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Research Article

Effectiveness of 577-nm Pro-Yellow Laser in Managing Inflammatory Acne: Results from a Quasi-Randomized Clinical Trial

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Abstract

Background: Acne has been treated with many types of lasers in recent years. It has been found that vascular laser effectively and safely reduce inflammation in acne lesions. ***Objective***: To evaluate the efficacy and safety of a 577-nm pro-yellow laser with traditional treatment for patients with mild to moderate inflammatory acne. ***Methods***: A quasi-randomized clinical trial study was conducted in a private dermatology clinic in Baghdad from January 2025 to January 2026 on 140 patients diagnosed with mild to moderate inflammatory acne and randomly divided into two groups: Group A (70 patients) underwent three laser treatment sessions/week, and group B (70 patients) received traditional treatment (topical, systemic, adjunctive, or a combination thereof). Both groups were assessed at the first session (baseline) and after one and six months from treatment. ***Results***: Acne severity and inflammatory lesion count show greater reduction in group A ($p<0.05$). 70% of patients in group A and 48.6% in group B didn't report any side effects. After six months, group A was more satisfied with the laser procedure than group B. The recurrence rate after six months was significantly higher in group B. The greatest predictor of successful 577 nm pro-yellow laser treatment was the baseline GAGS score reduction. ***Conclusions***: Although traditional treatment is effective, the 577-nm pro-yellow laser is more promising, effective, and well-tolerated for mild to moderate inflammatory acne with favorable satisfaction and lower 6-month recurrence relative to routine care.

Keywords: GAGS; Inflammatory acne; Pro-yellow laser; Traditional treatment.

فعالية ليزر برو-يلو 577 نانومتر في علاج حب الشباب الالتهابي: نتائج تجربة سريرية شبه عشوائية

الخلاصة

الخلفية: تم علاج حب الشباب بأنواع عديدة من الليزر في السنوات الأخيرة. وقد وجد أن الليزر الوعائي يقلل الالتهاب في آفات حب الشباب بشكل فعال وأمان. **الهدف**: تقييم فعالية وسلامة ليزر برو-أصفر بقياس 577 نانومتر مقارنة باستخدام العلاج التقليدي للمرضى الذين يعانون من حب الشباب الالتهابي الخفيف إلى المتوسط. **الطرق**: أجريت دراسة سريرية شبه عشوائية في عيادة جلدية خاصة في بغداد من يناير 2025 إلى يناير 2026 على 140 مريضا تم تشخيصهم بحب الشباب الالتهابي الخفيف إلى المتوسط وتم تقسيمهم عشوائيا إلى مجموعتين: المجموعة أ (70 مريضا) خضعت لثلاث جلسات علاج بالليزر في الأسبوع، وتلقت المجموعة ب (70 مريضا) علاجا تقليديا (موضعيا، جهازيا، مساعدا، أو مزيج منهما). تم تقييم كلا المجموعتين في الجلسة الأولى (القاعدة الأساسية) وبعد شهر وستة أشهر من العلاج. **النتائج**: أظهرت شدة حب الشباب وعدد الآفات الالتهابية انخفاضا أكبر في المجموعة أ ٪70 ($p<0.05$). من المرضى في المجموعة أ و48.6٪ في المجموعة ب لم يبلغوا عن أي آثار جانبية. بعد ستة أشهر، كانت المجموعة أ أكثر رضا عن إجراء الليزر مقارنة بالمجموعة ب. كان معدل التكرار بعد ستة أشهر أعلى بشكل ملحوظ في المجموعة ب. كان أكبر مؤشر على نجاح علاج الليزر الأصفر المثبت 577 نانومتر هو انخفاض درجة GAGS الأساسية. **الاستنتاجات**: على الرغم من فعالية العلاج التقليدي، فإن ليزر برو-يلو 577 نانومتر أكثر وعدا وفعالية وتحمل لحب الشباب الالتهابي الخفيف إلى المتوسط مع رضا إيجابي وانخفاض انتكاسية لمدة 6 أشهر مقارنة بالرعاية الروتينية.

