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Research Article

Evaluating the Clinical Outcomes of Using Pro-Yellow Laser for Steroid-Induced Rosacea: A Prospective Clinical Study

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Abstract

Background: Erythematotelangiectatic rosacea, face erythema, and facial telangiectasias have all been treated with different types of lasers. It has not yet been documented how well a 577-nm pro-yellow laser treats each of these disorders. ***Objectives***: To assess the efficacy and safety of the Pro-yellow laser 577 nm in the management of rosacea. ***Methods***: Six months, from January to July 2024, were devoted to a clinical experiment. Sixty individuals, ranging in age from twenty to sixty, were evaluated by two dermatologists for the presence of either papulopustular or Erythematotelangiectatic rosacea. Two groups were formed from them: group A, which included 30 patients receiving a combination treatment that also included laser therapy, and group B, which also included 30 patients receiving a combination therapy treatment but without laser therapy. The clinician utilized the researcher's score, which is an evaluation technique with three scales: region, telangiectasia, and erythema assessment. ***Results***: After three months, patients in group A showed a considerably greater average increase in total researcher's score, erythema, area, and telangiectasia compared to group B. After a month of treatment, group A had a greater percentage of significant improvements than group B. Group A showed a substantially greater rate of outstanding development compared to group B after three months. ***Conclusions***: With little adverse effects, the pro-yellow laser 577 nm is a novel and efficient treatment for telangiectasia and persistent erythema in rosacea with long-lasting effect and rapid improvement of symptoms combined with conventional treatment.

Keyword: Laser 577 nm, Pro-yellow laser, Rosacea, Researcher score.

تقييم النتائج السريرية لاستخدام ليزر برو-يلو لعلاج الوردية الناتجة عن الستيرويد: دراسة سريرية مستقبلية

الخلاصة

الخلفية: تم علاج الوردية الحمراء الجلدية اللينجية، واحمرار الوجه، واستقرار الوجه بأنواع مختلفة من الليزر. لم يتم توثيق مدى فعالية ليزر برو-يلو بعرض 577 نانومتر في علاج كل من هذه الاضطرابات. **الأهداف**: تقييم فعالية وسلامة ليزر Pro-yellow 577 نانومتر في إدارة الوردية. **الطرائق**: خصصت ستة أشهر، من يناير إلى يوليو 2024، لتجربة سريرية. تم تقييم ستين شخصا، تتراوح أعمارهم بين العشرين والستين، من قبل طبيبين جلديين لوجود إما الوردية الحمامية أو الوردية الحمراء الدماغية. تم تشكيل مجموعتين منها: المجموعة أ، التي شملت 30 مريضا يتلقون علاجا مركبا يشمل أيضا العلاج بالليزر، والمجموعة ب، التي شملت أيضا 30 مريضا يتلقون علاجا مركبا ولكن بدون علاج بالليزر. استخدم الطبيب المقياس الخاص بالبحث، وهي تقنية تقييم بثلاثة مقاييس: المنطقة، الفصيل التيلانجي، وتقييم الحمراة. **النتائج**: بعد ثلاثة أشهر، أظهر المرضى في المجموعة أ زيادة متوسطة أكبر بكثير في إجمالي مقياس البحث، والحمراء، والمنطقة، والانفصال التيلانجيازي مقارنة بالمجموعة ب. بعد شهر من العلاج، شهدت المجموعة أ نسبة أكبر من التحسن الملحوظ مقارنة بالمجموعة ب. أظهرت المجموعة أ معدل تطور ملحوظ أعلى بكثير مقارنة بالمجموعة ب بعد ثلاثة أشهر. **الاستنتاجات**: مع آثار جانبية قليلة، يعد ليزر برو-يلو 577 نانومتر علاجا جديدا وفعالا لاستصابة التيلانجياستيا والقمرة المستمرة في الوردية، مع تأثير طويل الأمد وتحسن سريع في الأعراض إلى جانب العلاج التقليدي.

