



EFFICACY OF HAIR REMOVAL WITH DIODE LASER SYSTEM (808NM) CORRELATE TO NUMBER OF TREATMENTS IN DARK SKIN LIBYAN PATIENTS

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Abstract

Background and Objective: The 808-nm wavelength Diode lasers is commonly used for hair removal. To date, the available spot sizes and repetition rates are defining factors in terms of penetration depth, treatment speed, and efficacy The 808nm wavelength diode laser can safely and successfully treat dark pigmented skin.

Study Design; A total of 50 adult patients with skin types I–IV were treated at 3-week intervals , the average of energy around from 10-50j\cm*2 were delivered on a monthly bases treatment into involved area by a single operator ,spot size 15*35mm standard. The device was set as short pulse (17ms), pulse rate (1 Hz-10Hz) conducted at a private clinic at a private clinic in ,Benghazi city , Libya in the period from Sep 2019 to Dec 2022 . **Results;**

Conclusions: Diode lasers can be used on dark pigmented skin with positive outcomes. Complications such as hypopigmentation, or hyperpigmentation occurred, but all were transient and resolved within a few months. Lasers Surg. Med. 28:150–155, 2001. © 2001 Wiley-Liss, Inc.

Keywords: Hairstisum , Diode Laser, hair removal

introduction

Laser hair removal (LHR) is a widely used treatment for unwanted hair recently, hair removal has been most challenging to perform on people with dark skin, who often need this treatment more than do people with light complexions[1] Laser hair removal operations aim to treat hair growth, and to prevent it from returning again in areas of the body where a person does not want hair to grow, for cosmetic reasons, or for treatment of excess hair [2]The first laser for hair removal was introduced in 1995. The most popular hair removal lasers include long-pulse alexandrite (755 nm), long-pulse diode (810 nm), longpulse neodymium-doped yttrium aluminum garnet (Nd:YAG; 1064 nm), each has its own specifications and advantages that makes it more suitable for specific skin and hair and hair conditions.[2.,3] Melanin absorption in the hair follicle was excellent, but the concomitant absorption by epidermal melanin was a great disadvantage. This factor limited treatment to patients of Fitzpatrick types I and II.[4] In 2000, the second-generation long-pulse ruby laser was developed. It used a superior cooling mechanism and a longer pulse, lasting up to 20 milliseconds. These factors facilitated effective and safe treatment for patients of Fitzpatrick skin types I through IV[5] During recent years, both men and women have begun to resort to laser treatments aimed at removing hair from several areas of the body. Whether these areas are visible or

hidden: the chest, back, legs, underarms, face, upper thighs, and other areas. laser therapy prevents the regrowth of melanin cells in the skin layers and hair follicles.[6]

Objectives:

To assess fluence, accumulative energy, and number of treatments needed to achieve a significant hair reduction and patient satisfaction with minimal side effects, low discomfort levels, and high safety profile in a skin type IV–VI In Libyan patients

In Materials and Methods:

The study conducted at a private clinic in **Nvrtite** district, Benghazi, Libya in the period from September 2019 to December in 2022. the study out of the total number of patients, 38 were treated at the smaller body areas (bikini area, face, upper lip or axilla) and 12 patients were treated in the larger body areas (chest, arm, legs,). and completed **12 months** treatments. Their age ranged between **18 - 40** years with (average $\pm$ SD) 27.7 ± 5.8 years. 29), with Fitzpatrick skin types iv–vi. Patients attending the clinic during the specified time of the study were included. Hormonal evaluation was performed. Any patient with a suspected hormonal cause of hirsutism was excluded. Only patients with familial and racial hirsutism are included. Laser treatment was carried by using diode laser 808 nm generated by a diode laser device (DILAS Moudle); the average of energy around from 10-50 J/cm² were delivered on a monthly bases treatment into involved area by a single operator, spot size 15*35mm standard. The device was set as short pulse (17ms), pulse rate (1 Hz-10Hz) and All area was treated in a sequence with minor overlap in adjacent areas. The fluence was increased gradually with the patient pain tolerance All the patients were evaluated before the treatment and at each visit; the following observations were recorded: visual analogue, time of hair regrowth /day, satisfaction, side effect.

