

Efficacy of Intense Pulsed Light Therapy in the Treatment of Facial Acne

Light Therapy in the Treatment of Facial Acne Vulgaris

Vulgaris: Comparison of Two Different Fluence

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ABSTRACT

Objective: Objective of study is to compare efficacy of two fluencies normal and subnormal of IPL on facial acne vulgaris.

Study Design: Randomized controlled trial (RCT)

Place and Duration of Study: This study was conducted at the dermatology department of Nishtar Hospital Multan, from January 2020 to December 2020.

Materials and Methods: Study was conducted on 60 patients, normal fluence was used on right side of face and subnormal was used on left side of face. Number of lesions was used to calculate reduction in lesion. SPSS version 23 was used for data analysis.

Results: Excellent results were obtained in 15.0% of patients in right side and 10% in left side. The most common side effect noted in both left and right side was itching i.e. 76.7% and 68.3% respectively. (p=0.021).

Conclusion: IPL is safe and effective option for inflammatory acne vulgaris with minimal reversible side effects. Both fluencies subnormal and normal fluence are equally.

Key Words: intense pulsed light, Acne vulgaris, Skin, Lesion count.

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INTRODUCTION

Acne vulgaris is a common skin disease that usually affects young people and teenagers and can lead to low self-esteem and psychological distress¹. In United States of America about fifty million people affected by acne vulgaris, among them 85% are teenagers. Acne can occur in all age groups but usual presentation is adulthood. Less than 20 blackheads or white heads labeled as mild acne and larger number of black or whiteheads considered under moderate acne².

In cases of severe acne blackheads present with nodules or cyst and pimples become painful. Combination of

oil, hormone and bacteria cause acne vulgaris during puberty³. Most common causes are hormonal changes either in pregnancy or not, use of cosmetics, high sweating and humidity and polycystic ovary syndrome⁴. This chronic inflammatory disease altered the pilosebaceous unit under the skin and involved in increased production of sebum and abnormal shedding of follicular epithelium that is responsible for obstruction of pilosebaceous unit and comedo formation⁵.

After sometime sebum in pilosebaceous unit pulls the Propionibacterium acnes and mediate the follicular inflammation. Available topical and oral anti-acne medications are less effective, more adverse and difficult to use⁶. Collectively antibiotic resistance, side effects of systemic and topical anti-acne medication and desire for advance technology based approaches are responsible for increasing interest of people in light based acne therapy⁷.

Intense pulsed light also famous with name of photofacial is a mode improvement in texture and color of skin without any surgical treatment. It works by mode of undo of damage due to sun exposure or photoaging⁸. Most common places are chest, hands, neck and face. Intense pulsed light (IPL) therapy for treatment of acne vulgaris has three therapeutic roles photo-immunological, photochemical and photothermal⁹. IPL based on selective thermal damage of P. acnes, its synthesis and storage of porphyrins.

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These porphyrins become chemical active on exposure to visible light and converted into single oxygen atom and develop a bond with cell membrane to destroy structure of *P. acnes*¹⁰. In our study we used IPL monotherapy to compare two types fluence. One is subnormal and other is normal fluence.

MATERIALS AND METHODS

Study was conducted at dermatology department of Nishtar Hospital Multan from January 2020 to December 2020 in duration of one. Written informed consent was obtained from patients. Ethical approval was taken from hospital ethical board. Non probability consecutive sampling technique was used.

A total of 60 diagnosed patients of acne vulgaris were enrolled in study. Patients having tendency to form keloid and hypertrophic scar, history of seizures, photosensitivity, tanned skin, breastfeeding and used topical and systemic antibiotics were excluded from study. Patient's Fitzpatrick skin type, history of prior treatment, duration of the disease and medical history was noted. Patients were asked to remove make up and wash face before every sitting of treatment. Number of acne lesions was counted on both sides of face. Patients were treated with four sittings of IPL at 2 weeks interval and were followed up for 2 months every 2 weeks. Minimum wavelength used was 550 nm and maximum 1200 nm of IPL, pulse duration was 5 ms, interval 10 ms, fluence on left side was 20 J/cm² and on right side was 35 J/cm². Intensity of fluence was reduces upto 20% on forehead and other bony appearances to overcome the complication of hyperpigmentation. Side effects were noted after each sitting of follow up. Reduction in lesion count was noted, 25% reduction counted as mild, 25-50% moderate, 50-75% good and 75-100% was considered as excellent.