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INTRODUCTION

Rosacea is a chronic inflammatory skin condition that is characterized by redness, swelling, blisters, pustules, and telangiectasia on the face [1]. In addition to skin manifestations, ocular signs and symptoms are also present [2]. More than 10% of white individuals are affected, women are more likely than males to have it, and individuals with pale skin (phototypes I and II) are more likely to have it. The preferred demographic for rosacea is adults aged between 30 and 50 [3]. The four main subtypes that were first found by the National Rosacea Society Expert Committee using a subtypes approach were erythrotelangiectatic (ETT), papulopustular (PPR), phymatous, and ocular [4]. The mechanism of rosacea remains unknown. Multifactorial pathogenesis with genetic predisposition has gained attention recently. Numerous causes have been identified as initiating or exacerbating the condition, including ultraviolet (UV) exposure, local inflammatory reactions to skin bacteria

(linked to Demodex infestation), temperature fluctuations, hot, cold, and spicy foods, and stress [5]. It can result in stigmatization, anxiety, depression, low self-esteem, and shame. Additionally, it negatively affects social and psychological well-being as well as quality of life [6]. Treatment recommendations and professional consensus for rosacea have expanded recently to include a wide range of therapeutic options like topical creams, light devices, oral therapies, care of skin, and lifestyle modifications [7]. For the effective management of all rosacea patients, self-care advice, identifying and avoiding triggering factors (such as alcohol, the sun, hot beverages, and spicy food), and general skin care practices (such as using mild face cleansers and high-SPF physical sunscreen) are still essential [8-10]. The pro-yellow laser (PYL) is a yellow light laser system with a wavelength of 577 nm. 577 nm is the ideal wavelength for treating skin lesions and vascular anomalies [11]. Numerous conditions, such as poikiloderma civatte, facial rosacea, facial telangiectasia, erythema, Becker's nevus, and port wine stain nevus, can benefit from PYL systems [12]. It works to reduce rosacea symptoms such as redness by decreasing the size of blood vessels [13]. According to some research, PYL treatment decreased the amount of demodex in the facial skin, which may be one of its positive therapeutic benefits. However, there was no connection found between the decrease in density of demodex and clinical improvement, particularly in erythema [14]. According to reports, PYL therapy is a good therapeutic choice with few side effects that can also be employed as adjuvant therapy for rosacea [15]. The purpose of this study is to assess the efficacy and safety of PYL 577 nm in the management of rosacea.

METHODS

Study design and setting

This was a quasi-randomized controlled study conducted in Al-Imamain Al-Kadhimain Medical City and a private clinic during the period of six months from January to July 2024.

Study population and sample size

Sixty individuals, ranging in age from twenty to sixty, were included in the study. Two dermatologists had previously diagnosed them with either PPR rosacea or ETTR. Exclusion criteria for this study included not being pregnant or breastfeeding, having a history of laser therapy or oral isotretinoin treatment within the past six months, using topical treatments within the past month, having an active skin infection, being photosensitive, having a cancer diagnosis, and refusing to participate. Patients were randomly divided into two groups. Each patient was given a number, and those with odd numbers were placed in group A (30 patients), while those with even numbers were placed in group B (30 patients). This method is a predictable quasi-random procedure. Despite being pre-specified and implemented consistently, the predictable nature of the allocation sequence raises concerns about selection bias. To ensure balance, we used standardized mean differences to compare baseline characteristics.