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INTRODUCTION

Acne vulgaris, a chronic inflammatory disorder that affects the pilosebaceous follicles of the skin, afflicts people worldwide [1]. With an estimated 9.4% of the world's population affected, it ranks eighth among skin illnesses and is one of the most commonly seen dermatologic conditions by dermatologists around the globe [2]. More than 85% of teenagers are affected by acne, and it's more common among girls to continue having the condition well into adulthood [3]. The disorder is hallmarked by the presence of comedones, papules, pustules, and cysts and can have a significant psychological and social impact on patients in severe cases. This is because dermatosis typically appears on exposed areas, such as the face, but it can also be localized to less apparent locations, including the front and back of the chest [4, 5]. When inflammatory acne clears up

entirely, a reddening or blistering area known as post-acne erythema (PAE) may remain [6]. This condition arises when inflammatory cytokines, including interleukin (IL)-6 and tumor necrosis factor (TNF)-α, are released and continue to be present even after inflammatory acne lesions have healed [7]. The inflammatory aspect of acne develops because of several factors, including hyperseborrhea, follicular hyperkeratinization, and the growth of Cutibacterium acnes, a bacterium implicated in the disease's pathogenesis [8]. Insight into the pathogenesis of acne and its inflammation has prompted the investigation of a number of therapeutic options designed to relieve symptoms, decrease lesions, and prevent post-inflammatory hyperpigmentation, as well as recent developments in dermatological therapies that have increasingly turned to the use of laser treatments as a non-invasive means of controlling inflammatory acne and its sequelae [9]. Most acne treatments are either topical or oral medications. While there may be less serious adverse effects from using oral medications, one issue with topical treatments is that they need to be applied frequently (compliance) [10]. Acne vulgaris has been treated with many types of lasers in recent years. It has been found that vascular lasers effectively and safely reduce inflammation in acne lesions [11]. The utilization of lasers with emission at the yellow wavelength of 577 nm has been promising based on its distinct characteristics. However, the yellow laser will mainly act on hemoglobin in the dilated capillaries and can help in decreasing erythema and healing and also speed up tissue regeneration [12]. They are generally considered vascular lasers, as in their capacity for selective coagulation of superficial vessels, decreasing inflammation and erythema, and enhancing the overall skin texture [13]. In addition, since patients usually develop post-inflammatory changes after acne lesions, these lasers are being assessed not just for their immediate anti-inflammatory effects but also for whether they can promote quicker recovery and reduce the irregular pigmentation often encountered after acne lesions have resolved [14]. With the demand for efficacious acne treatments continuing to grow, it is imperative to validate the utility of yellow laser therapy not just as an acute treatment option but also as a long-term management strategy for the sequelae of inflammatory acne. Despite the abundance of topical and systemic treatments for acne vulgaris, a number of patients still endure post-acne redness and inflammatory lesions, and some refuse or are unable to take systemic medications. Among these supplementary modalities, vascular-targeted lasers have shown promise. However, there is a lack of information about the 577 nm pro-yellow laser's effectiveness in treating face acne and post-acne redness when used independently. Thus, the purpose of this study was to assess the efficacy and safety of the 577 nm pro-yellow laser in treating inflammatory acne by evaluating acne severity by the Global Acne Grading System (GAGS) at week 8 of treatment as a single primary outcome, while secondary outcomes included the number of inflammatory papules, pustules, and nodules; side effects; patients' satisfaction level; and recurrence rate (six months after the last follow-up).

METHODS

Study design and setting

A quasi-randomized clinical trial study was carried out in a private dermatology clinic in Baghdad during a period of one year from January 2025 to January 2026.

Study patients

The study comprised 140 patients diagnosed with inflammatory acne (mild to moderate in severity) characterized by at least 10 papules or pustules. They were randomly divided into two groups: Group A (70 patients) treated by three sessions of 577 pro yellow laser, two weeks apart, and Group B (70 patients) who received traditional treatment of either topical, systemic, or adjunctive treatments or a combination of them, which were decided by two dermatologists. Patients were assigned alternately to groups A or B according to odd/even numbering (Figure 1).

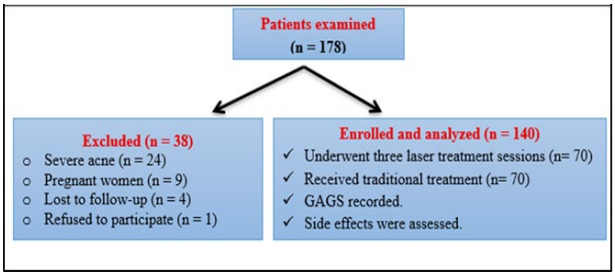

Figure 1: Illustrates the study's strict inclusion criteria (Patient Flow Diagram).

