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Original Article

Clinical Efficacy of the ProYellow Laser for the Treatment of Steroid-Induced Facial Dermatosis in Premenopausal Iraqi Women: A Quasi-experimental study

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Abstract

Background Topical corticosteroids are widely used in dermatology for their potent anti-inflammatory and immunosuppressive properties. Nevertheless, inappropriate use of or prolonged treatment with topical corticosteroids in facial skin can result in a characteristic clinical presentation called steroid-induced facial dermatitis.

Objective To compare ProYellow laser therapy to traditional treatment in Iraqi patients with steroid-induced facial dermatitis, focusing on severity of erythema and pigmentation and also patient satisfaction.

Methods Eligible premenopausal women with steroid-induced facial dermatitis unresponsive to previous topical therapy were enrolled. Participants received either three monthly sessions of 577-nm QuadroStar® PRO Yellow laser or conventional topical treatment for three months. Facial erythema and pigmentation were assessed using standardized 0-4 scales, and patient satisfaction was compared between the groups

Results Total number of patients included were 101 (laser group, n=50; conventional treatment, n=51). After treatment, there was no erythema in 48.0% vs. 0% of the laser group and conventional-treatment group, respectively, and severe erythema persisted in 0% vs. 43.1%, respectively (P<0.001). Patient satisfaction was significantly higher in the laser group (95.8% vs. 2.0%; P<0.001). No adverse events related to the treatment were noted.

Conclusion Compared to usual treatment, ProYellow laser therapy reduced facial erythema and pigmentation in steroid induced facial erythema significantly. Laser patients had faster clinical improvement, shorter treatment duration, and more patient satisfaction.

Keywords Laser Therapy; Face; Glucocorticoids.

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Introduction

Topical corticosteroids are widely used in dermatology for their potent anti-inflammatory and immunosuppressive properties. Nevertheless, inappropriate use of or prolonged treatment with topical corticosteroids on facial skin can result in a characteristic clinical presentation called steroid-induced rosacea-like dermatitis. It is characterized by persistent erythema, telangiectasia, dyschromia, skin atrophy, burning and rosacea-like outbreaks often having a significant psychological impact and reduced quality of life.[1,2] The pathophysiology of steroid-induced facial rash is complicated. The prolonged use of corticosteroids leads to disruption of the epidermal barrier, dermal vasodilatation,

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rebound inflammation and increased vascular fragility. Inhibition of collagen formation and changes in melanocyte activity worsen the erythema and postinflammatory hyperpigmentation.[3,4] Stopping the application of topical steroids often results in a rebound effect, so that management is highly challenging and long term in most cases.[5] Typical treatment regimens consist of less potent steroids, topical calcineurin inhibitors, oral antibiotics, antihistamines and emollients. Even though these methods may palliate symptoms, their efficiency is only partial and slow, and depends on patient compliance.[6] As a result, energy-based devices, such as vessel-targeted lasers have gained popularity and offer alternative or adjuvant treatment approaches for steroid-induced facial changes.

The ProYellow laser, having a wavelength of 577 nm, selectively affects Oxygenated hemoglobin with minimal effects on other tissues by causing targeted photothermolysis of ectatic superficial vessels. This makes it especially useful for erythematous and vascular dermatoses such as rosacea, telangiectasia or corticosteroids-induced facial erythema.[7,8] The ProYellow laser therapy, besides its vascular influence has been suggested to indirectly reduce pigmentation through suppression of inflammation-triggered melanocyte activation and enhancement of dermal remodelling.[9] A number of studies have shown that yellow and pulsed dye lasers are effective in reducing facial redness, achieving shorter treatment times and increased patient satisfaction in patients with inflammatory and corticosteroid induced dermatoses.[7-10] Nonetheless, its efficacy in reducing steroid-induced facial disorders is not well-established among Middle Eastern patients with darker skin phototypes. Therefore, the present study aimed to evaluate the clinical efficacy of ProYellow laser therapy compared with traditional treatment in patients with steroid-induced facial dermatitis, focusing on improvement in erythema and pigmentation severity, treatment duration, and patient satisfaction among Iraqi women.

Methods

This was a prospective comparative interventional study carried out in Al-Basrah Private Dermatological Clinic, Basrah, Iraq over 12 months from January to December 2025. No formal sample size calculation was performed, which is a limitation. The study employed a consecutive sampling method in which all premenopausal women attending the outpatient clinic with a history of use or abuse of potent topical corticosteroids for cosmetic purposes causing facial erythema, telangiectasia and hyperpigmentation and who had failed topical therapies, were enrolled. Exclusion criteria were age less than 18 years, pregnant or lactating women, Fitzpatrick skin types V and VI, active facial infections, psychiatric disease, inflammatory facial dermatoses (e.g., lupus or eczema), Cushing syndrome, and any contraindication to laser therapy.