Intervention procedures

A detailed history was taken from each patient, including age, gender, occupation, skin type, and duration of rosacea. Local and dermatological examinations to detect the type of skin and the type and site of rosacea. The Samsung Note S23 mobile was used to take clinical images. In group A, Asclepion Laser Technologies (Germany) used a PYL with a Quadrostar yellow laser at 577 nm to manage the patients. Topical xylocaine 10% is applied after the skin has been cleaned of any makeup or residue, and patients and operators wear protective goggles to shield their eyes from reflected or dispersed laser light. With a 1 mm spot size and a 15 mm scan area, the fluence is 18–22 j/cm^2, and the pulse duration (36–40 ms) is progressively raised based on the kind of skin and scanning mode. Because of the rupture or coagulation of blood vessels, the result is erythema or a light purple color. Zinc-containing cream was applied after the session. The patients were instructed to follow a daily quadruple combination therapy regimen that included an SPF 50 sunscreen, ivermectin gel (1*2), moisturizer cream (1*2), and either isotretinoin tab 0.5 mg/kg for the PPR type or doxycycline 100 mg 1*1 for the ETTR type (According to the distinct subtypes of rosacea and their clinical presentations, adhering to subtype-specific clinical guidelines and patient requirements) for three months. Excessive heat, sun exposure, spicy food, hot beverages, alcohol, and other aggravating factors were advised to be avoided. In group B, sunscreen with an SPF of 50, ivermectin gel (1*2), moisturizer cream (1*2), and either isotretinoin tab 0.5 mg/kg for PPR type or doxycycline 100 mg 1*1 for ETTR type were all part of their daily quadruple combination therapy regimen that did not involve laser treatment. The program lasted for three months. We also warned against heat, sun exposure, spicy food, hot drinks, alcohol, and other exacerbating variables. To reduce the impact of placebo or expectation effects when a sham is not present, we used consistent language with participants, distributing the visits and contact time evenly among groups, and establishing predetermined interventions to work in tandem with the use of blinded outcome assessors (dermatologists) and objective endpoints.

Post-intervention follow-up

Following therapy, each patient was expected to attend three additional sessions, spaced four weeks apart. Two independent dermatologists evaluated the images that were taken both before and after each therapy session to improve reliability (We standardized the procedures for photograph acquisition at a fixed position and distance from the participant and employed validated scoring scales, but blinding for both patients and the researcher was impractical in our study design because of the nature

of the interventions, particularly the observable effects of laser treatment). So, the researcher's score, an evaluation technique with three scales used, is the Clinician Erythema Assessment (CEA), which is scored as (0 = clear, 1 = almost clear, 2 = mild, 3 = moderate, and 4 = severe); area, which is a 3-point scale [1 = BSA (Body Surface Area) < 0.8%, 2 = BSA between 0.8% and < 1.6%, and 3 = BSA ≥ 1.6%]; and telangiectasia, which is a 3-point scale (0 = clear, 1 = focal or mild, 2 = diffuse or severe). Total score is calculated according to equation: CEA * Area + Telangiectasia and ranged from (0 – 14) [16], as shown in Figure 1.