Exclusion criteria

Patients who used systemic or topical antibiotics within the last month or oral isotretinoin within the last six months; patients with active herpes simplex infections; pregnant or lactating women with severe nodulocystic acne or any active skin infections; those with a history of keloid scarring; those using photosensitizing medications (such as doxycycline); those who received any laser treatments within the previous six months; and those who refused to participate were excluded from this study.

Intervention and outcome measurements

For group A, the laser device utilized was a new 577 nm high-power optically pumped semiconductor laser (HOPSL) (QuadroStarPRO, Asclepion Laser Technologies, Jena, Germany) for three sessions at 2-week intervals. The parameters for the treatment included a wavelength of 577 nm, a spot size of 8-10 mm, a fluence ranging from 12 to 14 J/cm², and a pulse duration of 15-20 ms. Air-cooling was employed (without contact gel) to minimize discomfort during the procedure. Cleaning the skin of any residuals or makeup, no topical anesthesia is used and wearing protective goggles for the patient and

operator to protect eyes from reflected or scattered laser light. The lesion area was treated with one pass of Fluence starting at 12-14 J/cm² in the first session and was raised by 2 J/cm² in every subsequent session. Depending upon the phototype of the skin, the laser was administered in scanner mode with 80% coverage. Each session lasted approximately 15-20 minutes, focused on full-face treatment. Post-treatment care included avoiding sun exposure and the application of Sun Protection Factor (SPF) 50+ sunscreen. Patients were instructed to refrain from using abrasive skincare products (such as retinoids or acids) for 48 hours and to moisturize with fragrance-free products. For group B, this approach was decided by the dermatologists according to the options illustrated in Figure 2, which include systemic, topical, and adjuvant or combination for 8 – 12 weeks. Severity of inflammatory acne was evaluated by GAGS, which considers both the type and distribution of acne lesions across different facial and upper trunk regions.

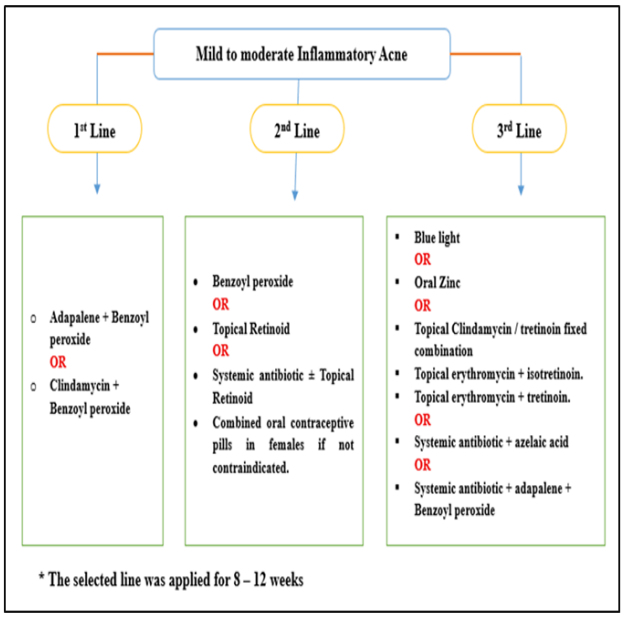

Figure 2: Treatment options for the traditional group.

It's designed to be quick to apply, clinically consistent, and quantitatively reliable. Unlike subjective visual judgment, GAGS uses a scoring formula that combines lesion types and their anatomical locations to calculate a final severity score. The system divides the face, chest, and upper back into six areas. Each area is assigned a factor based on its surface area (forehead 2, each cheek 2, nose 1, chin 1, chest/back 3). Lesion scoring involves the following: (0: No lesions, 1: Comedones, 2: Papules, 3: Pustules, and 4: Nodules). The area score is multiplied by the factor, and the total score is the sum of all six areas. Severity classification is mild (1–18), moderate (19–30), severe (31–38), and very severe: ≥ 39) [15].

