



Research Article

COMPARATIVE STUDY OF THERAPEUTIC EFFICACY AND SAFETY OF 70% GLYCOLIC ACID PEEL VERSUS LOW FLUENCE Q SWITCHED ND:YAG LASER IN THE TREATMENT OF MELASMA

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ABSTRACT

Background: Melasma is an acquired hypermelanosis characterized by light-to-deep brown pigmentation over cheeks, forehead, upper lip, and nose. Treatment of this condition is difficult and associated with high recurrence rates. Among newer therapies, there is interest in the use of glycolic acid peels and Q-switched Nd:YAG laser (QSNYL). The aim of the present study was to compare the therapeutic efficacy and safety in melasma.

Methods: 50 patients of melasma were included in the study. Randomly divided in two groups (Group A = 25 patients treated with glycolic acid and Group B = 25 patients treated with QSNYL). Response to treatment was assessed using MASI scores.

Results: The peak incidence of melasma was seen in the age group 30-39 years. Female preponderance was seen in the study (F: M-7.3:1). Centrifacial type was the most common (48.0 %) observed in both the groups. MASI scores improved from 6.82 to 4.30 with glycolic acid peel and from 7.22 to 4.96 in the laser group at the end of the study. Post-inflammatory hyperpigmentation was frequent in laser treated patients. The common adverse effect observed in the study was erythema in both the groups.

Conclusions: 70% Glycolic peels were better than Q switched Nd: YAG laser for the treatment of melasma. Among patients treated with laser post-inflammatory hyperpigmentation was a significant side effect especially in darker skin types.

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INTRODUCTION

Melasma is a common skin problem. It causes brown to gray-brown patches, usually on the face. Most people get it on their cheeks, bridge of their nose, forehead, chin, and above their upper lip. It also can appear on other parts of the body that get lots of sun, such as the forearms and neck. It commonly affects people of darker skin type.^{1,2} One of the most common treatment for melasma is sun protection. This means wearing sunscreen every day and reapplying the sunscreen every 2 hours. Women are far more likely than men to get melasma. It is so common during pregnancy that melasma is sometimes called "the mask of pregnancy." Estrogen and progesterone sensitivity are also associated with the condition. This means birthcontrol pills, pregnancy, and hormone therapy can all trigger melasma. Stress and thyroid disease are also thought to be causes of melasma. In today's modern world, it is a cause of great emotional and psycho-social stress to both men and women, affecting their quality of life.³ Agents such as hydroquinone⁴, and peeling time must be titrated with caution in these darker skin types.⁵

Various lasers have been used for melasma, of which Q switched Nd: YAG laser is commonly used.⁶ These lasers disrupt the melanin granules in the upper dermis and the tiny melanin granules are engulfed by macrophages.⁷ Epidermal melasma responds faster and better than dermal or mixed melasma. Post inflammatory hyperpigmentation and rebound melasma are common and improvement has to be maintained by repeated treatment sessions.⁸ This study was conducted with the aim to compare the efficacy, clinical outcomes and side effects of 70% glycolic acid peels and low fluence Q switched Nd:YAG laser in the treatment of melasma as standalone treatments along with sunprotection.

METHODS

Fifty patients diagnosed as melasma were enrolled in the study at the Department of Dermatology, Venereology and Leprosy at S.N Medical College & Hospital from Oct 2016 to Oct 2017. The patients were randomly divided into two groups (Group A: 25 patients of melasma treated with 70 % glycolic acid, Group B: 25 patients of melasma treated with Q Switched Nd:YAG laser with 1064nm wave length). Patients fulfilling the above criteria were asked for a written consent for their participation in the study. Clinical photographs were taken before starting the study.

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Inclusion criteria

- Patients with melasma.
- Patients with realistic expectations.

Exclusion criteria

Patients with a history of recurrent herpetic infections, *Molluscum contagiosum*, viral warts, active bacterial infections, Hypersensitivity to the chemical peel, patients with photosensitive dermatoses, Patients with any systemic or endocrinological illness. Patients on oral contraceptives, hormone replacement therapy, Pregnant, and lactating women. Patients with HIV and HBsAg were excluded. Patients on isotretinoin. Patients with history of keloids or hypertrophic scars

Procedure for treatment with 70% glycolic acid: The patients were asked to wash the face with water and asked to lie down with head elevated to 45 degrees, the eyes closed with eyepads. The skin was degreased with alcohol. The required strength of the peeling agent was poured into a bowl and neutralizing agents were kept ready. Sensitive areas like the inner canthus of the eyes and nasolabial folds were protected with vaseline. The peeling agent was then applied with a brush. The peel was applied on the entire face, beginning from forehead, then the right cheek, nose, left cheek and chin in that order. If required, the perioral, upper and lower lids were treated last. Feathering strokes were applied at the edges to blend with surrounding skin and prevent the demarcation lines. The peel was neutralized after the predetermined duration of 5 minutes. The neutralization was done with 10-15% sodium bicarbonate and then, washed off with water and dapped with ice cubes. In case of erythema or frosting before 5 minutes the peel was neutralized immediately. The patient was advised to avoid prolonged exposure to sunlight, to use sunscreen SPF30 every 2 hourly interval, and avoid any kind of topical therapy on the face. This procedure was done at 2 weekly interval for 6 sittings in a period of 12 weeks. MASI score was estimated and clinical photographs were taken after every sitting.