Measures of efficacy Subjective reduction in hairiness was determined by a subjective overall impression of the hair reduction. Patient satisfaction reflects an overall satisfaction with the treatment outcome. Moreover, side-effects were evaluated, when reported in a controlled manner. Hair reduction estimated up to 6 months after treatment was considered as ‘short-term efficacy’ and beyond 6 months postoperatively as ‘long-term efficacy’. hair removal efficacy was evaluated as both short-term and long-term, of which five studies had follow-up evaluations of up to 12 months postoperatively

Results;

a total of 50 patients, Mean age =27.7, Std. Deviation =5.8 , Median= 27 , Minimum age= 18 , Maximum = 40 as Fig1, females number 46 and 4 males with a Fitzpatrick iv–vi skin type were included in the study. 38() patients were treated at the smaller body area (bikini, face, axilla, upper lip, beard) and 12 (28.17%) patients were treated at the larger ones (chest, leg , and arms).

Subjective reduction in hairiness was determined by a subjective

Table 1: Distribution of patients according to age

Age /year	No.	%
≤20	4	8
21 - 30	34	68
31 - 40	12	24
Total	50	100

Mean age =27.7, Std. Deviation =5.8 , Median= 27 , Minimum age= 18 , Maximum = 40

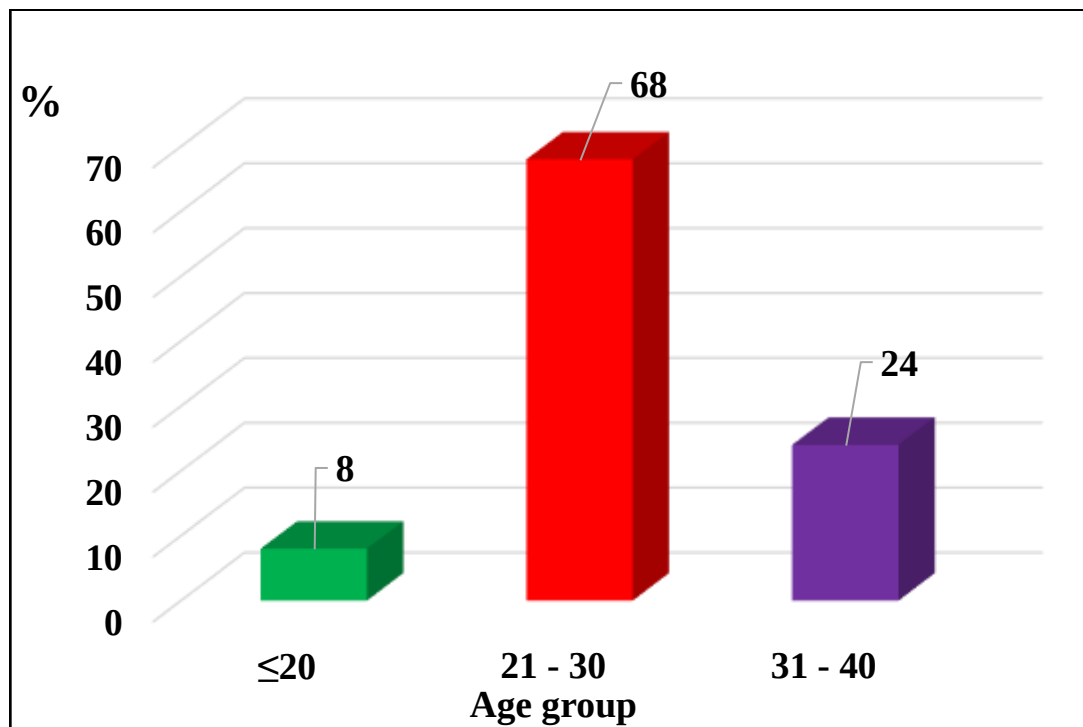


Fig.1: Distribution of patients according to age

Table 2 : Distribution of patients according to visual analogue scale

Visual analogue scale	No.	%
Hair thinner	20	40
Hair thinner and weak	30	60
Total	50	100