Post-intervention follow-up

In group A, patients were assessed at the first session (baseline), after one month from the last session (10 weeks after the first session), and six months after the last follow-up visit. Both groups underwent outcome assessments at the same intervals. The assessment includes a clinical examination, and photos were taken before starting treatment and at each visit using the same mobile with identical camera settings (Samsung Galaxy Note 20 Ultra) and reviewed by two dermatologists to evaluate before-and-after treatment photos. At every appointment, we used the same camera, maintained a constant distance, and used the same lighting settings to take standardized images of your face. After gently washing their faces, patients were photographed from both the front and side, with a neutral look on their faces and no makeup applied. Using predetermined markings, the patient and camera positions were maintained consistently throughout the trial. Blinded dermatologists, who did not have any knowledge of the patients' treatment allocation or visit orders, reviewed all the photos. Evaluators were not given access to any identifying or treatment-related information by coding the images prior to assessment. As a single primary outcome, acne severity was evaluated by GAGS from baseline to the first post-treatment assessment (1 month after the last laser session, corresponding to approximately week 8 of treatment). Secondary outcomes included number of inflammatory papules, pustules, and nodules; any side effects such as any discomfort, erythema, swelling, scarring, itching, skin dryness, or hyperpigmentation; self-assessment by patients themselves reflecting their satisfaction level using a four-point scoring scale: 1, very dissatisfied; 2, dissatisfied; 3, satisfied; and 4, very satisfied; and recurrence rate (six months after the last follow-up).

Data collection

Demographics (age, gender, residence, and occupation); skin phototype; clinical variables (severity and duration of acne); medical history (hypertension, DM, smoking, or alcohol use); and associated conditions such as hirsutism or polycystic ovary were collected.

Ethical considerations

The Declaration of Helsinki establishes the fundamental principles for ethical conduct. Approval was obtained from the Ibn Sina University of Medical and Pharmaceutical Sciences Ethics Committee (approved no.: ISU-2024-158). All patients were signed with written consent about the study, giving them full information about the treatment options, and they were requested to be a part of this work. Data were stored securely using coded identifiers in a password-protected environment.

Statistical analysis

The data analysis in this study was carried out using SPSS version 28. Bivariate analysis for continuous variables was done using t-tests. p-value < 0.05 was established as the level of significance. An independent t-test (two-tailed) was used to compare continuous variables between study

groups. A chi-square test was used to compare categorical variables between study groups. Logistic regression analysis was applied to identify the greatest predictors of successful treatment.

RESULTS

Among 140 patients, the mean age was 21.9 ± 4.7 years (range: 16 – 36). Group A comprised 31 males and 39 females, while Group B included 33 males and 37 females. There were no appreciable variations in the group's baseline characteristics, including age, gender, residence, occupation, skin type, and severity and duration of acne (Table 1).

Table 1: Comparison of baseline characteristics between groups A and B

Variable	Group A (n=70)	Group B (n=70)	*p*-value
Age (year)	21.49±4.6	22.7±4.8	0.13
Gender			
Male	31(44.3)	33(47.1)	0.734
Female	39(55.7)	37(52.9)	
Residence			
Urban	58(82.9)	52(74.3)	0.216
Rural	12(17.1)	18(25.7)	
Occupation			
Housewife	25(35.7)	22(31.4)	0.539
Employee	15(21.4)	19(27.1)	
Student	23(32.9)	18(25.7)	
Private work	7(10)	11(15.7)	
Fitzpatrick Skin type			
II	19(27.1)	21(30)	0.689
III	32(45.8)	27(38.6)	
IV	19(27.1)	22(31.4)	
Severity of acne (GAGS)	22.61±6.2	20.48±7.1	0.06
Duration of acne (month)	10.27±6.4	9.11±7.3	0.311

Values are presented as frequency, percentage, and mean±SD.

This study showed that both groups showed big improvements in acne severity and lesion count; however, acne severity (GAGS) and inflammatory lesion count exhibited a statistically significant greater reduction in group A than that in group B ($p< 0.05$), indicating a significant outcome advantage of 577 pro yellow laser therapy (Table 2 and Figures 3 and 4). In group A, age and gender-stratified analysis demonstrated a significant reduction in GAGS across all age groups and between males and females; however, the differences between categories of age and gender were not statistically significant ($P > 0.05$) (Table 3).

Table 2: Comparison in GAGS and number of inflammatory lesions changes following laser and traditional treatments

Parameter	GAGS	Papules No.	Pustules No.	Nodules No.
Before Laser	22.61±6.2	8.55±2.6	9.12±2.9	7.44±1.8
After Laser	8.12±4.1	2.82±0.9	2.54±0.6	1.34±0.4
Laser Reduction rate (%)	64.1	67.0	72.1	82.0
Before Traditional treatment	20.48±7.1	9.41±3.2	8.76 ±3.6	10.39±3.3
After Traditional treatment	11.32±4.7	4.07±1.4	3.47±1.8	4.59±2.6
Traditional Reduction rate (%)	44.7	56.7	60.4	55.8
p-value	<0.001	0.017	0.002	<0.001

Values are presented as percentage and mean±SD.