The severity of the melasma in each of the four regions (forehead, right malar region, left malar region and chin) is assessed based on three variables: percentage of the total area involved (A), darkness (D), and homogeneity (H).

A numerical value assigned for the corresponding percentage area involved is as follows: 0= no involvement; 1=<10% involvement; 2=10-29% involvement; 3=30-49% involvement; 4=50-69% involvement; 5=70-89% involvement; and 6=90-100% involvement. The darkness of the melasma (D) is compared to the normal skin and graded on a scale of 0 to 4 as follows: 0= normal skin color without evidence of hyperpigmentation; 1=barely visible hyperpigmentation; 2=mild hyperpigmentation; 3=moderate hyperpigmentation; 4=severe hyperpigmentation. Homogeneity of the hyperpigmentation (H) is also graded on a scale of 0 to 4 as follows: 0=normal skin color without evidence of hyperpigmentation; 1= specks of involvement; 2=small patchy areas of involvement <1.5cm diameter; 3= patches of involvement >2cm diameter; 4= uniform skin involvement without any clear areas).

To calculate the MASI score, the sum of the severity grade for darkness (D) and homogeneity (H) is multiplied by the numerical value of the areas (A) involved and by the

percentages of the four facial areas (10-30%).

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

Laser

Low fluence Q Switched Nd: YAG Laser (1064nm) was used in our study. 6 sessions of laser at 2 weekly interval was done for a period of 12 weeks. Topical anaesthesia (mixture of lignocaine and prilocaine) was applied 1 hour prior to laser under occlusion. The procedure was done in a room specially meant for lasers and eyes protected with protective glasses. The patient was made to lie down comfortably over the couch with head elevated to 45 degrees. Laser shots were administered at parameters 6-8mm spot size, 4-5Hz, 0.5-1J/msq, with 2 passes done at 2 weekly intervals, with an increment of 0.1J/cm sq was done at every session till the energy fluence of 1J/cm sq is attained at the 6th session. Passes were stopped in case of immediate erythema. Patients were advised to use sunscreen SPF30 during the day and repeat the application at 2 hours interval and avoid any kind of topical therapy. MASI (melasma area severity index score) was assessed and clinical photographs were taken before and after every sitting.

Statistical analysis

All data collected using a proforma were entered in Microsoft Excel 2010 sheet and a master chart was prepared. The data was analysed using statistical package for social studies software version 17.0. Chi square test was used to evaluate correlations between variables. A p-value of <0.05 was considered significant.

RESULTS

Table 1 presents the demographic data of the patients. Out of 50 patients who were included in the study, there were 44(88.0%) females and 6(12.0%) males. The female:male ratio was 7.3:1. In the present study, peak incidence (52%) of melasma was in the age group 30-39 years. Of them 84% were married and remaining 16% were unmarried.

Table 1 Demographic data in the both groups

Variables	Peel group		Laser group		Total		P-Value
Age in yrs	Number	%	Number	%	Number	%	
20-29	4	16.0	5	20.0	9	18.0	
30-39	12	48.0	14	56.0	26	52.0	
40-49	7	28.0	5	20.0	12	24.0	0.82
50-59	2	8.0	1	4.0	3	6.0	
Gender							
Male	4	16.0	2	8.0	6	12.0	0.38
Female	21	84.0	23	92.0	44	88.0	
Marital status							
Unmarried	5	20.0	3	12.0	8	16.0	0.44
Married	20	80.0	22	88.0	42	84.0	
Duration of Disease							
<6 months	2	8.0	1	4.0	3	6.0	0.91
6-12 months	3	12.0	3	12.0	6	12.0	
1-2 years	8	32.0	6	24.0	14	28.0	
2-5 years	7	28.0	8	32.0	15	30.0	
>5 years	5	20.0	7	28.0	12	24.0	

In both the groups, the duration of the disease ranged from 6 months to more than 5 years. A positive family history was seen in a total of 27(54.0%) patients in both the groups. All the two groups are comparable with no statistically significant difference (p>0.05) based on the age, gender, marital status

and duration of disease. Centrifacial type was the most common (48.0%), followed by malar melasma (42.0%) and mandibular 10.0% patients. The distribution of clinical pattern in each group is given in Table 2. In the present study melasma are a severity index (MASI) score improved from 6.82 to 4.30 with glycolic acid peel and from 7.22 to 4.96 in the laser group at the end of the study. Statistically significant results were seen when the responses were compared after the 3rd sitting with the Laser group showing better result (p=0.035) as seen in Table 3.