SPSS version 23 was used for data analysis. Mean and SD was calculated for continuous data and frequency (percentages) were presented for categorical data. Test of significance (t test, chi square test) were applied to see association among variables. P values ≤ 0.05 was taken as significance.

RESULTS

Sixty patients were included in this study, n=35 (58.3%) males and n=25 (41.7%) females with mean age 25.30 \pm 3.54 years. Fitzpatrick skin Grade IV and Grade V was noted in n=33 (55.0%) and n=27 (45.0%), respectively. Acne lesions Grade II, III, and IV was observed in n=41 (68.3%), n=12 (20.0%) and n=7 (11.7%), respectively.

No significant difference was found in efficacy in two fluencies that was used on right and left sides on face in falling the frequency of acne lesion at first, second, third and fourth setting. (Table. I). No significant difference was found in efficacy in two fluencies that

was used on right and left sides on face in falling the frequency of acne lesion at the end of follow-up. (Table. 2).

Table No.1: Mean distribution of lesion counts in one to fourth sittings on right and left sides of the face

Lesion counts	Right side	Left side	P-value
First Sitting	38.35 \pm 3.02	38.34 \pm 4.25	0.997
Second Sitting	33.75 \pm 3.46	34.49 \pm 3.44	0.410
Third Sitting	27.18 \pm 4.34	29.16 \pm 3.84	0.067
Fourth Sitting	24.82 \pm 4.82	26.39 \pm 3.97	0.174

Table No.2: Mean distribution of lesion counts in one to fourth follow-up

Lesion counts	Right side	Left side	P-value
First Follow-up	22.24 \pm 2.41	22.14 \pm 2.76	0.890
Second Follow-up	21.16 \pm 3.59	20.69 \pm 2.59	0.540
Third Follow-up	17.61 \pm 4.64	16.77 \pm 4.13	0.466
Fourth Follow-up	15.34 \pm 3.18	15.83 \pm 2.93	0.541

Table No.3: Distribution of lesion counts in one to fourth follow-up

Lesion counts	Right side	Left side	P-value
First Follow-up	n=33 (55.0%)	n=27 (45.0%)	0.938
Second Follow-up	n=32 (53.3%)	n=34 (56.7%)	0.651
Third Follow-up	n=33 (55.0%)	n=32 (53.3%)	0.077
Fourth Follow-up	n=41 (68.3%)	n=42 (70.0%)	0.856

Table No.4: Mean distribution of lesion counts at baseline and follow-up

Lesion counts	Right side	P-value	Left side	P-value
First sitting versus first follow-up	38.35 \pm 3.02 versus 22.24 \pm 2.41	0.000	38.34 \pm 4.25 versus 22.14 \pm 2.76	0.000
First sitting versus fourth follow-up	38.35 \pm 3.02 versus 15.34 \pm 3.18	0.000	38.34 \pm 4.25 versus 15.83 \pm 2.93	0.000
Fourth sitting versus fourth follow-up	24.82 \pm 4.82 versus 15.34 \pm 3.18	0.000	26.39 \pm 3.97 versus 15.83 \pm 2.93	0.000

Table No.5: Decreasing grade of lesion count

Grade	Right side	Left side	P-value
Mild (0-25)	n=4 (6.7%)	n=3 (5.0%)	0.748
Moderate (26-50)	n=17 (28.3%)	n=5 (8.3%)	0.000
Good (51-75)	n=30 (50.0%)	n=46 (76.7%)	0.000
Excellent (76-100)	n=9 (15.0%)	n=6 (10.0%)	0.041

Table No.6: Distribution of side effects of right and left sides

Side Effect	Right side	Left side	P-value
Erythema	n=3 (5.0%)	n=2 (3.3%)	0.854
Burning	n=5 (8.3%)	n=3 (5.0%)	0.642
Itching	n=46 (76.7%)	n=41 (68.3%)	0.021
Malia	n=6 (10.0%)	n=14 (23.3%)	0.000