Figure 3: A 26-year-old female with a history of inflammatory acne who declined oral therapy. The patient underwent three sessions of Pro Yellow laser treatment at 2 -week intervals. A: First session, B: Last session.

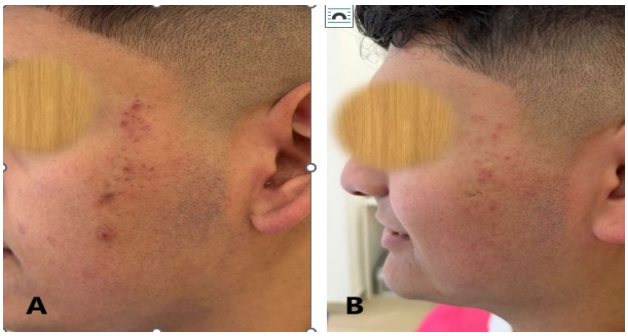

Figure 4: A 19-year-old male with a history of inflammatory acne. The patient underwent traditional treatment (Systemic and topical) for 12 weeks. A: Before treatment, B: After 12 weeks.

Table 3: Age and Gender-Specific changes in GAGS one month follow up after last session of 577 pro yellow laser therapy

Parameter	Change in GAGS	*p*-value
Age (year)		
< 20	- 16.4±6.1	0.326
20 – 25	- 14.7±4.2	
> 25	- 15.3±4.6	
Gender		
Male	- 16.0±5.3	0.412
Female	- 15.2±5.1	

Values are presented as mean±SD.

These results indicate that although GAGS decreased with treatment with the 577 pro yellow lasers across various age and gender groups, the GAGS did not yield significantly greater advantages in certain groups when age and gender were considered. The 557 pro yellow laser treatment procedure caused much fewer side effects than the traditional treatment option, as group A showed erythema (17.1%) and swelling (11.4%), which completely resolved in 24-48 hours with no need of intervention, and post-inflammatory hyperpigmentation (4.3%) was an uncommon side effect, and 70% of the patients didn't report any side effects. Traditional treatment caused skin dryness (45.7%), erythema (35.7%), skin irritation (27.1%), GIT upset (15.7%), and photosensitivity (8.6%), while 48.6% of patients didn't report any side effects (Figure 5). After six months, 48.6% of patients in group A were satisfied with the laser procedure, and 38.6% of them were very satisfied, which is significantly higher (p= 0.002) than that in group B, when 34.3% of them were satisfied and 25.7% were very satisfied with traditional options.

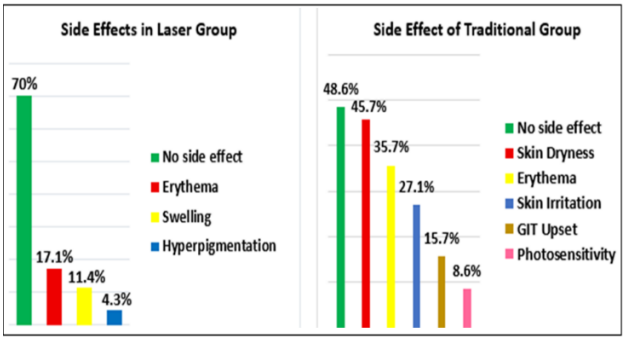

Figure 5: Adverse effect one month after last session among study groups.

The recurrence rate after six months was significantly higher in group B than that in group A when 28 (40%) patients in group B showed recurrence compared to eight (11.4%) in group A (Table 4). The regression model constructed for successful 577 pro yellow laser treatment (successful outcome considered when the reduction of GAGS is > 50%) was the dependent variable, while the independent variables were age, gender, baseline lesion counts and severity, and duration of acne.

Table 4: Patients' satisfaction level one month after last session and recurrence rate after six months

Parameter	Group A (n=70)	Group B (n=70)	*p*-value
Patients' satisfaction			
Very Satisfied	27(38.6)	18(25.7)	0.002
Satisfied	34(48.6)	24(34.3)	
Dissatisfied	8(11.4)	19(27.1)	
Very Dissatisfied	1(1.4)	9(12.9)	
Recurrence of acne			
Yes	8(11.4)	28(40)	<0.001
No	62(88.6)	42(60)	

It confirmed that the greatest predictor of successful 577 pro yellow laser treatment was the baseline GAGS score reduction (OR= 2.34, 95% CI= 1.67 – 5.28; $P < 0.001$) and emphasized that patients with more inflammation initially benefit more from therapy (age, gender, baseline lesion count, and duration of acne did not significantly influence outcomes ($P > 0.05$), suggesting consistent efficacy across demographics (Table 5).

