



# International Journal of Dermatology, Venereology and Leprosy Sciences

E-ISSN: 2664-942X

P-ISSN: 2664-9411

[www.dermatologypaper.com](http://www.dermatologypaper.com)

Derma 2023; 6(2): 40-43

Received: 12-06-2023

Accepted: 17-07-2023

**Samar Saeed Ashmawy**  
Dermatology and Venereology  
Department, Faculty of  
Medicine, Tanta University,  
Tanta, Egypt

**Elham Mohamed Kassem**  
Dermatology and Venereology  
Department, Faculty of  
Medicine, Tanta University,  
Tanta, Egypt

**Shereen Farouk Gheida**  
Dermatology and Venereology  
Department, Faculty of  
Medicine, Tanta University,  
Tanta, Egypt

**Nahla Elsayed Ramzy**  
Dermatology and Venereology  
Department, Faculty of  
Medicine, Tanta University,  
Tanta, Egypt

**Corresponding Author:**  
**Samar Saeed Ashmawy**  
Dermatology and Venereology  
Department, Faculty of  
Medicine, Tanta University,  
Tanta, Egypt

## Use of light emitting diode in Treatment of Inflammatory Acne Vulgaris

**Samar Saeed Ashmawy, Elham Mohamed Kassem, Shereen Farouk Gheida and Nahla Elsayed Ramzy**

**DOI:** <https://doi.org/10.33545/26649411.2023.v6.i2a.152>

### Abstract

**Objectives:** Its purpose was to evaluate the efficacy of light-emitting diodes in the treatment of inflammatory acne.

**Background:** Acne vulgaris is a prevalent skin condition. Acne vulgaris can be treated in a variety of ways. Phototherapy is one of the most effective acne treatments.

**Methods:** This research involved 40 acne vulgaris patients (15 men and 25 women). All subjects received eight treatments with a low intensity continuous infrared diode laser (808nm) wavelength and frequency (500HZ). The evaluation was performed at the commencement of the sessions and three months after the therapy was discontinued.

**Results:** Acne lesions were less severe (non-inflammatory and inflammatory lesion counts). Patients were pleased with the laser therapy since there was less recurrence.

**Conclusion:** An effective non-invasive therapy for acne vulgaris is eight sessions with a low power continuous infrared diode laser.

**Keywords:** Low level laser, Acne vulgaris

### Introduction

"It is said that no one truly knows a nation until one has been inside its jails. A nation should not be judged by how it treats its highest citizens, but its lowest ones." - Nelson Mandela  
More than 10.2 million people worldwide are held in prisons. As per the World Prison Population List-2013, there is a general trend of growth in prison population in majority of nations, including in India. As of 2017, the latest figures available for India, there are and belong to marginalized or socially disadvantaged groups and have limited knowledge about health and practice unhealthy lifestyles. Thus, they represent a distinct and vulnerable health group needing priority attention <sup>[1]</sup>.

### International Law

Acne vulgaris (AV) is a prevalent skin condition with non-inflammatory (open and closed comedones) and inflammatory (papules and pustules) symptoms <sup>[1]</sup>. Topically applied antibiotics, retinoids, benzoyl peroxide (BPO), alpha hydroxy acids (AHA), salicylic acid (SA), and azelaic acid are all used to treat AV (AA). In severe instances, systemic antibiotics such as tetracycline and doxycycline, oral retinoids, and some hormones are provided <sup>[2]</sup>. As a potential treatment for AV, phototherapy (light, lasers, and photodynamic therapy (PDT)) has been offered <sup>[3]</sup> as an alternative. Low-level laser treatment (LLLT) facilitates healing, reduces pain and inflammation, and enhances function <sup>[4]</sup>. Additionally, it inhibits the cyclooxygenase 2 (cox-2) enzyme, reducing tumour necrosis factor-alpha (TNF-) and interleukin 1alpha (IL-1) levels and, therefore, inflammation <sup>[5, 6]</sup>. The LLLT includes exposing cells to low-levels of red and near infrared (NIR) light, which is referred to as "low-level" because the energy or power densities used are low compared to other types of laser <sup>[7]</sup>.

### Patients and Methods

They were selected from the Faculty of Medicine's Outpatient Clinic of Dermatology and Venereology at Tanta University Hospitals.

**All patients were subjected to**

The GEA scale is based on a photographic and clinical evaluation of acne patients, which includes a patient's medical history and physical examination. (Table 1).

- This examination was conducted before to commencing therapy, after eight sessions of therapy (after one month), and three months after treatment was discontinued.

This examination was conducted before commencing therapy, after eight sessions of therapy (after one month), and three months after treatment was discontinued.