Eligible participants were allocated into either the ProYellow laser group or the conventional treatment group randomly after clinical evaluation. Clinical parameters noted were severity of facial erythema and pigmentation at baseline and following each treatment session. Duration of treatment and patient's satisfaction were noted. Outcome assessment was standardised by separate grading scales for erythema and pigmentation (0 to 4 scale) by same investigator. Erythema was graded from no erythema (0) to severe violaceous erythema (4). Pigmentation was graded from normal skin tone (0) to severe dark brown/black pigmentation (4) **(Table 1)**.

Table 1 Erythema and Pigmentation Severity Scoring System.[11,12]

Score	*Erythema Severity*	*Pigmentation Severity*
0	No erythema	Normal skin tone / no pigmentation
1	Mild erythema	Mild pigmentation
2	Moderate erythema	Moderate pigmentation
3	Marked erythema	Marked pigmentation
4	Severe violaceous erythema	Severe dark brown/ black pigmentation

Overall improvement was evaluated by comparison of baseline and follow-up photographs. Patient-reported outcomes were also evaluated using a Visual Analogue Scale (VAS). Standardised photography was performed using the same camera, lens, fixed distance, neutral background and standardised lighting conditions with frontal and bilateral oblique views obtained at each visit. The laser group was treated with the QuadroStar® PRO Yellow compact (Asclepion Laser Technologies GmbH, Jena, Germany), a 577 nm high-power optically pumped semiconductor laser in the Class IV range which matches perfectly to the absorption peak of oxyhemoglobin. This wavelength has the capacity to carry precise photothermolysis of superficial dermal vasculature, with limited epidermal damage and less absorption of melanin and is thus effective for erythematous dermatoses and vascular dermatoses.[10,13] A standard handpiece with 1 mm spot size was used for treatments. The initial settings were a fluence of 12-14 J/cm², pulse duration of 20-26 msec and a single-pass technique. They underwent 3 sessions with monthly intervals and the parameters were modified according to post-treatment erythema response.[14] The conventional treatment group was prescribed broad spectrum SPF ≥50 twice daily, topical niacinamide 4% cream twice daily, azelaic acid 20% cream once nightly and regular use of emollients for 3 months.

Safety monitoring included the assessment of all adverse events at each treatment session and through telephonic contact within 48-72 hours after treatment. Adverse events monitored included pain, transient erythema, blistering, post-inflammatory hyperpigmentation, and scarring. Treatment interruption and IRB notification were to be considered if blistering involved >10% of the treated area, persistent post-inflammatory hyperpigmentation lasted >8 weeks, or any serious adverse event.

Statistical analysis was carried out using SPSS version 24. Continuous variables were described as means ± standard deviations (SD), while categorical variables were presented as frequencies and percentages. Normality of continuous data was tested with the Shapiro-Wilk test and visual inspection of histograms. Continuous variables with normal distribution were compared using an independent samples t-test, while variables with non-normal distribution were analysed using the Mann–Whitney U test. Association between categorical variables was determined using Chi-square test or Fischer exact test as applicable. Two-sided p-values of ≤0.05 were considered statistically significant.

Ethical approval: The study was performed in accordance with the ethical principles of the Declaration of Helsinki. Written informed consent was obtained from patients before starting treatment. Ethical Committee Review Board of the College of Medicine at the University of Basrah reviewed and approved the study protocol, subject information and consent form according to document number 2140 dated 14/05/2026).

Result

A total of 101 patients were enrolled in the study, ProYellow laser group (n=50) and traditional treatment group (n=51). Erythema severity progressively reduced with each of the four treatment sessions with ProYellow laser, an increasing proportion of patients achieving complete clearance or only mild residual erythema. There was a statistically significant difference between the severity of erythema in the earlier treatment stages and after the third session (P<0.001) as shown in **Table 2**.

After treatment, nearly half of laser-treated patients had no erythema (24, 48.0%), whereas none of the traditional group achieved this outcome (0, 0.0%). Severe erythema remained in the traditional group (22, 43.1%) but was not seen in the laser group (0, 0.0%). These differences were highly significant (*P* <0.001).

After treatment, pigmentation severity decreased in the conventional group, with mild pigmentation observed in 19 patients (38.0%) and severe

Table 2 Comparison of erythema severity at baseline and after treatment in both groups.

	Traditional (No.,%)	*Laser (No.,%)*	*P value*
Erythema at baseline			
No	0 (0.0%)	2 (4.0%)	<0.001
Mild	6 (11.8%)	23 (46.0%)	
Moderate	19 (37.3%)	24 (48.0%)	
Severe	26 (51.0%)	1 (2.0%)	
Erythema after treatment			
No	0 (0.0%)	24 (48.0%)	
Mild	8 (15.7%)	25 (50.0%)	<0.001
Moderate	21 (41.2%)	1 (2.0%)	
Severe	22 (43.1%)	0 (0.0%)	

Table 3 Comparison of erythema severity at baseline and after treatment in both groups.