Table 5: Logistic regression for predictors of 577 pro yellow laser treatment outcomes

Variable	OR	95% CI	*p*-value
Age	1.02	0.91–1.14	0.72
Gender (male *vs*. female)	1.15	0.87–1.52	0.33
Baseline lesion count	0.95	0.71–1.11	0.091
Duration of acne	1.16	0.57–2.07	0.461
Baseline GAGS score	2.34	1.67–5.28	<0.001

DISCUSSION

Patients with inflammatory acne, especially those who do not respond to traditional treatments or who are hesitant to utilize systemic drugs over the long term, continue to face a significant challenge in managing this illness [16,17]. Concerns about side effects, long-term safety, and antibiotic resistance have prompted a rise in interest in non-pharmacologic alternatives, like light-based therapies and lasers, despite the availability of various pharmacologic options [18]. A novel and modern version of the traditional yellow laser is the Pro-Yellow Laser. Their efficacy and applicability to various skin issues vary significantly, although they share a wavelength range [19]. This study demonstrated its relevance to the broader context of acne treatment by comparing it with previous research on lasers and light, and we will explore the potential mechanisms, clinical implications, and limitations of this method. The current study showed significant clinical improvement, supported by objective optical measurements, lesion count reductions (papules, pustules, and nodules), and reduction of overall severity of acne significantly more in laser than traditional treatment. This result agreed with a study conducted by Mohamed EM et al. in 2021 [11]. The possible mechanism of action is similar to that of other vascular laser and IPL systems, which are anti-inflammatory effects as the laser suppresses pro-inflammatory cytokines (IL-1α, TNF-α) and reduces neutrophil chemotaxis, limiting follicular inflammation [20]; bactericidal action as the 577 nm wavelength activates porphyrins produced by Cutibacterium acnes, generating reactive oxygen species that damage bacterial membranes [21]; and sebum modulation as some evidence suggests yellow lasers may downregulate sebaceous gland activity, though further studies are needed [22]. This study showed that baseline GAGS scores of acne patients were improved by 64.1% in group A compared to 44.7% in group B, placing most patients into mild or clear categories of coursework, and according to GAGS, not only are lesion count and severity check considered, but also lesion distribution is taken into account, implicitly confirming a broad-spectrum improvement after 577 nm laser treatment, indicating that the treatment may be helpful in both mild and moderate inflammatory lesions. In this study, 70% of the patients didn't report any side effects, which is higher than that in group B (48.6%), while a few patients showed erythema and swelling, which completely resolved in 24-48 hours with no need of intervention. The 577-nm pulse duration is so selective for hemoglobin that it cannot result in significant melanin absorption, which increases safety for shorter-wavelength lasers for Fitzpatrick skin types III-IV. In other words, the dilated dermal arteries and inflammatory lesions absorb the laser energy more efficiently than the surrounding normal skin. When compared to less selective wavelengths, this selectivity significantly lowers the risks of burns, blisters, and post-inflammatory hyperpigmentation [23]. This further supports the fact that the treatment can be used in a routine clinical setup. When treating inflammatory acne, the 577-nm laser is the most effective instrument for targeting blood vessels. Patients suffering from aggressive pustules or papules as well as prolonged post-acne erythema will find it especially advantageous In comparison studies, 1064-nm is superior for deep lesions, whereas 577-nm provides a more targeted approach for red, inflamed lesions and has a high rate of patient satisfaction [24]. The present work found that

patients with more inflammation initially benefit more from therapy. Due to higher leukocyte recruitment and a rise in the number and caliber of superficial arteries in highly inflamed acne, a vascular-targeted laser has a larger "pathological substrate" to work upon, resulting in a more noticeable relative improvement. This results in a greater decrease in papules, pustules, and post-acne erythema in individuals with higher starting GAGS scores, while a smaller range of apparent changes is observed in those with milder baseline inflammation. The idea that vascular and inflammatory components are especially responsive to 577-nm laser intervention and play a central role in the pathophysiology of acne is supported by this gradient of response [15].

