

Combination Of Q-Switched Nd:YAG Laser And Topical Tri-White Serum In Treatment Of Melasma

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Abstract—Recently, the Q-switched Nd:YAG laser has been reported to be an effective and safe method for melasma treatment and has become a new trend in clinical practices. In Vietnam, there has been no study conducted to evaluate the effectiveness of the Q-switched Nd:YAG laser on melasma patients yet. This study aims to evaluate the efficacy of the combination of the Q-switched Nd:YAG laser and the topical Tri-white serum in melasma treatment at Can Tho University of Medicine and Pharmacy Hospital. This study was a cross-sectional descriptive study with 90 participants, diagnosed with melasma at Can Tho University of Medicine and Pharmacy Hospital from April 2019 to July 2020. At the end of the treatment procedure, of all the participants, 13.41% had good results/completely cured, 41.46% saw significant improvements, 45.12% had slight improvements. No case got worse. The MASI score decreased over the treatment sessions, by 4.91 ± 2.70 points in total compared to the beginning. The success rate of the Q-switched Nd:YAG laser and the Tri-white serum combining method in melasma treatment was 82.22%.

Keywords — *melasma, Q-switched Nd:YAG laser, Tri-white serum.*

I. INTRODUCTION

In recent years, the Q-switched Nd:YAG laser has been reported to be an effective and safe method with minimal side effects for treating melasma patients (1). This method is favored because of its noninvasive, painless nature so that it does not require a postoperative recovery period.

In Vietnam, the Q-switched Nd:YAG laser was used to treat melasma at some beauty salons and some dermatological hospitals with caution because there has been no study or report about the treatment result of the Q-switched Nd:YAG on Vietnamese melasma patients yet. Therefore, we chose to evaluate the efficacy of the combination of the Q-switched Nd:YAG laser and the topical Tri-white

serum in the treatment of melasma at Can Tho University of Medicine and Pharmacy Hospital.



Figure 1. Tri-white serum used in this study

II. METHODS

A. Selecting of participants

There were 90 participants taking part in the study. All of them were diagnosed with melasma at Can Tho University of Medicine and Pharmacy Hospital based on these criteria:

- Light to dark brown areas of pigmentation with unclear boundaries, alternate with normal skin areas in some cases.
- No pruritus, no skin atrophy.
- Lesions are commonly bilaterally located on the forehead, the temples, the malar, and the mandibular regions. They may be less on the eyelids and the chin (2).

Exclusion criteria:

- Pregnancy.
- Patients had pigmentation disorders because of some endocrine disorders, some genetic, metabolic diseases (hemochromatosis), chronic malnutrition, or using anti-malarial drugs or tetracycline, or other occupational factors (frequently contact with petroleum, tar, arsenic poisoning).
- Patients applied the topical medication containing hydroquinone, tretinoin, steroids or had some oral drugs containing vitamin A agonists (isotretinoin, acitretin) or steroids within six months before the study.

- History of using other types of chemical peels, microdermabrasion, or laser therapies within nine months before the study.
- Patients who are allergic to anesthetic substances, or some topical ingredients used in the study.
- Patients did not follow the checking-up timeline after the treatment.
- Patients did not agree to participate in the study.

B. Implementations

The participants were examined and evaluated their clinical features. The MASI score of melasma lesions was then grouped into epidermal, dermal, and mixed melasma using the Wood lamp (3). Every three weeks, we noted the change in colors, area of the lesions, and the MASI score.

Evaluation of pigmentation was on a scale of five grades. Grade 0 was no lesion or only a few pigmented spots. Grade 1 was a significant improvement, in which the lesions lightened and have no different from normal skin. Grade 2 was a slight improvement with lesions lightened but can be easily detected. Grade 3 was no improvement; the lesions look the same as before. Finally, grade 4 was worsening; more lesions appeared or lesions darkened (4).

The evaluation based on the MASI classification has four levels. Slight melasma has below 5.5 MASI score, followed by moderate melasma with a MASI score from 5.5 to under 8.7, and severe melasma has a MASI score from 8.7 to under 13.1. Very severe melasma has MASI score from 13.1 to 48 (5).

The successful treatment was a cleared or improved lesions comparing to the baseline. The unsuccessful treatment was the non-change lesions or even got worse according to the MASI classification.

