

Could 675-nm Laser Treatment Be Effective for Facial Melasma Even in Darker Phototype?

Paolo Bonan, MD,¹ Alice Verdelli, MD, PhD,¹ Laura Pieri, PhD,² and Irene Fusco, PhD^{3,i}

Abstract

Objective: The study assesses the safety and efficacy of a 675-nm laser source on melasma.

Background: Melasma is a frequent acquired skin disease defined by the presence of hyperpigmented macules on the face.

Methods: Study protocol included up to three sessions of the 675-nm laser. Objective evaluation was assessed by using a 5-point visual analogue pain scale (VAS) (range 0–4). Treatment tolerance was assessed using the 5-point VAS.

Results: A mean 3.1 ± 0.7 improvement was reached according to photographic evaluation by VAS. Patients treated one time showed mean clearance of 3.3 ± 0.76 , patients treated two times showed mean clearance of 3.0 ± 0.71 , and patients treated three times showed mean clearance of 3.0 ± 1 . Pain score mean was 1.2 ± 0.4 .

Conclusions: The 675-nm laser system seems to be safe and effective even in the treatment of facial melasma in patients with Fitzpatrick phototypes IV to V.

Keywords: 675-nm laser, facial melasma, phototypes IV to V (or darker phototypes)

Introduction

MELASMA IS A CHRONIC acquired hyperpigmentation disease that mainly affects women with various darker skin patterns.¹ The higher melanin content in phototypes IV and V makes it difficult to carry out aesthetic procedures due to possible side effects.² For the treatment of melasma, laser therapy represents a good alternative option compared with more usual therapies such as chemical peels and topical creams, especially for patients with refractory cases.³ Cellular reactions exhibit specificity to irradiation wavelengths.⁴ The wavelength between 550 and 850 nm is best for selectively targeting melanin, since the light absorption coefficient for hemoglobin is lower than that of water.⁵ An optimal wavelength of 650–700 nm targets melanin, the absorbance of melanin continues to decrease with increasing wavelength.⁶

The 675-nm laser targets melanin but does not interfere with the vascular component. The preclinical study showed that it acts on melanin to melanin, preserving skin structures. Therefore, it would represent a promising and valid therapy for pigmented disorders, linked to chronoaging and photoaging.⁷ In the literature, it has already been demonstrated that this wavelength is optimal for resurfacing and acne

treatment, as shown in the study of Cannarozzo and colleagues⁸ in which the 675-nm laser system is effective and well tolerated in patients with acne scars, involving a simple post-treatment management.

Nisticò et al.⁹ demonstrated the efficacy of a 675-nm laser system on melasma in Fitzpatrick skin types I–III. We report our results of the efficacy of the 675-nm nonablative fractional laser (RedTouch; Deka, Calenzano, Italy) for pigmented disorders therapy in skin color patients.

Methods

Our study included 15 patients (2 men and 13 women) with facial melasma, of whom 9 were skin type IV and 6 were skin type V. The mean age was 60 ± 7 years (range 48–69 years). The study protocol included up to three sessions of the 675-nm laser, with a 30-day interval between treatments. Parameters included power 3–5 W, dwell time 100–150 ms, spacing 0.5–1 mm, and cooling 5°C (300–700 mJ @ 0.7 mm spot). Parameters were adapted to phototype with a reduction in energy to reduce the risk of postinflammatory hyperpigmentation. After treatment, skin was cooled with cold water-soaked gauzes, and nonsteroidal anti-inflammatory cream

¹Laser Cutaneous Cosmetic and Plastic Surgery Unit, Villa Donatello Clinic, Florence, Italy.

²Biologist, Florence, Italy.

³University of Florence, Florence, Italy.

ⁱORCID ID (<https://orcid.org/0000-0001-7264-8808>).

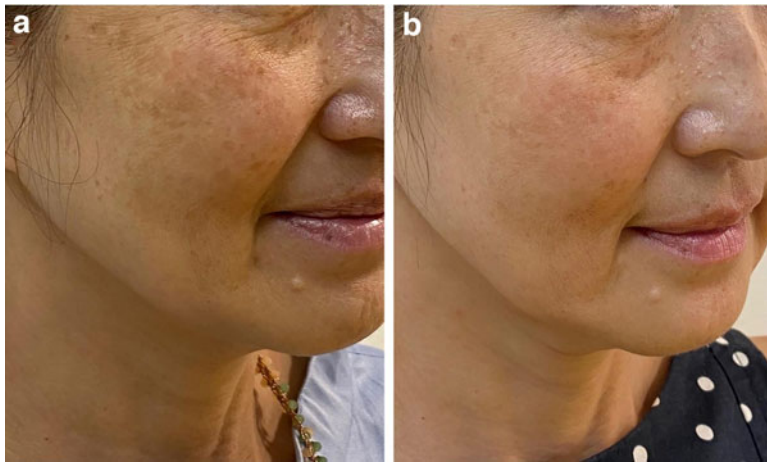


FIG. 1. A 56-year-old Asiatic patient with facial melasma (a) improved after three sessions (3 months follow-up) of 675-nm laser treatment (b).

based on B₁₂ vitamin was applied twice a day for 2 weeks. All subjects were also asked to take oral tranexamic acid (250 mg) after each treatment, three times 1 day for 1 week, and to use SPF 50 sunscreen during the day. Standardized photography was obtained at baseline, at a 3-month follow-up. After 3 months from the last treatment, objective evaluation was assessed by using a 5-point scale (excellent=4: clearance >81%, good=3: clearance between 61% and 80%, moderate=2: clearance between 41% and 60%, mild=1: clearance between 21% and 40%, minimal=0: clearance <20% or no change/getting worse). Treatment tolerance was assessed using the 5-point visual analogue pain scale. Adverse effects associated with the laser treatment were monitored.