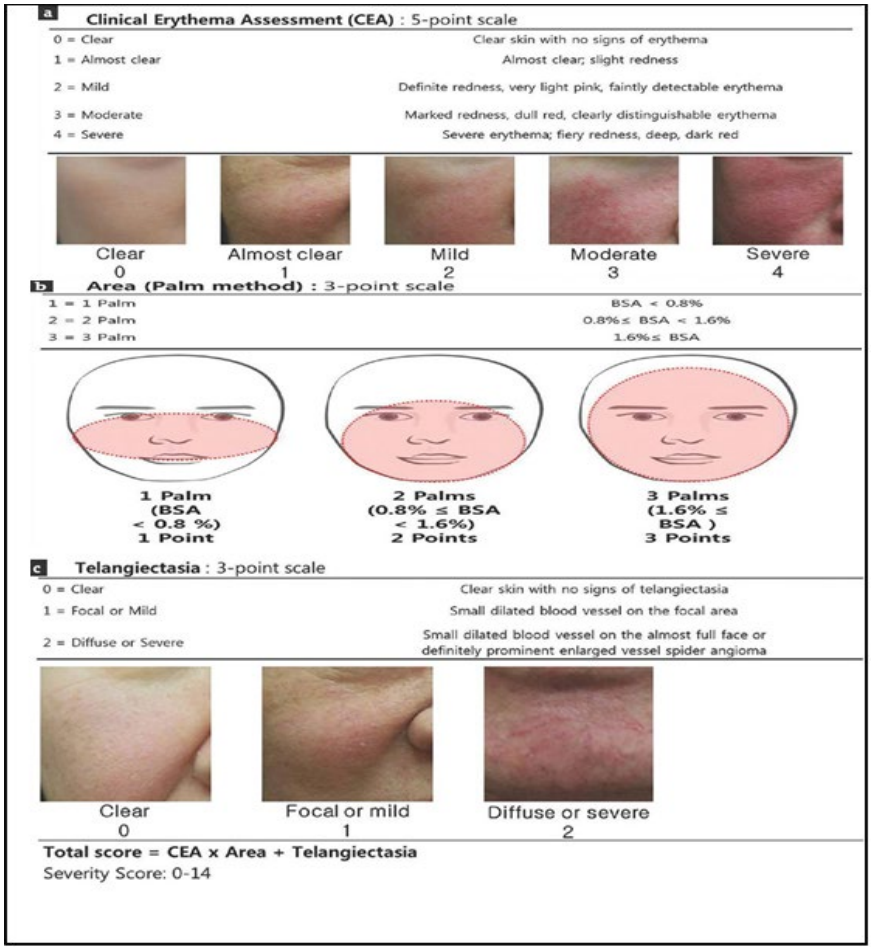

Figure 1: Researcher's score

Ethical consideration

The research followed all the guidelines established by the Declaration of Helsinki 2000 and its amendments, as well as any other relevant ethical guidelines. The Research Ethics Committee of the College of Medicine at Al Nahrain University approved the study protocol. All patients provided signed written consent before enrollment. They were informed about the study details, giving them full information about the treatment options, and they were requested to be a part of this work. All personal information was kept anonymous. Data were exclusively used for the sake of this study.

Statistical analysis

Statistical analysis was performed using IBM SPSS version 26 software. Categorical variables are shown as percentages, whereas continuous variables are shown as means ± standard deviations and medians with interquartile ranges. For continuous variables, the analysis was conducted using an independent t-test; for categorical variables, the chi-square test (χ^2 test) was used. When the P-value was less than 0.05, it was deemed significant.

RESULTS

Table 1 shows that baseline characteristics were similar between groups A and B; there were no significant differences in age, sex, family history, skin type, rosacea type, or duration of rosacea. After three months of treatment, changes from baseline in the investigator's global severity score, erythema, area affected, and telangiectasia differed significantly between groups (p< 0.05), with greater improvements in group A than in group B for the total score, erythema, and telangiectasia (and for area as well).

Table 1: Comparison between study groups by clinical characteristics

Variable	Group A	Group B	*p*-value
Age (year)	33.23±9.9	35.17±8.7	0.425
Gender (M/F)	9(30)/ 21(70)	11(36.7)/19(63.3	0.583
Family history (+ve)	13(43.3)	15(50)	0.604
Skin type			
2	6(20)	8(26.7)	
3	16(53.3)	13(43.3)	0.72
4	8(26.7)	9 (30)	
Type of rosacea			
Telangiectasia	22(73.3)	24(80)	0.541
Papulopustular	8(26.7)	6(20)	
Duration of disease (month)			
≤ 6	19(63.3)	21(70)	0.583
> 6	11(36.7)	9(30)	

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

At one month, there was no significant difference between groups based on area, but group A showed greater mean improvements in the investigator's score, erythema, and telangiectasia than group B (Table 2). The proportion of patients achieving clinically significant improvement in one month was higher in group A than in group B (56.6% *vs*. 26.7%, P= 0.019). Over three months, group A demonstrated a substantially higher rate of outstanding improvement compared with group B (50% *vs*. 3.3%, *p*= 0.001) (Table 3 and Figure 2).