Table no 2 Clinical types of melasma

Clinical types	Peel group		Laser group		Total	
	Number	%	Number	%	Number	%
Centrifacial	13	52.0	11	44.0	24	48.0
Malar	10	40.0	11	44.0	21	42.0
Mandibular	2	8.0	3	12.0	5	10.0

Table no. 3 Evaluation of MASI scores of the study participants in the both groups

MASI Score	Peel Group	Laser Group	P-Value	All Cases
MASI-I	6.82 ± 3.82	7.22 ± 3.58	0.538	7.02 ± 3.70
MASI-II	6.23 ± 3.61	6.78 ± 3.34	0.261	6.50 ± 3.48
MASI-III	5.84 ± 3.53	6.32 ± 3.06	0.035	6.08 ± 3.30
MASI-IV	5.22 ± 3.34	5.87 ± 2.86	0.427	5.54 ± 3.10
MASI-V	4.76 ± 3.31	5.38 ± 2.51	0.542	5.07 ± 2.91
MASI-VI	4.30 ± 3.27	4.96 ± 2.20	0.638	4.63 ± 2.74

The response to lasers plateaus out after the 3rd sitting, while the MASI scores continue to decrease till the last sitting in the peel group

In the present study 25%-50% improvement was seen in maximum number of patients (48.0%) ie.14 patients in peel group and 10 patients in laser group. More than 50% improvement was observed only in 5 patients in the glycolic peel group and 3 patients of the laser group as tabulated in Table 4.

Table no. 4 Comparison of response in both groups at the end of 12 weeks

Improvement	Peel Group (n=25)		Laser Group (n=25)		Total (n=50)	
	No.	%	No.	%	No.	%
<25	6	24	12	48	18	36
25-50	14	56	10	40	24	48
>50	5	20	3	12	8	16
Inference	Improvement in two groups is statistically similar with p= 0.205					

The adverse effects in each study group are given in Table 5. Most common side effect of peels was erythema followed by transient burning. In laser group erythema was the predominant adverse effect observed in 12 patients followed by mild pigmentation in 8 patients.

Table no 5 Adverse Effects of the treatments in both the groups

Adverse Effect	Peel Group(n=25)	Laser Group (n=25)
Erythema	15	12
Transient Burning	9	5
Mild pigmentation	4	8
Moderate pigmentation	NIL	3
Severe pigmentation	NIL	NIL
Post Inflammatory Hyperpigmentation	1	3
Mild Scaling	3	NIL
Frosting	NIL	2

DISCUSSION

Melasma causes significant social and emotional stress to the patients and although many treatment modalities are available, its management remains a challenge due to its recurrent and refractory nature. In our study the majority of patients were in the age group of 30-39 years a kin to studies done by Karetal and Bansal *et al.*^{3,9} About 88.0% of our study population were females and 84.0% of the cases were married. In most of the cases the duration of melasma ranged from 6 months to 5 years and a family history was obtained in 54.0% of cases. Goyal *et al* too observed that the average duration of melasma was 60 months.¹⁰ Exposure to sunlight aggravated the melasma.¹¹ Centrifacial pattern was the most common pattern of melasma observed in our study. Bansal *et al* observed that centrifacial pattern was the commonest followed by malar and mandibular types.³ MASI score based on the area, pigmentation and homogeneity of the patches were assessed at the beginning and at the end of each session. In the glycolic peel group, MASI scores improved from 6.82 to 4.30 and in the laser group from 7.22 to 4.96. On further observation we found that the improvement in laser group is very good with the first 3 sittings after which there is no significant improvement. This observation is likely to be due to the fact that the epidermal component of the melasma responds faster with laser therapy while the dermal component takes a longer time to respond. In the case of 70% glycolic peels, visible and significant improvement was observed after the 2rd sitting onwards. Goyal *et al* found an improvement of 33% in MASI scores with 50% glycolic peel and 47% with 70% glycolic peel.¹⁰ Sachdeva *et al* too concluded that 35%-70% glycolic acid was effective in the treatment of melasma.¹² Zhou *et al* using Qswitched Nd:YAG1064nm laser observed a mean decrease in MASI by 61.3%.¹³ Less than 50% of study population had 25-50% improvement. These findings seem to suggest that Qswitched Nd: YAG laser may not be very effective in people with darker skintones. The adverse events associated with 70% glycolic peels included transient and patchy erythema (60%), mild scaling and post inflammatory hyperpigmentation (16.0%). Puri reported burning sensation (6.6%), erythema (10%), post inflammatory hyperpigmentation (13.3%) as the common adverse effects of peels.¹⁴ We found that worsening of melasma was higher in the group treated with laser with 12.0% of patients developing post inflammatory hyperpigmentation. Transient burning and erythema was observed in 68.0% of cases. Wattanakrai *et al* reported spotty hypopigmentation (13.6%) and rebound hyperpigmentation (18%) as the main adverse effects with laser treatment of melasma. In their study all patients had recurrence.¹⁵

CONCLUSION

In our study 70% Glycolic peels were better than low fluence Q switched Nd: YAG laser for the treatment of melasma. Chemical peels remain popular for the treatment of pigmentation and aesthetic improvement. They are best used in combination with other treatments. However the results were not statistically significant. Among patients treated with laser, better results were obtained in the first three sittings.

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