▪ **Therapeutic regimen**

1. In this study, LLL was utilized to treat 40 patients with inflammatory acne (ENDOLASER 422. Enraf-nonius B. V, Netherlands). It is a low-level continuous infrared diode laser (808 nm) with a 500Hz frequency and a 500mW peak output. The laser probe is a 500 Mw continuous laser diode (LP500) with a peak output of 500 W.
2. The patients were treated with the LLL device) at the Physical Medicine Department of the Faculty of Medicine at Tanta University Educational Hospital.
3. Every week for four weeks, there were two sessions.
4. Patients were instructed to refrain from using other acne treatments throughout laser therapy and for three months after the last session.
5. Patients reported adverse consequences.

**Evaluation of the therapy procedure's effectiveness was conducted by**

1. At baseline, before each session, and three months after the final session, photographs were taken. The photographs were captured with a Samsung ST150F smart compact camera with a 5x telephoto lens, an F2.5 lens, and a 16.2 MP resolution.
2. The GEA scale was used to evaluate the severity of inflammatory acne lesions prior to treatment, two weeks after the last session, and three months afterwards.
3. **Patient satisfaction:** Dissatisfaction, partial satisfaction, contentment, or extreme satisfaction.

**Follow up**

Following the conclusion of treatment sessions, patients were followed up on monthly for three months to evaluate treatment efficacy, recurrence, and side effects.

**Statistical analysis**

Data were input into the computer and analysed using IBM

SPSS version 20.0 software. IBM is headquartered in Armonk, New York. The qualitative data were described numerically and by percentage. The Kolmogorov-Smirnov test was utilized to demonstrate the distribution's normality. Range (minimum and maximum), mean, standard deviation, median, and interquartile range were used to report quantitative data (IQR). At the 5 percent significance threshold, the gathered findings were evaluated. Utilized were the Chi-square, McNemar, and marginal tests. F-test, Wilcoxon signed ranks test, Kruskal Wallis test, and homogeneity test (ANOVA).

- P value was considered statistically significant at  $P \leq 0.05$ , and statistically high significant at  $p < 0.001$ .

**Results**

Clinical results were demonstrated in Table (2, 3).

**Discussion**

In accordance with the GEA scale, acne improved following medication in the current study.

Szymaska *et al.* demonstrated that treating acne with LLLT for 10 minutes by a device with a power of 360 mW emitting IR radiation with a wavelength of 785 nm and a power density of 80 mW/cm<sup>2</sup> resulted in a significant improvement in acne lesions and a decrease in skin sebum secretion with no adverse effects (9).

According to Aziz-Jalali MH *et al.*, LLLT using a 630-nm (red spectrum) laser considerably eradicates active acne lesions after 12 therapy sessions. They concluded that red-wavelength LLLT is a safe method for treating facial AV (3).

Several studies have also demonstrated the synergistic effects of mixing blue and red light in acne treatment (14).

In the current study, laser therapy improved papulopustular, nodulocystic, and associated comedonal lesions statistically substantially. The value of the papulopustular lesions was statistically significant.

Szymaska A *et al.* exhibited a significant reduction in non-inflammatory and inflammatory lesion counts with an LLL and no known adverse effects (15). Notably, improvement in inflammatory lesions was larger than improvement in comedonal lesions in the majority of clinical studies (9).

In a single-blind, well-controlled investigation, blue (415 nm) and red (660 nm) light were compared to blue light alone. They were evaluated using cold white light and 5% BPO. The individuals had mild to severe acne. Significant differences existed between the white light group and the other treatments; blue-red light was frequently superior to blue light alone. With active therapy, comedonal numbers decreased significantly, whereas they increased in the control group (10).

**Table 1:** Global evaluation of acne scale

0	Clear, no lesions	There may be residual pigmentation and erythema.
I	Almost clear, almost no lesions	A few scattered open or closed comedones and few papules are present.
II	Mild	Less than half the face is involved in the recognition. A few open or closed comedones as well as a few papules and pustules are present.
III	Moderate	More than fifty percent of the face is affected. Numerous papules and pustules, or numerous open and closed comedones. There may be one nodule present
IV	Severe	Many papules and pustules, open or closed comedones, and uncommon nodules cover the entire face.
V	Very severe	Extremely inflammatory acne with nodules covering the face

**Table 2:** Demographic data of the studied cases (n = 40):

Parameter		No.	%
Gender	Male	12	30.0
	Female	28	70.0
Age	Range	17.0-22.0	
	Mean ± SD.	19.25 ± 1.65	
	Median (IQR)	19.0 (18.0 – 21.0)	
Duration (years)	Min. – Max	0.50 – 7.0	
	Mean ± SD.	3.53 ± 1.77	
	Median (IQR)	3.50 (2.0 – 5.0)	
<b>Family history</b>			
No	28	70.0	
Yes	12	30.0	
<b>Aggravating factors</b>			
No	6	15.0	
Sun exposure	2	5.0	
Sun exposure, food	4	10.0	
Food	10	25.0	
Menses	10	25.0	
Sun exposure , menses	6	15.0	
Sun exposure, menses, food	2	5.0	
<b>Laser side</b>			
Right	12	30.0	
Left	28	70.0	
<b>Type of lesion</b>			
Papulopustular	30	75.0	
Nodulocystic	10	25.0	