Table 2: Comparison in average change of researcher's score between study groups at one and three months postoperatively

Average change (%)	Group A	Group B	*p*-value
Total researcher's score			
After one month	44.21±8.14	22.71±7.11	0.001
After three months	72.31±13.79	39.22±9.18	0.001
Erythema			
After one month	33.14±5.4	21.21±6.41	0.001
After three months	61.46±8.44	39.51±9.55	0.001
Area			
After one month	9.71±2.61	6.79±2.32	0.421
After three months	28.38±7.61	17.44±6.18	0.002
Telangiectasia			
After one month	42.41±16.1	25.32±10.2	0.001
After three months	73.31±12.27	43.49±11.1	0.001

Values are presented as mean±SD.

Table 3: Comparison between the study groups according to clinical assessment by a dermatologist after one and three months

Dermatologist clinical assessment	Group A (n= 30)	Group B n= 30	Total (n= 60)	*p*-value
Outcome after one month				
Mild improvement	2(6.7)	9(30)	11(18.3)	
Moderate improvement	11(36.7)	13(43.3)	24(40)	0.019
Significant improvement	17(56.6)	8(26.7)	25(41.7)	
Outcome after 3 months				
Mild improvement	1(3.3)	6(20)	7(11.7)	
Moderate improvement	2(6.7)	9(30)	11(18.3)	
Significant improvement	12(40)	14(46.7)	26(43.3)	0.001
Excellent improvement	15(50)	1(3.3)	16(26.7)	

Values are presented as frequency and percentage, n(%).

DISCUSSION

With its yellow light wavelength and significant benefits of low pain, high hemoglobin absorption, and low melanin and water absorption, the 577-nm PYL [17]. At this wavelength, the lesion's quick blanching serves as a clinical sign of heat injury and the correct dosage [18]. Compared to patients who did not undergo laser treatment, those who did had a considerably greater average increment in total researcher's score, erythema, and telangiectasia. This result agrees with the results reported by Kapicioglu *et al*. in 2019 [19] and Aksoy Saraç *et al*. in 2021 [20] when they concluded that with a limited number of sessions and little to no side effects for individuals with ETTR, the PYL is a very safe, well-tolerated, and efficient treatment for rosacea. PYL effectively reduces redness and promotes remission by targeting the vascular component of inflammation. There are several benefits to using the PYL to treat vascular lesions, including the fact that it can be used on patients with darker skin tones, a decreased likelihood of hyperpigmentation or scarring, and a shortened recovery period following treatment for erythema [21]. Regarding the clinical assessment of the dermatologist, this study found that patients treated with laser showed a significantly higher proportion of "significant improvement" than patients treated without laser after one month of therapy. After three months, the excellent improvement rate was significantly higher in group A than in group B. These results are similar to those reported by Mohamed *et al*. in 2019 [15] and Kapicioglu *et al*. in 2019 [19], as they observed a significant clinical improvement (80-100%) in the first or second sessions of the laser treatment, at 4-week intervals, in rosacea patients, and the treatment was very well tolerated.

Figure 2: A 42 year old female treated with PYL (Before treatment and three months after treatment).

Sarac *et al*. (2021) found that 52.5% of the 40 patients who took part saw good improvement, 25% saw excellent improvement, and 22.5% saw moderate improvement. This shows how well PYL works to treat this type of erythema [22]. The effectiveness of laser treatment is influenced by many factors since smaller, superficial arteries can respond better at earlier ages. Variations in blood vessel size, depth, and intimal thickness, as well as the dynamic nature of vascular chromophore, may be the reason why some people react poorly [23, 24]. Oxyhemoglobin is the precise target of the wavelength that lasers used to treat vascular lesions emit. Oxyhemoglobin absorbs the laser and converts it into heat, which produces more heat. damage to the vascular endothelium, which results in the wall coagulating and the vascular endothelium being destroyed [25]. These vascular lasers cause the skin's blood vessels to heat up, which reduces the diameter of the blood vessels. Three factors—fluence, wavelength, and pulse duration—are essential for producing effective results with lasers [13].