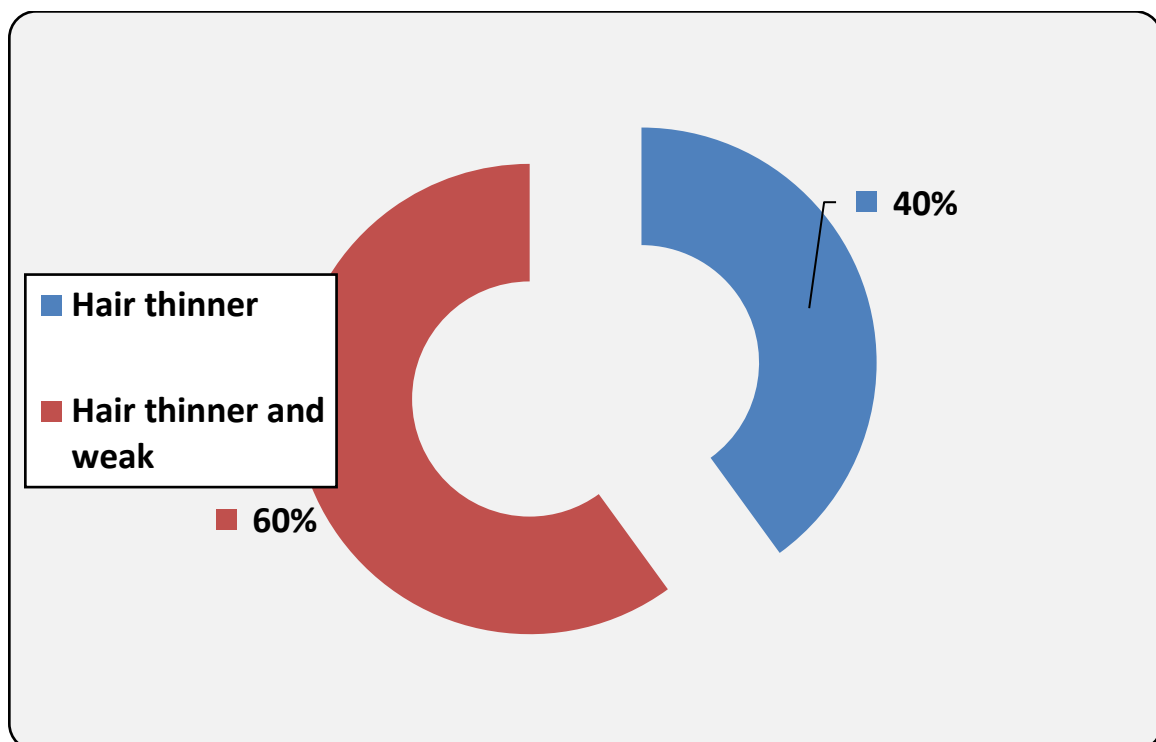


Fig.2: Distribution of patients according to visual analogue scale

Table 3: Distribution of patients according to satisfaction

Number of Session	Unsatisfied		Satisfied		Full satisfied	
	No.	%	No.	%	No.	%
2 nd Session (50)	50	100	0	0	0	0
3 rd Session (50)	44	88	6	12	0	0
4 th Session (50)	28	56	21	42	1	2
5 th Session (50)	15	30	31	62	4	8
6 th Session (50)	10	20	33	66	7	14
7 th Session (50)	2	4	36	72	12	24
8 th Session (50)	1	2	28	56	21	42
9 th Session (41)	0	0	22	53.7	19	46.3
10 th Session (30)	0	0	15	50	15	50
11 th Session (25)	0	0	8	32	17	68
12 th Session (22)	0	0	7	31.8	15	68.2

Table 4: Distribution of patients according to time of hair regrowth /day

Number of Session	Time of hair regrowth /day		
	Mean±St.deviation	Range	p value
1 st Session (50)	8±1.7	5 - 10	0.544
2 nd Session (50)	8.3±2.5	5 - 15	0.006
3 rd Session (50)	9.9±3.1	5 - 18	0.004
4 th Session (50)	12.1±4.4	7 - 20	0.001
5 th Session (50)	15.3±4.7	7 - 28	0.010
6 th Session (50)	18.4±6.5	7 - 30	0.010
7 th Session (50)	22.14±6.7	7 - 35	0.006
8 th Session (50)	25.94±7.9	10 - 45	0.010
9 th Session (41)	26.84±6.9	15 - 45	0.575
10 th Session (30)	28±6.7	20 - 45	0.434
11 th Session (25)	30.7±5.7	25 - 45	0.126
12 th Session (22)	33.7±6.4	25 - 45	0.091

Table 5: Distribution of patients according to area and number of session

Area	Number of Session				
	8	9	10	11	12
	No.(%)	No.(%)	No.(%)	No.(%)	No.(%)
Face	1(14.3)	2(28.6)	2(28.6)	1(14.3)	1(14.3)
Upper lips	3(50)	2(33.3)	0	0	1(16.7)
Bread	0	0	1(100)	0	0
Axilla	3(30)	4(40)	1(10)	1(10)	1(10)
Chest	0	0	0	0	2(100)
Bikini	0	2(14.3)	0	0	12(85.7)
Legs	0	1(12.5)	1(12.5)	1(12.5)	5(62.5)
Arms	0	2(100)	0	0	0
Total	7(14)	13(26)	5(10)	3(6)	22(42)

Fisher's Exact Test =41.667 p = 0.001 (Significant)

DISSCUTION:

Distribution of Patients According to Age:

The table1 shows the distribution of patients across different age groups.