SD: Standard deviation

IQR: Inter quartile range

**Table 3:** Comparison between before and after treatment in laser side:

Grading GEA scale	Laser side				P value
	Before		After		
	No.	%	No.	%	
I	0	0	17	85.0	<0.001*
II	10	50.0	3	15.0	
III	4	20.0	0	0	
IV	1	5.0	0	0	
V	5	25.0	0	0	
<b>IAA grading</b>					
No	0	0.0	12	60.0	<0.001*
Mild	10	50.0	8	40.0	
Moderate	5	25.0	0	0.0	
Severe	5	25.0	0	0	

\* Statistically significant at  $p \leq 0.05$

P: p value for Marginal Homogeneity Test for comparing between before and after treatment

**Conclusion**

- We found that Papulopustular, nodulocystic, and similar comedonal lesions improved.
- After laser therapy, several patients noted an improvement in the texture and elasticity of their facial skin.

**Financial support and sponsorship:** Nil

**Conflict of interest**

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

**References**

1. Lynn DD, Umari T, Dunnick CA, Dellavalle RP. The epidemiology of acne vulgaris in late adolescence. *Adolesc Health Med Ther.* 2016;7:13.
2. Aziz-Jalali MH, Tabaie SM, Djavid GE. Comparison of red and infrared low-level laser therapy in the treatment of acne vulgaris. *Indian J Dermatol.* 2012;57(2):128-31.
3. Rotunda AM, Bhupathy AR, Rohrer TE. The new age of acne therapy: light, lasers, and radiofrequency. *J Cosmet Laser Ther.* 2004;6(4):191-200.
4. Avci P, Gupta A, Sadasivam M, Vecchio D, Pam Z, Pam N, *et al.* Low-level laser (light) therapy (LLLT) in skin: stimulating, healing, restoring. *Semin Cutan Med Surg.* 2013;32(1):41.
5. Seaton ED, Mouser PE, Charakida A, Alam S, Seldon PE, Chu AC. Investigation of the mechanism of action of nonablative pulsed-dye laser therapy in photorejuvenation and inflammatory acne vulgaris. *Br J Dermatol.* 2006;155(4):748-55.
6. Lanzafame RJ, Blanche RR, Bodian AB, Chiacchierini RP, Fernandez-Obregon A, Kazmirek ER. The growth of human scalp hair mediated by visible red light laser and LED sources in males. *Lasers Surg Med.* 2013;45(8):487-95.

7. Barolet D. Light-emitting diodes (LEDs) in dermatology. *Semin Cutan Med Surg.* 2008;27(4):227-38.
8. Dreno B, Poli F, Pawin H, Beylot C, Faure M, Chivot M, *et al.* Development and evaluation of a Global Acne Severity scale (GEA scale) suitable for France and Europe. *J Eur Acad Dermatol Venereol.* 2011;25(1):43-8.
9. Szymańska A, Budzisz E, Erkiert-Polguj A. The anti-acne effect of near-infrared low-level laser therapy. *Clin Cosmet Investig Dermatol.* 2021;14:1045-51.
10. Papageorgiou P, Katsambas A, Chu A. Phototherapy with blue (415 nm) and red (660 nm) light in the treatment of acne vulgaris. *Br J Dermatol.* 2000;142(5):973-8.
11. Nestor MS, Swenson N, Macri A, Manway M, Paparone P. Efficacy and tolerability of a combined 445nm and 630nm over-the-counter light therapy mask with and without topical salicylic acid versus topical benzoyl peroxide for the treatment of mild-to-moderate acne vulgaris. *J Clin Aesthet Dermatol.* 2016;9(3):25.
12. Kharazi L, Dadkhahfar S, Rahimi H, Gheisari M, Mozafari N, Tehranchinia Z. The efficacy of blue light versus the combination of blue and red-light therapy in the treatment of acne vulgaris. *Photodermatol Photoimmunol Photomed.* 2021;37(6):564-6.
13. Sadick NS. Handheld LED array device in the treatment of acne vulgaris. *J Drugs Dermatol.* 2008;7(4):347-50.
14. Goldberg DJ, Russell BA. Combination blue (415 nm) and red (633 nm) LED phototherapy in the treatment of mild to severe acne vulgaris. *J Cosmet Laser Ther.* 2006;8(2):71-5.
15. Heng AH, Chew FT. Systematic review of the epidemiology of acne vulgaris. *Sci Rep.* 2020;10(1):1-29.

**How to Cite This Article**

Ashmawy SS, Kassem EM, Gheida SK, Ramzy NE. Use of light emitting diode in Treatment of Inflammatory Acne Vulgaris. *International Journal of Dermatology, Venereology and Leprosy Sciences.* 2023; 6(2): 40-43.

**Creative Commons (CC) License**

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-Non Commercial-Share Alike 4.0 International (CC BY-NC-SA 4.0) License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.