Study limitations

The study faced limitations: First, it had limited statistical power and generalizability due to its single-center design and small sample size. These will raise the need for larger studies to reliably assess differential treatment effects by subtype. Second, possible explanations for the observed benefits other than the PYL include placebo effects or natural changes in the disease, since there was no proper control group or randomization. We can't rule out the possibility of placebo or expectation effects because there isn't a laser-control group, and to reduce the likelihood of this happening, we used standardized scripts, made sure that each group had the same amount of interaction time, and blindly assessed the objective results. However, nonspecific effects cannot be ruled out. Isolating the laser's unique effect will be achieved in a future randomized, laser-controlled trial. Third, possible confounding factors include population heterogeneity (different types of rosacea, length and severity of steroid exposure, concurrent treatments, etc.). Fourth, blinding was impractical in our study design because of the nature of interventions, particularly the observable effects of laser treatment. To reduce this possible bias, we standardized the procedures for photograph acquisition and scoring, employing validated scoring scales. Furthermore, several independent dermatologists evaluated the images to improve reliability.

Conclusion

With little adverse effects, PYL 577 nm is a novel and efficient treatment for telangiectasia and persistent erythema in rosacea, both ETTR and PPR types. The reaction is long-lasting, and symptoms and indicators improve more quickly and clearly when conventional treatment is combined with vascular laser therapy, such as PYL. There is a need for larger studies with larger sample sizes to reliably assess differential treatment effects by subtype, to employ standardized treatment protocols across subtypes, which would reduce the heterogeneity of using different systemic medications, and to incorporate blinded assessments.

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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 upon reasonable request.

REFERENCES

1. Türkmen D, Türkoğlu G. Demodex infestation in patients with rosacea. *Turkiye Parazitolojii Dergisi*. 2019;43. doi: 10.4274/tpd.galenos.2019.6456.
2. Rodrigues-Braz D, Zhao M, Yesilirmak N, Aractingi S, Behar-Cohen F, Bourges JL. Cutaneous and ocular rosacea: Common and specific physiopathogenic mechanisms and study models. *Mol Vis*. 2021;27:323-353. PMID: 34035646.
3. Van Zuuren EJ. Rosacea. *N Engl J Med*. 2017;377(18):1754-1764. doi: 10.1056/NEJMcp1506630.