Results

Totally, a mean of 3.1 ± 0.7 improvement was reached according to photographic evaluation by VAS (Fig. 1). A control photographic evaluation was also made at 6 months follow-up (Fig. 2). Seven patients were treated one time and



FIG. 2. A control photographic evaluation of the same patient at 6 months follow-up.

their clearance mean was 3.3 ± 0.76 , five patients were treated two times and their clearance mean was 3.0 ± 0.71 , and three patients were treated three times and their clearance mean was 3.0 ± 1 . Treatment was well tolerated by all patients (pain score mean: 1.2 ± 0.4), (Table 1). No postinflammatory hyperpigmentation was observed, the only adverse effect has been some small and rare burn due to bad positioning of the hand piece on the skin that resolved in 10 days.

The result of patients' VAS self assessment was aligned with physician VAS assessment.

Conclusions

According to our data, the 675-nm laser source system seems to be safe and effective even in the treatment of facial melasma in patients with Fitzpatrick phototypes IV to V.

TABLE 1. FEATURES AND MEAN CLEARANCE/PAIN VALUES OF TREATED PATIENTS

	Mean $\pm$ SD	No. of patients
Total number of patients	—	15
Sessions	1.7 ± 0.8	15
Women	—	13
Men	—	2
Phototype IV	—	9
Phototype V	—	6
One session	—	7
Two sessions	—	5
Three sessions	—	3
Total clearance (3 months follow-up)	3.1 ± 0.7	15
Clearance of the group of patients who were treated for one session	3.3 ± 0.8	7
Clearance of the group of patients who were treated for two sessions	3.0 ± 0.7	5
Clearance of the group of patients who were treated for three sessions	3.0 ± 1.0	3
Total pain	1.2 ± 0.4	15

Clearance: excellent=4 clearance >81%, good=3 clearance between 61% and 80%, moderate=2 clearance between 41% and 60%, mild=1 clearance between 21% and 40%, minimal=0 clearance <20% or no change/getting worse.

SD, standard deviation.

This system is promising in the treatment of pigmentary diseases, thanks to its low interaction with water and vascular component, its high affinity with melanin, and its great ability to penetrate into the tissues with the reduction of heating.¹⁰ For color skin, cooling is very important as it protects the epidermis and reduces the risk of edema and erythema, which may lead to further postinflammatory hyperpigmentation.

Author Disclosure Statement

No competing financial interests exist.

Funding Information

No funding was received for this article.

References

1. Neagu N, Conforti C, Agozzino M, et al. Melasma treatment: a systematic review. *J Dermatolog Treat* 2021;1–39.
2. Shah S, Alster TS. Laser treatment of dark skin: an updated review. *Am J Clin Dermatol* 2010;11:389–397.
3. Iranmanesh B, Khalili M, Mohammadi S, Amiri R, Aflatoonian M. The efficacy of energy-based devices combination therapy for melasma. *Dermatol Ther* 2021;34:e14927.
4. Letokhov VS. Laser biology and medicine. *Nature* 1985; 316:325–330.
5. Zoccali G, Piccolo D, Allegra P, Giuliani M. Melasma treated with intense pulsed light. *Aesthetic Plast Surg* 2010; 34:486–493.
6. Tanaka Y. Impact of near-infrared radiation in dermatology. *World J Dermatol* 2012;1:30–37.
7. Cannarozzo G, Nistico SP, Nouri K, Sannino M. Melasma. In: *Atlas of Lasers and Lights in Dermatology*. Cham: Springer, 2020; pp. 43–48.
8. Cannarozzo G, Silvestri M, Tamburi F, et al. New 675-nm laser device in the treatment of acne scars: an observational study. *Lasers Med Sci* 2021;36:227–231.
9. Nisticò SP, Tolone M, Zingoni T, et al. A new 675nm laser device in the treatment of melasma: results of a prospective observational study. *Photobiomodul Photomed Laser Surg* 2020;38:560–564.
10. Cannarozzo G, Fazio G, Bennardo L, et al. A new 675nm laser device in the treatment of facial aging: a prospective observational study. *Photobiomodul Photomed Laser Surg* 2021;39:118–122.

Address correspondence to:
Irene Fusco, PhD
University of Florence
Florence 50121
Italy

E-mail: irene.fusco@unifi.it

Received: June 8, 2021.
 Accepted after revision: July 6, 2021.
 Published online: September 30, 2021.