	Traditional (No.,%)	*Laser (No.,%)*	*P value*
Pigmentation at baseline			
No	0 (0.0%)	2 (4.0%)	<0.001
Mild	6 (11.8%)	23 (46.0%)	
Moderate	19 (37.3%)	24 (48.0%)	
Severe	26 (51.0%)	1 (2.0%)	
Pigmentation after treatment			
No	0 (0.0%)	5 (10.0%)	
Mild	16 (31.4%)	19 (38.0%)	0.2
Moderate	19 (37.3%)	18 (36.0%)	
Severe	16 (31.4%)	8 (16.0%)	

pigmentation in only 8 patients (16.0%). However, this difference was not statistically significant (*P*= 0.2), between the two groups **(Table 3)**.

Satisfaction was reported by 95.8% of patients in the laser group versus only 2.0% in the traditional group, with a highly significant difference (*P*< 0.001). This highlights a strong patient-perceived benefit of ProYellow laser therapy **(Table 4)**.

Safety outcomes were assessed throughout the study. No serious or minor adverse events related to ProYellow laser therapy were seen. No patients developed blistering, scarring, infection or cessation of treatment. All participants tolerated the laser

Table 4 Patient satisfaction.

Satisfaction	*Groups*		*P-value*
	Traditional n. (%)	*Laser n (%)*	
Yes	1 (2%)	46 (92%)	<0.001
No	49 (98%)	4 (8%)	

Figure 1 42 years old patient before and after completing her ProYellow sessions showing clearance of her erythema (left cheek).

Figure 2 Same patient after completing her ProYellow sessions showing clearance of erythema (right cheek).

Figure 3 Resolution of pigmentation after 3 laser sessions.

treatment well. **Figures 1-3** depict improvement in erythema and pigmentation after laser treatment.

Discussion

Treatment of steroid-induced facial dermatitis is difficult, and many patients suffer from persistent erythema, dyschromia and dissatisfaction. The current study suggests that ProYellow laser therapy is superior with respect to lessening the severity of erythema and enhancing satisfaction for Iraqi patients experiencing steroid-induced facial changes. In relation to erythema, our results showed a gradual significant improvement after each consecutive treatment of the laser therapy. These results are in agreement with previous studies in which yellow and ProYellow (577 to 585 nm) lasers were effective

for the treatment of steroid-induced rosacea-like dermatitis and facial telangiectasia by selective photothermolysis of superficial dermal vasculature.[15-17] Deaver Peterson *et al*.[16] and Cai Y, Zhu Y *et al*.[17] reported that vascular-targeted lasers enable faster and longer-lasting erythema normalization than local treatments alone, which supports our superior results in the laser-treated group. Pigmentation were showing a stable but steady improvement in few patients. similar to other previous reports that pro-yellow laser could help post-inflammatory hyperpigmentation by indirectly improving it through decreasing dermal inflammation, and obstruction to vascular space which can trigger melanocyte activation.[18,19] The lack of significance between inter-group comparison after 2 sessions indicate the delayed clearance of melanin relatively to vascular remodelling which has also been reported by Yepuri V *et al*.[19] and Bae YC *et al*.[20] A clinically relevant benefit presented in this study is the reduced timing of treatment in the laser group. The patient satisfaction was significantly higher in the laser treatment group, it is an important difference that reflects a rapid, tangible improvement, lower reliance on prolonged topical therapy and improved quality of life. High level of satisfaction is reported in prior studies, consistently with the present findings on laser treatment for steroid-induced facial changes and highlights that patient-reported outcomes should be considered as an important component of evaluating therapeutic efficacy.[20-22]

Conclusion

In this study we found that the ProYellow laser treatment was linked with a gradual reduction of facial erythema in individuals with steroid-induced facial dermatitis. Compared with standard therapy, patients treated with ProYellow laser had faster clinical improvement, shorter length of treatment and greater level of patient satisfaction. However, the results should be taken cautiously because to the non-randomized design and single-center character of the study, although these data imply that ProYellow laser may be a potential and well-tolerated therapy approach. Long-term effectiveness and safety require confirmation in larger randomised studies with longer follow-up periods.

Limitations The main strength of the study was the systematic evaluation of erythema and pigmentation, including serial follow-up and photographic recording. However, the paper is a non-randomised single center study and so may have selection bias and limited generalizability. Differences in baseline values between treatment groups and the relatively short duration of follow-up limit causal inferences and evaluation of long-term effectiveness.

Declaration of patient consent Authors certify that they have obtained all appropriate patient consent.

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Conflict of interest No conflict of interest.

Author's contribution

SFD, SZAA, DKA: Substantial contributions to study design, acquisition of data and manuscript writing.

Every author has given final approval of the manuscript version to be published and agreed to be accountable for all aspects of the work.

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