The distribution of lesion counts at first, second, third and fourth follow-up shown in table-3. The mean lesion counts at baseline and at different levels of follow-up were shown in table. IV. The mean lesion counts at follow-up was less than the mean lesion counts at baseline. The differences were statistically significant. (Table. 4). Grade of reduction in lesion counts at right and left side was statistically significant. (Table. 5). The most common side effect noted in both left and right side was itching i.e. n=46 (76.7%) and n=41 (68.3%), respectively. (p=0.021). (Table. 6).

DISCUSSION

In spite of many advances treatment modalities of acne vulgaris, treatment of choice is still controversial. Many conventional treatment modalities are available but limited in use because of high cost, poor efficacy, recurrence, bacterial resistance and allergic reactions. There is obvious necessity of better treatment option, in this era of satisfaction IPL as monotherapy or in combination is a better option. Our study will made the use of IPL more beneficial by exploring its better type of fluence.

In our study at final follow up 57.9% reduction in acne lesion on left side and 63.49% on right side were observed. Kumaresan et al¹¹ conducted a study on comparison of single and burst mode of IPL and observed 49% reduction in acne lesion after final follow up of IPL monotherapy. Among both treatment option burst mode reduced acne severity 56% and single mode reduced 40%.

Use of high fluence in our study have more photochemical and photothermal effects but low fluence affiliated with photo-immunological effects. In a study by Paithankar et al¹² used photothermal approach of IPL and found reduced inflammatory acne

vulgaris upto 50%. Similarly, Elman et al¹³ conducted a study on 19 acne patients and efficacy of IPL was noted. More than 50% reduction in acne vulgaris lesion was found in 85% of patients.

In our study erythema, itching and burning like side effects were noted in a small proportion of patients. Kawana et al¹⁴ acquitted a research on high and low frequencies of smooth pulse light and reported smooth pulse light with 1200 nm light more effective in treatment of acne vulgaris. No major side effects of IPL therapy were observed except transient erythema with or without stinging and burning.

Different theories were postulated on role and effectiveness of IPL to overcome the acne lesions, but its wavelength and duration is still under debate. Barikbinet al¹⁵ carried out a study on comparison of different pulse duration and efficacy was assessed by counting the number of lesion after and before follow up. Longer duration of pulse light was reported more effective as compare to shorter duration.

Sami et al¹⁶ carried a study on effectiveness of phototherapy and laser therapy in treatment of acne and reported that phototherapy is a growing modality for acne and can be used in place of antibiotic and other topical medicines. In this study IPL, pulsed dye laser PDL was compare and with use of IPL 41.7% reduction was observed and PDL reduced acne lesion upto 90%. Young et al¹⁷ compared different wavelength of IPL and found all frequency useful in acne vulgaris.

Other than established benefits of IPL in acne vulgaris it is also associated with side effects like erythema, burning and stinging. In a study by Stanglet al¹⁸ hyperpigmentation, dermatitis, infection, scaring and skin texture changes like side effects were observed. In another study Sadicket al¹⁹ observed superficial cruting and transient hyperpigmentation like minor side effects. Bjerring et al²⁰ used special IPL with 950nm wavelength and observed common adverse effect purpura associated with burning sensation.

Limitations: we didn't use multiple parameters such as pulse duration, wavelength of higher and lower intensity, pulse duration and single and burst pulse mode in our study. Most of our patients belong to tribal or village areas, they didn't allow to include images of study results.

CONCLUSION

IPL is safe and effective option for inflammatory acne vulgaris with minimal reversible side effects. Both fluencies subnormal and normal fluence are equally.

Recommendations: Results of our suggested that IPL is effective and safe option for inflammatory acne vulgaris with few downtime and reversible adverse effects. Although the study was done using it as monotherapy, we suggest combination of IPL and systemic antibiotics for better and long-lasting outcomes

Author's Contribution:

Concept & Design of Study: Aliya Akhtar
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Conflict of Interest: The study has no conflict of interest to declare by any author.

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