Study Limitations

The study includes many limitations, such as the trial only included one private dermatology clinic in Baghdad; the results might not apply to other communities, healthcare systems, or socioeconomic categories; and the dermatologists who treated the "traditional" group used a wide range of topical, systemic, and adjunctive treatments, or a mix of these approaches. The difficulty in attributing results to a particular regimen and the potential introduction of variability into the control group are both caused by the treatment heterogeneity, and although patients were monitored for six months following treatment, acne persists and frequently flares up. To evaluate the persistence of response, the frequency of long-term recurrence, and the duration of delayed adverse effects, further follow-up is required. Another limitation is group B did not receive a single regimen but rather got a wide range of topical and systemic drugs as part of usual clinical practice. Because of this variability, it is more challenging to conclude that the 577-nm Pro Yellow laser was the only cause of any observed differences between the groups in terms of clinical outcomes. For a more accurate comparison, future research should employ standard protocol control therapy.

Conclusion

This study deviates from the traditional 532- or 595-nm vascular lasers and standard pharmacologic therapy by utilizing a vascular-selective wavelength to target oxyhemoglobin. Its approach is mechanism-based. The results of this clinical trial study lend credence to the 577 nm Pro Yellow laser's potential as an effective and safe option for mild to moderate inflammatory acne with favorable satisfaction and lower 6-month recurrence relative to routine care; further, randomized controlled trials with extended follow-up periods are needed to confirm these findings. Also, it would be beneficial to look at combination protocols with topical or systemic medicines, as well as optimized treatment parameters (fluence, spot size, number, and interval of sessions). The underlying mechanisms should be further explored using high-resolution imaging and objective vascular and inflammatory biomarkers to determine which patient subgroups are most likely to experience a positive outcome, especially those with severe inflammatory activity and post-acne erythema.

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Conflict of interests

The authors declared no conflict of interest.

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Data sharing statement

Supplementary data can be shared with the corresponding author based on a reasonable request

REFERENCES

1. Hazarika N. Acne vulgaris: new evidence in pathogenesis and future modalities of treatment. *J Dermatol Treatment*. 2021;32(3):277-285. doi: 10.1080/09546634.2019.1654075.
2. Heng AHS, Chew FT. Systematic review of the epidemiology of acne vulgaris. *Sci Rep*. 2020;10(1):5754. doi: 10.1038/s41598-020-62715-3.
3. Guguluș DL, Vâță D, Popescu IA, Pătrașcu AI, Halip IA, Mocanu M, et al. The epidemiology of acne in the current era: Trends and clinical implications. *Cosmetics*. 2025;12(3):106. doi: 10.3390/cosmetics12030106.
4. Najeeb A, Gaurav V, Sharma R. Comedones in dermatology. *Indian J Dermatol Venereol Leprol*. 2024;90(3):396-407. doi: 10.25259/IJDVL_896_2023.
5. Zhou C, Vempati A, Tam C, Khong J, Vasilev R, Tam K, et al. Beyond the surface: a deeper look at the psychosocial impacts of acne scarring. *Clin Cosmet Investig Dermatol*. 2023:731-738. doi: 10.2147/CCID.S406235.
6. Yang L, Gao Y, Wu H, Li Y, Li C, Li X. Efficacy and safety of intradermal botulinum toxin A for post-acne erythema: a split-face randomized controlled trial. *Front Med*. 2025;12. doi: 10.3389/fmed.2025.1610125.
7. Kalantari Y, Dadkhahfar S, Etesami I. Post-acne erythema treatment: A systematic review of the literature. *J Cosmet Dermatol*. 2022;21(4):1379-1392. doi: 10.1111/jocd.14804.
8. Niedźwiedzka A, Micallef MP, Biazzo M, Podrini C. The role of the skin microbiome in acne: Challenges and future therapeutic opportunities. *Int J Mol Sci*. 2024;25(21). doi: 10.3390/ijms252111422.
9. Mar K, Khalid B, Maazi M, Ahmed R, Wang OJ, Khosravi-Hafshejani T. Treatment of post-inflammatory hyperpigmentation in skin of colour: a systematic review. *J Cutaneous Med Surg*. 2024;28(5):473-480. doi: 10.1177/12034754241265716.
10. Reynolds RV, Yeung H, Cheng CE, Cook-Bolden F, Desai SR, Druby KM, et al. Guidelines of care for the management of acne vulgaris. *J Am Acad Dermatol*. 2024;90(5):1006. doi: 10.1016/j.jaad.2023.12.017.
11. Mohamed E, Tawfik K, Elsayed I, Bölke E, Gerber P. 577-nm high-power optically pumped semiconductor laser is safe and effective in the treatment of inflammatory acne: a prospective, single-center, split-face comparative study. *Eur J Med Res*. 2021;26(1):103. doi: 10.1186/s40001-021-00573-z.
12. Hasan EF, Ahmed MH, Hraiga NM. Evaluating the clinical outcomes of using pro-yellow laser for steroid-induced rosacea: A