%8 of the patients (4 out of 50) are 20 years old or younger.

%68 of the patients (34 out of 50) are between 21 and 30 years old.

%24 of the patients (12 out of 50) are between 31 and 40 years old.

The total number of patients is 50.

Central Tendency Measures:

- * Mean Age*: The mean age of the patients is 27.7 years.
- * Median Age*: The median age of the patients is 27 years.
- * Minimum Age*: The minimum age of the patients is 18 years.
- * Maximum Age*: The maximum age of the patients is 40 years.

***Dispersion Measure*:**

- * **Standard Deviation***: The standard deviation of the patients' ages is 5.8 years.

In summary, this table provides information about the distribution of patients across different age groups, as well as the central tendency and dispersion measures of their ages. The majority of the patients (68%) are between 21 and 30 years old, with a mean age of 27.7 years and a standard deviation of 5.8 years.

Table 2: Distribution of Patients According to Visual Analogue Scale

***Visual Analogue Scale Categories*:**

The table shows the distribution of patients across two categories of the visual analogue scale:

" Hair thinner

"Hair thinner and weak"

***Distribution of Patients*:**

%40 of the patients (20 out of 50) were categorized as having "Hair thinner".

%60 of the patients (30 out of 50) were categorized as having "Hair thinner and weak".

The total number of patients is 50.

***Interpretation*:**

This table provides information about the subjective assessment of the patients' hair condition using a visual analogue scale.

The majority of the patients (60%) were categorized as having both "Hair thinner and weak", indicating a more severe hair condition.

The remaining 40% of the patients were categorized as having "Hair thinner" only, suggesting a less severe hair condition.

In summary, this table presents the distribution of patients across two categories of the visual analogue scale related to their hair condition. It shows that 60% of the patients were assessed as having "Hair thinner and weak", while 40% were assessed as having "Hair thinner" only.

Table 3: Distribution of Patients According to Satisfaction about Hair Removal by Laser

***Satisfaction Levels*:**

The table shows the distribution of patients' satisfaction levels across different sessions of laser hair removal treatment.

The satisfaction levels are categorized as "Full satisfied", "Satisfied", and "Unsatisfied".

***Treatment Sessions*:**

The table covers the distribution of satisfaction levels from the 2nd session to the 12th session of laser hair removal treatment.

*

Satisfaction Distribution*:

In the 2nd session, 100% of the patients were "Unsatisfied" with the hair removal by laser.

As the number of sessions increased, the percentage of "Unsatisfied" patients decreased, while the percentages of "Satisfied" and "Full satisfied" patients increased.

By the 12th session, 68.2% of patients were "Full satisfied" and 31.8% were "Satisfied", with no "Unsatisfied" patients.

***Trends*:**

The table shows a positive trend in patient satisfaction as the number of laser hair removal sessions increased.

The percentage of "Unsatisfied" patients decreased from 100% in the 2nd session to 0% by the 10th session.

The percentage of "Satisfied" and "Full satisfied" patients increased steadily, with the majority of patients being "Full satisfied" by the 11th and 12th sessions.

In summary, this table demonstrates the distribution of patient satisfaction levels with laser hair removal treatment over multiple sessions. It shows a clear improvement in satisfaction as the number of sessions increased, indicating the effectiveness of the treatment in meeting patients' expectations

Table 4: Distribution of Patients According to Time of Hair Regrowth (Days) After Start of Hair Removal by Laser

1. *Hair Regrowth Time:*

- The table shows the time (in days) it took for hair to regrow after each session of laser hair removal treatment.

- The time of hair regrowth is presented as a range and a mean with standard deviation for each session.

2. *Session-wise Comparison:*

- For the 1st session, the mean time of hair regrowth was 8 ± 1.7 days, with a range of 5 to 10 days.

