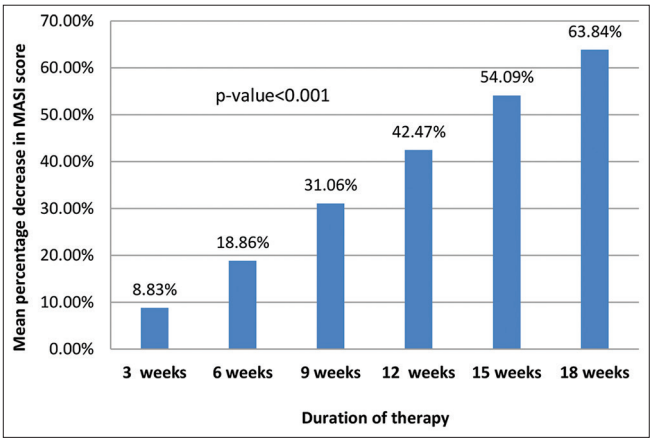

Figure 8: Mean percentage decrease in melasma area and severity index scores at various weeks of therapy as compared to baseline in group 2 (35% glycolic acid peel group)

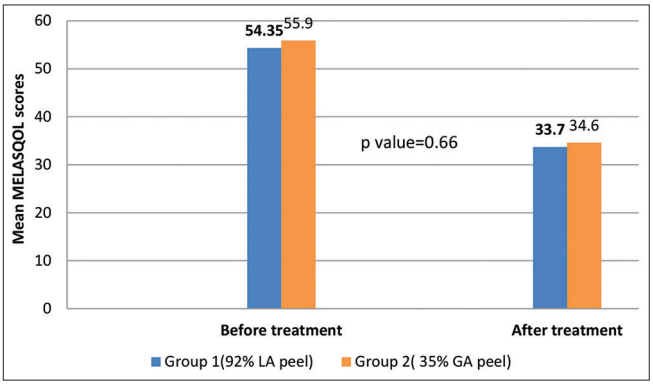

Figure 9: Mean melasma quality of life score before and after treatment in the both the groups

and 18th weeks, respectively, from a baseline value of 23.88±5.56, with a P<0.001 (Figure 5). When analysing the percentage reduction in the MASI score from baseline to the end of the 3rd, 6th, 9th, 12th, 15th, and 18th weeks of treatment within group 1, the findings indicated reductions of 9.63±3.41%, 21.07±6.305%, 32.22±6.56%, 41.52±7.15%, 51.38±7.9%, and 61.73±9.09%, respectively, with a statistically significant difference (P<0.001) (Figure 7). Consequently, in group 1, the mean MASI score decreased from a baseline of 23.88±5.56 to a final score of 14.86, reflecting a significant reduction of 61.73%. Numerous prior studies have documented substantial improvements in MASI scores following the application of lactic acid peels for melasma treatment.[18-20]

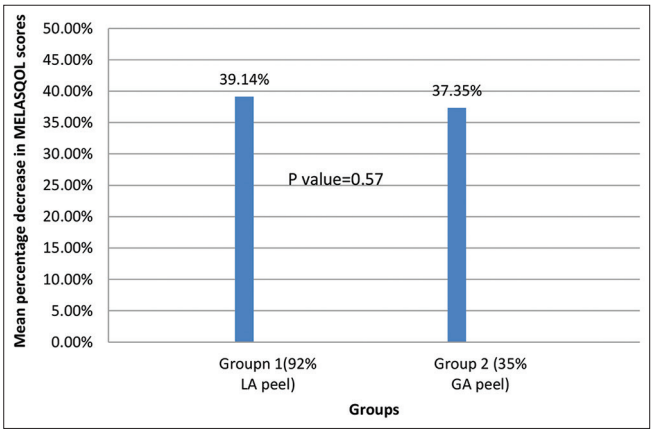

Figure 10: Mean percentage decrease in melasma quality of life score at the end of 18 weeks of therapy in the two groups

In our investigation, by the end of the 18-week period, the mean MELASQOL score in group 1 decreased to 33.7±8.12 from a baseline value of 54.35±6.62, demonstrating a statistically significant difference (P<0.001). The mean percentage reduction in the MELASQOL score relative to baseline was 39.14±11.24. This reduction in the MELASQOL score is notably higher in our study, as the assessments were conducted at the conclusion of 18 weeks, in contrast to the study by Magalhães et al., where evaluations were performed at the 8th week of therapy.[18]

In group 2, the mean MASI score decreased to 21.55±5.88, 19.30±5.82, 16.48±5.42, 13.82±4.84, 11.13±4.27, and 8.79±3.71 at the conclusion of the 3rd, 6th, 9th, 12th, 15th, and 18th weeks, respectively, from a baseline value of 23.51±5.82, with a P<0.001 (Figure 6). When analysing the percentage decrease in the MASI score from baseline to the end of the 3rd, 6th, 9th, 12th, 15th, and 18th weeks of treatment within group 2, the results were found to be 8.83±3.22, 18.86±5.23, 31.06±6.51, 42.47±7.6, 54.09±8.03, and 63.84±7.71, respectively, indicating a statistically significant difference (P<0.001) (Figure 8). Therefore, in group 2, the average reduction in the MASI score from baseline to the end of the 18-week treatment period was 14.72, reflecting a significant decrease of 63.84% in the MASI score. Numerous prior studies have documented substantial improvements in MASI scores following GA peels for melasma.[2,21,22]

In our investigation, by the end of 18 weeks, the mean MELASQOL score in group 2 decreased to 34.6±4.51 from a baseline value of 55.9±8.09, which was statistically significant (P<0.001). The mean percentage reduction in the MELASQOL score compared to baseline was 37.35±8.40.

Our research indicated a reduction of 61.73% in the MASI score for the LA group and a 63.84% reduction for the GA group after 18 weeks. The average decline in MASI scores from baseline within each group was statistically significant. However, when comparing the two groups, the differences in MASI score reductions and percentage decreases were not statistically significant (P=0.82 and 0.43, respectively). Similar results were reported in a previous study conducted by Dangi et al.[23]

When evaluating the reduction in MELASQOL scores at the conclusion of the 18-week therapy, the comparison between the two groups also yielded a statistically insignificant result (P=0.66).

Regarding side effects in our study, one patient in group 1 and three patients in group 2 experienced erythema after peeling, which resolved with the application of 1% hydrocortisone twice daily for 5 days. One patient from each group reported pruritus, which was alleviated with oral antihistamines. Additionally, two patients from group 2 experienced a burning sensation that was relieved through cold compresses, calamine lotion, and sunscreen application. The side effects observed in both groups were transient and did not necessitate the discontinuation of therapy, indicating the safety of both peels.

In conclusion, our study demonstrated that both peels are safe and effective in enhancing the MASI and MELASQOL scores of the patients.

Limitations of the study

It is a single centric study with a limited sample size.

CONCLUSION

It was determined that both the 92% Lactic acid peel and the 35% GA peel are effective and safe therapeutic alternatives for the treatment of melasma. When evaluated against one another, both peels demonstrate comparable clinical effectiveness, safety, and enhancement in the quality of life for patients suffering from melasma.

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