prospective clinical study. *Al-Rafidain J Med Sci*. 2025;9(2):327-332. doi: 10.54133/ajms.v9i2.2445.
13. Aksoy Sarac G, Onder M. Evaluation of the efficacy of pro-yellow laser in the management of vascular skin disorders. *J Cosmet Dermatol*. 2022;21(3):1018-1022. doi: 10.1111/jocd.14162.
14. Jean-Pierre P, Tordjman L, Ghodasara A, Nwosu C, Nouri K. Emerging lasers and light-based therapies in the management of acne: a review. *Lasers Med Sci*. 2024;39(1):245. doi: 10.1007/s10103-024-04196-8.
15. Bae IH, Kwak JH, Na CH, Kim MS, Shin BS, Choi H. A comprehensive review of the acne grading scale in 2023. *Ann Dermatol*. 2024;36(2):65. doi: 10.5021/ad.23.094.
16. Al-Taie A, Hussein AN, Younes AA, Kassas M, Bandzhiki N. Acne vulgaris: Scoping insights towards pharmacological management and patient care prospects. *J Sci Soc*. 2025;52(4). doi: 10.4103/jss.jss_102_25
17. Kadhim S, Al-Atta D, Samarraee M. Superiority of the body roundness index over BMI in linking central adiposity with vitamin D3: A cross-sectional study in Iraqi adults. *Funct Food Health Dis*. 2025;15(11):783-795. doi: 10.31989/ffhd.v15i11.1798.
18. de Vries FMC, Meulendijks AM, Driessen RJB, van Dooren AA, Tjin EPM, van de Kerkhof PCM. The efficacy and safety of non-pharmacological therapies for the treatment of acne vulgaris: A systematic review and best-evidence synthesis. *J Eur Acad Dermatol Venereol*. 2018;32(7):1195-1203. doi: 10.1111/jdv.14881.
19. Demirci MA, Temiz SA, Abdelmaksoud A, Wollina U, Dursun R, Khachemoune A. Pro-yellow laser therapy in vascular and non-vascular skin disorders: A narrative review. *J Cutaneous Aesthetic Surg*. 2025;19(1):41-49. doi: 10.25259/JCAS_88_2024.
20. Ng MY, Lin T, Chen SH, Liao YW, Liu CM, Yu CC. Er:YAG laser suppresses pro-inflammatory cytokines expression and inflammasome in human periodontal ligament fibroblasts with Porphyromonas gingivalis-lipopolysaccharide stimulation. *J Dent Sci*. 2024;19(2):1135-1142. doi: 10.1016/j.jds.2023.12.011.
21. Mahajindawong B, Kumtornrut C, Asawanonda P, Kerr SJ, Chatsuwan T, Boontaveeyuwat E. Antimicrobial photodynamic therapy using sodium iron chlorophyllin against drug-resistant Cutibacterium acnes from patients with acne vulgaris. *Sci Rep*. 2026;16(1):5124. doi: 10.1038/s41598-025-34866-8.
22. Xu J, Huang S, Fu Z, Zheng W, Luo W, Zhuang N, et al. Effects of light and laser therapies on the microecosystem of sebaceous glands in acne treatment. *Photodermatol Photoimmunol Photomed*. 2025;41(1):e70005. doi: 10.1111/phpp.70005.
23. Seo DJ, Chung B. Low-energy, multi-wavelength long-pulse diode laser for post-sclerotherapy hyperpigmentation in Fitzpatrick skin type III-IV: A case series. *Ann Phlebology*. 2025;23(1):47-52. doi: 10.37923/phle.2025.23.1.47.
24. Mohamed EM, Abdel-Aleem HL, Elazab GMH, Rageh MA. Comparative efficacy and safety of 577-nm diode laser versus 1064-nm Nd: YAG laser for inflammatory acne vulgaris: a split-face randomized study. *Lasers Med Sci*. 2025;40(1):422. doi: 10.1007/s10103-025-04654-x.