III. RESULTS

Pre-treatment evaluation

Most of the participants (98.9%) were female. The age has fluctuated from 22 to 64 years with the mean age of 40.98 ± 7.48 years as shown in table 1.

Table 1. Age distribution of patients

Age group	Frequency (n)	Rate (%)
< 30	3	3.33
≥ 30	87	96.67
Total	90	100.0
$\bar{X} \pm SD$	40.98 ± 7.48 (22 - 64)	

The epidermal melasma had the highest proportion (65.56%), the mixed and dermal melasma was 25.56% and 8.89%, respectively (Table 2). At first, most patients had moderate to severe melasma (81.12%) based on the pigmentation levels and lesions area. Moderate and severe melasma accounted for 32.22% and 38.89%, respectively (Table 3).

Table 2. Types of melasma based on Wood's light examination

Types	Frequency (n)	Rate (%)
Epidermal	59	65.56
Dermal	8	8.89
Mixed	23	25.56
Total	90	100.0

Table 3. Melasma severity at the beginning

Severity	Pigmentation & lesions area		MASI	
	Frequency (n)	Rate (%)	Frequency (n)	Rate (%)
Slight (light brown)	17	18.89	13	14.44
Moderate (brown)	42	46.67	29	32.22
Severe (dark brown)	25	27.78	35	38.89
Very severe (black)	6	6.67	13	14.44
Total	90	100.0	90	100.0

The effectiveness of the treatment of the combination



Figure 2. Pre- and post-treatment comparison

There were some improvements on clinical examination at the time of 3-week, 6-week, 9-week, and 12-week follow-up, shown in table 4. At the end of the treatment procedure, 13.41% of all the participants had good results/completely cured, 41.46% had significant improvements, 45.12% had slight improvement. There were no worsen cases in this study (shown in table 4).

Table 4. Clinical improvement of melasma

Improvement	3 weeks after (n=90)	6 weeks after (n=90)	9 weeks after (n=90)	12 weeks after (n=82)
Clearing	0 (0.0%)	0 (0.0%)	8 (8.89%)	11 (13.41%)
Significant improvement	34 (37.78%)	37 (41.11%)	39 (43.33%)	34 (41.46%)
Slight improvement	43 (47.78%)	53 (58.89%)	43 (47.78%)	37 (45.12%)
No improvement	13 (14.44%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Worsening	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)

The MASI classification of melasma showed improvement at 3-week, 6-week, 9-week and 12-week shown in table 5. Severe and very severe melasma was ameliorating over time of treatment.

Table 5. The MASI classification of melasma

Melasma	Pre-treatment (n=90)	3 weeks after (n=90)	6 weeks after (n=90)	9 weeks after (n=90)	12 weeks after (n=82)
Slight	13 (14.44%)	19 (21.11%)	42 (46.67%)	53 (58.89%)	55 (67.07%)
Moderate	29 (32.23%)	43 (47.78%)	32 (35.56%)	25 (27.78%)	18 (21.95%)
Severe	35 (38.89%)	19 (21.11%)	9 (10.00%)	8 (8.89%)	8 (9.76%)
Very severe	13 (14.44%)	9 (10.00%)	7 (7.78%)	4 (4.44%)	1 (1.22%)

The successful rate of treatment was 82.22% in total, comprised of 17.78% completely recovered and 64.44% partly recovered. However, there were 16/90 patients (17.78%) had no improvement (Table 5).

IV. DISCUSSION

At the end of treatment (12 weeks after the beginning), based on clinical examination, 13.41% of patients completely recovered, 41.46% significantly improved. In the evaluation of laser treatment after the 4th, 6th, 8th laser session, the MASI index was decreasing over time proving that all patients responded to the treatment. In general, the successful rate was 82.22% with 17.78% completely recovered and 64.44% had improvement.

These results were different from the figures that had been reported before. In 2014, Sim et al. study found that 74% of patients were successfully treated after 15 treatment sessions (6). In 2016, Gokalp et al. study reported the MASI score of 58.8% of patients was decreased (1). In 2018, the successful rate of treatment in Choi et al study was 72.5%, in which 35% had good improvement and 37.5% had moderate improvement (7).

There are many reasons that lead to the differences. Severe and large melasma lesions would respond to treatment worse than mild and small lesions. The younger patients would respond better. The result is also affected by the treatment technique and parameters. However, the common thing of all the studies was that the efficacy of the Q-switched Nd:YAG laser in melasma treatment was very high. The condition was improving over time and the more treatment sessions were attended, the better the results were.