4. Geng RSQ, Bourkas AN, Mufti A, Sibbald RG. Rosacea: Pathogenesis and therapeutic correlates. *J Cutan Med Surg*. 2024;28(2):178-819. doi: 10.1177/12034754241229365.
5. Chen C, Wang P, Zhang L, Liu X, Zhang H, Cao Y, et al. Exploring the pathogenesis and mechanism-targeted treatments of Rosacea: Previous understanding and updates. *Biomedicines*. 2023;11(8). doi: 10.3390/biomedicines11082153.
6. Baldwin HE, Harper J, Baradaran S, Patel V. Erythema of rosacea affects health-related quality of life: results of a survey conducted in collaboration with the National Rosacea Society. *Dermatol Ther*. 2019;9:725-734. doi: 10.1007/s13555-019-00322-5.
7. Thiboutot D, Anderson R, Cook-Bolden F, Draelos Z, Gallo RL, Granstein RD, et al. Standard management options for rosacea: The 2019 update by the National Rosacea Society Expert Committee. *J Am Acad Dermatol*. 2020;82(6):1501-1510. doi: 10.1016/j.jaad.2020.01.077.
8. Sharma A, Kroumpouzos G, Kassir M, Galadari H, Goren A, Grabbe S, et al. Rosacea management: a comprehensive review. *J Cosmet Dermatol*. 2022;21(5):1895-1904. doi: 10.1111/jocd.14816.
9. Hampton P, Berth-Jones J, Duarte Williamson C, Hay R, Leslie T, Porter I, et al. British Association of Dermatologists guidelines for the management of people with rosacea 2021. *Br J Dermatol*. 2021;185(4):725-735. doi: 10.1111/bjd.20485.
10. Paiva-Santos AC, Gonçalves T, Peixoto D, Pires PC, Velsankar K, Jha NK, et al. Rosacea topical treatment and care: from traditional to new drug delivery systems. Molecular Pharmaceutics. 2023;20(8):3804-28. doi: 10.1021/acs.molpharmaceut.3c00324.
11. Albahadili M, Ismael SM, Al-Samarraee MF. Is it Possible to Manage Appendicular Mass Without Surgery?. Al-Rafidain Journal of Medical Sciences. 2025 Oct 3;9(2):46-50.
12. Temiz SA, Durmaz K, Işık B, Ataseven A, Dursun R. The effect of 577-nm pro-yellow laser on demodex density in patients with rosacea. *J Cosmet Dermatol*. 2022;21(1):242-246. doi: 10.1111/jocd.14085.
13. Yepuri V, Patil AD, Fritz K, Salavastru C, Kroumpouzos G, Nisticò SP, et al. Light-based devices for the treatment of facial erythema and telangiectasia. *Dermatol Ther (Heidelb)*. 2021;11(6):1879-1887. doi: 10.1007/s13555-021-00607-8.
14. Altunisik N, Turkmen D, Sener S. Evaluation of the effect of 577-nm pro-yellow laser on demodex intensity. *J Cosmet Laser Ther*. 2021;23(7-8):221-224. doi: 10.1080/14764172.2022.2075898.
15. Mohamed EEM, Mohamed Tawfik K, Hassan Ahmad W. Successful treatment of facial vascular skin diseases with a 577-nm pro-yellow laser. *J Cosmet Dermatol*. 2019;18(6):1675-679. doi: 10.1111/jocd.12963.
16. Yang R, Liu C, Liu W, Luo J, Cheng S, Mu X. Botulinum toxin A alleviates persistent erythema and flushing in patients with erythema telangiectasia rosacea. Dermatol Ther. 2022;12(10):2285-2294. doi: 10.1007/s13555-022-00784-0.
17. Ataseven A, Temiz SA, Özer İ. An investigation of the effectiveness of the 577-nm pro-yellow laser in patients with vascular disorders. *Eur J Ther*. 2023;29(1). doi: 10.58600/eurjther-346.
18. Cios A, Ciepielak M, Szymański Ł, Lewicka A, Cierniak S, Stankiewicz W, et al. Effect of different wavelengths of laser irradiation on the skin cells. Int J Mol Sci. 2021;22(5):2437. doi: 10.3390/ijms22052437.
19. Kapicioglu Y, Sarac G, Cenk H. Treatment of erythematotelangiectatic rosacea, facial erythema, and facial telangiectasia with a 577-nm pro-yellow laser: a case series. *Lasers Med Sci*. 2019;34:93-98. doi: 10.1007/s10103-018-2606-6.
20. 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). doi: 10.1111/jocd.14162.
21. Mohamed E, Younes AK, Hussein G. Efficacy of 577 nm pro-yellow laser in the treatment of melasma: a prospective split-face study. *J Cosmet Laser Ther*. 2020;22:1-4. doi: 10.1080/14764172.2020.
22. Sarac G, Kapicioglu Y, Cenk H. An evaluation of the efficacy of a single-session 577 nm pro-yellow laser treatment in patients with postacne erythema and scarring. *Dermatol Ther*. 2021;34(1):e14611. doi: 10.1111/dth.14611.
23. Deegan AJ, Wang RK. Microvascular imaging of the skin. *Physics Med Biol*. 2019;64(7):07TR1. doi: 10.1088/1361-6560/ab03f1.
24. Al-Atta DM, Al-Samarraee MF, Fadhil AA, Kadhim ST, Alsarhan HW. Compliance with second visit of diabetes mellitus screening program and impact of dietary and exercise modification on glycemic control. *Al-Rafidain J Med Sci*. 2025;8(2):150-156. doi: 10.54133/ajms.v8i2.1929.
25. Zhai Q, Cheng S, Liu R, Xie J, Han X, Yu Z. Meta-analysis of the efficacy of intense pulsed light and pulsed-dye laser therapy in the management of rosacea. *J Cosmetic Dermatol*. 2024;23(12):3821-3827. doi: 10.1111/jocd.16549.