- As the number of sessions increased, the mean time of hair regrowth also increased, reaching 33.7 ± 6.4 days by the 12th session, with a range of 25 to 45 days.

3. *Statistical Significance:*

- The p-value is provided for each session, indicating the statistical significance of the hair regrowth time.

- The p-values are significant ($p < 0.05$) for the 2nd to 8th sessions, suggesting that the changes in hair regrowth time are statistically significant.

- For the 9th to 12th sessions, the p-values are not significant ($p > 0.05$), indicating that the changes in hair regrowth time are not statistically significant.

4. *Interpretation:*

- The table shows that as the number of laser hair removal sessions increased, the time required for hair regrowth also increased.

- This suggests that the laser treatment was effective in delaying hair regrowth, with the effects becoming more pronounced after multiple sessions.

- The statistical significance of the results up to the 8th session indicates that the changes in hair regrowth time were not due to chance.

In summary, this table provides information on the time required for hair regrowth after each session of laser hair removal treatment. The data suggests that the treatment was effective in delaying hair regrowth, with the effects becoming more pronounced over multiple sessions.

Table 5: Distribution of Patients According to Area and Number of Sessions After Start of Hair Removal by Laser

Areas Covered:

The table shows the distribution of patients across different areas of the body where laser hair removal was performed.

The areas included are Face, Upper Lips, Beard, Axilla (armpits), Chest, Bikini, Legs, and Arms.

Number of Sessions:

The table shows the distribution of patients across the 5th, 8th, 9th, 10th, 11th, and 12th sessions of laser hair removal treatment.

Distribution of Patients:

The data is presented as the number and percentage of patients for each area and session.

For example, in the 12th session, 1 (14.3%) patient had laser hair removal on the Face, 1 (16.7%) on the Upper Lips, 1 (10%) on the Axilla, 2 (100%) on the Chest, and 12 (85.7%) on the Bikini area.

Statistical Significance:

The Fisher's Exact Test was performed to analyze the statistical significance of the distribution.

The p-value of 0.001 indicates that the distribution of patients across the different areas and number of sessions is statistically significant.

Interpretation:

The table shows that the distribution of patients across different body areas and the number of sessions is not uniform.

Certain areas, such as the Bikini and Chest, had a higher percentage of patients in the later sessions, suggesting that these areas required more sessions for effective hair removal.

Other areas, such as the Arms and Beard, had a smaller number of patients, indicating that they may have been less commonly targeted for laser hair removal.

In summary, this table provides insights into the distribution of patients across different body areas and the number of laser hair removal sessions. The statistically significant results suggest that the treatment approach may have been tailored to specific areas based on patient needs or preferences. Here are the key points from the results presented in the tables:

Hair Regrowth Time:

As the number of laser hair removal sessions increased, the mean time of hair regrowth also increased, from 8 ± 1.7 days after the 1st session to 33.7 ± 6.4 days after the 12th session.

The changes in hair regrowth time were statistically significant ($p < 0.05$) up to the 8th session.

Patient Satisfaction:

Patient satisfaction with the laser hair removal treatment improved over multiple sessions.

In the 2nd session, 100% of patients were "Unsatisfied", but by the 12th session, 68.2% were "Fully Satisfied" and 31.8% were "Satisfied", with no "Unsatisfied" patients.

Visual Analogue Scale:

60% of the patients were categorized as having "Hair thinner and weak", while 40% were categorized as having "Hair thinner" only.

Patient Demographics:

The majority of the patients (68%) were between 21 and 30 years old, with a mean age of 27.7 years and a standard deviation of 5.8 years.

Overall, the results suggest that the laser hair removal treatment was effective in delaying hair regrowth and improving patient satisfaction over multiple sessions. The visual analogue scale assessment indicated that the majority of patients had more severe hair conditions. The patient demographic information showed that the study population was predominantly young adults.

CONCLUSION:

The results of this study demonstrate that laser hair removal is an effective treatment for delaying hair regrowth and improving patient satisfaction over multiple sessions. As the number of treatments increased, the mean hair regrowth time also increased significantly up to the 8th session. Patient satisfaction improved considerably, with 100% of patients being "Fully Satisfied" or "Satisfied" by the 12th session. The visual analogue scale assessment indicated that most patients had more severe hair conditions, with 60% having "Hair thinner and weak". The study population consisted predominantly of young adults between 21 and 30 years old. Overall, these findings suggest that laser hair removal can be a valuable option for individuals seeking a long-lasting solution for unwanted hair.

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