In our study, the mean MASI score pre-treatment (T0), 3-week follow-up (T1), 6-week (T2), 9-week (T3), 12-week (T4) were 9.25 ± 4.50 ; 8.09 ± 4.30 ; 6.29 ± 3.70 ; 5.55 ± 3.67 ; 5.20 ± 3.53 , respectively (Figure 1). The decrease was statistically significant between two adjacent laser sessions ($p < 0.05$). The MASI score at the end of treatment (T4) decreased by 4.91 ± 2.70 points from the baseline (T0), which was statistically significant with $p < 0.01$. Comparing to previous studies, we found that the MASI scores in our study dropped more significantly (figure 1). For example, Gokalp et al. (2016) reported that MASI scores decreased from 6.7 ± 3.3 to 3.2 ± 1.6 after treatment ($p < 0.01$) (1). The study of Guo et al (2019) found that the mean decrease of MASI score was 2.69 ± 2.32 points from the initial point of $7.09 \pm$

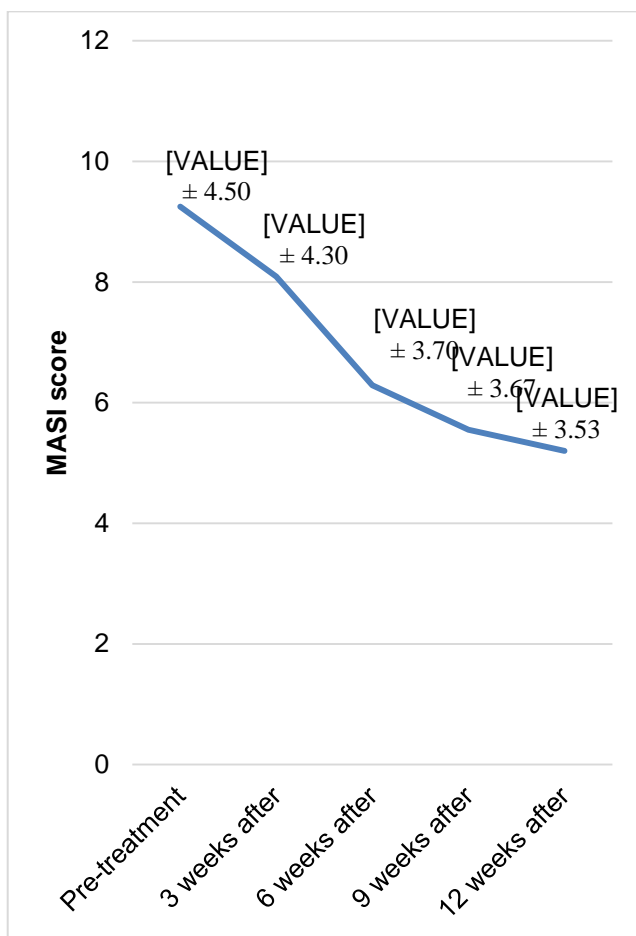


Figure 3. Mean MASI score over treatment time

Using Student's t test to compare the mean at each time, we realize that the mean MASI score decreased after each 3 weeks of treatment, respectively 1.16 ± 1.15 ($p < 0.01$); 1.79 ± 1.23 ($p < 0.01$); 0.75 ± 0.97 ($p < 0.01$) and 1.03 ± 1.16 ($p < 0.01$). At the end of 12 weeks of treatment, the MASI score dropped by 4.91 ± 2.70 points comparing to the baseline ($p < 0.01$).

3.13 (8). This difference may be because of using the combination of Q-switched Nd:YAG laser and the topical FOB Tri-White serum rather than laser monotherapy. Bansal et al (2012) reported MASI to score decreasing most in the group using a combination of Q-switched Nd:YAG laser and azelaic acid 20% (MASI decreased by an average of 13.79 points) (4). It is showed that the treatment result of the combination of laser and topical anti-pigmentation cream is better than laser monotherapy.

V. CONCLUSION

The success rate of the Q-switched Nd:YAG laser and the Tri-white serum combining method in melasma treatment was 82.22%. This result indicated that the combination of the Q-switched Nd:YAG laser and the Tri-white serum can be used for treatment of melasma in the future.

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