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Original Article

Efficacy and Safety of Intense Pulsed Light in Patients of Inflammatory Acne Vulgaris

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ABSTRACT

Objective: To assess the efficacy and safety of IPL in patients with inflammatory Acne Vulgaris.
Study Design: Quasi-experimental study.
Place and Duration of Study: Department of Dermatology, Pakistan Air Force Hospital, Fazaia Medical College, Islamabad Pakistan, from Aug 2019 to Jan 2020.
Methodology: Ninety patients with inflammatory facial acne were enrolled and received four Intense Pulsed Light (IPL) sessions at two weeks intervals with fluence 25J/cm^2 and 420nm cut-off filter. The duration of treatment for each patient was two months. Clinical improvement was assessed using the Global Acne Grading System score (GAGs score).
Results: Mean age of the patients was 18.5±3.3years, of which nine were males (10%), and 81 were females (90%). IPL was effective in 42(46.7%) patients with inflammatory acne vulgaris. The median GAGS score before treatment was 20(22–19), and after treatment was 10(12-9), with a significant *p*-value(<0.001). Only 8(9%) developed erythema, and 1(1%) patient developed post-inflammatory hyperpigmentation.
Conclusions: Intense Pulsed Light was a significantly effective and safe treatment for inflammatory acne of all grades, ages, and genders.

Keywords: Efficacy, Inflammatory acne vulgaris, Intense pulsed light, Safety, Treatment.

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INTRODUCTION

Acne vulgaris is a chronic inflammatory disorder involving the pilosebaceous unit causing significant psychological distress.[1] The existing oral and topical treatments are limited by their efficacy, adverse effects, patient compliance and antibiotic resistance.[2] This has led to the increased use of energy-based treatments, including Intense Pulsed Light (IPL). IPL consists of an intense light source polychromatic with a wavelength from 400nm to 1200nm delivered using a flash lamp. Multiple pulses can be given with variable pulse delays to reduce the side effects and prevent thermal damage, allowing sufficient skin cooling during the procedure.[3,4] Researchers have theorized that IPL therapy reduces *Propionibacterium Acnes* (*P. acnes*) in the skin and shrinks the size of the pilosebaceous unit and, subsequently, its function.[5,6]

Previous literature has shown the efficacy of IPL for Acne vulgaris ranging from 34% to 88% in both inflammatory and non-inflammatory acne.[7-9] One study compared two different fluences, i.e., 35J/cm^2 and 20J/cm^2, on the right and left side of the face, respectively. Both fluences were significantly effective and safe with minimal side effects, and there was no statistically significant difference in efficacy of the two fluences used.[10] Multiple studies have shown IPL as a safe and effective option. However, only a few have been done in the Pakistani population. Our study explored the use of IPL therapy in the Pakistani population and add to the scarce published data about its efficacy and safety in Asian skin types.

METHODOLOGY

The quasi-experimental study was conducted at the Department of Dermatology, Pakistan Air Force Hospital, Fazaia Medical College, Islamabad Pakistan, from August 2019 to January 2020 after taking approval from Ethical Committee (Certificate Reference no. ECC/2019/156-1). The sample size was calculated using the WHO sample size calculator, and after taking informed consent, 90 patients were enrolled using non-probability consecutive sampling.

Inclusion Criteria: Patients of either gender, aged 13 to 35 years old, having inflammatory Acne vulgaris and of skin type IV and V were included in the study.

Exclusion Criteria: Pregnant women, patients with comedonal acne, photosensitivity disorders or drugs, eczema or active herpes on the face, those who had systemic or topical treatment within the last month, isotretinoin in the last six months, laser therapy or chemical peels in the last three months were excluded from the study.

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All patients were given four sittings of IPL at two weeks intervals using IPL Photorejuvenation Treatment System with RF function Model HS-300C at a fluence of 25J/cm², 420nm cut-off filter, one pulse/second, 300 msec delay at radio-frequency level 1 with built-in cooling system and three passes per area at every sitting. Each patient received a total treatment of 2 months.

Digital photographs were taken, and Global Acne Grading System (GAGS) score was calculated before and one week after the completion of treatment. Based on the type of lesions and the area score, they are further categorized into mild (1-18), moderate (19-30), severe (31-38) and very severe (>38) disease. Improvement was classified as poor (1-24%), fair (25-49%), good (50-74%) and excellent (75-100%). Efficacy was taken as >50% improvement of GAGS scores one week after completion of treatment. The safety of the treatment was assessed based on the patient's feedback on three parameters of persistent erythema, postinflammatory hyperpigmentation and burning of the skin.

All data were analyzed using Statistical Package for the social sciences (SPSS) version 20:00. Frequencies and percentages were calculated for qualitative variables. Mean and standard deviation was calculated for quantitative variables, including age and median, and IQR was calculated GAGS score before and after treatment. McNemar test of significance was used for IPL efficacy according to gender, age and pre-treatment GAGS severity category. The Wilcoxon test was used for comparing pre, and after-treatment GAGS score. The $p \leq 0.05$ was taken as significant.

RESULTS

A total of 90 patients were included. The mean age of the patients was 18.4±2.97 years. Before the treatment, 87(96.7%) of patients had acne of moderate severity, while 1(1.1%) had mild, 1(1.1%) had severe, and 1(1.1%) had very severe acne. IPL was effective in 42 (46.7%) patients with inflammatory acne vulgaris. After the completion of treatment, 87(96.7%) of patients had improved to acne of mild severity, 1(1.1%) had moderate, 1(1.1%) had severe, and 1(1.1%) had very severe acne. Comparison of before and after IPL therapy GAGS score severity categories were depicted in Figure-1. The median GAGS score before treatment was 20(22–19), and after treatment was 10(12-9), there was a statistically significant difference (p<0.001) shown in Table.

The treatment was well tolerated. Only 8(9%) developed erythema immediately after treatment which resolved after a few hours, and 1(1%) developed post-inflammatory hyperpigmentation, which resolved at a one-month follow-up visit after the completion of IPL treatment (Figure-2).

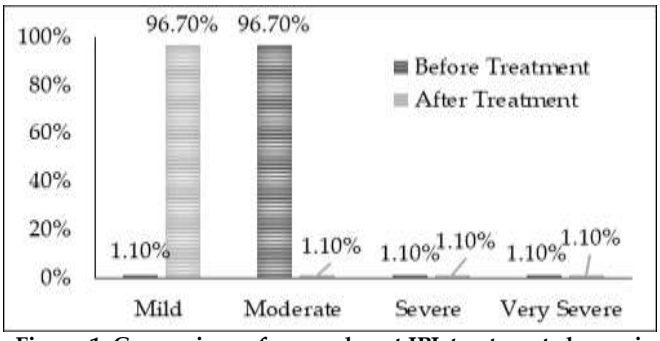

Figure-1: Comparison of pre and post IPL treatment change in Global Acne Grading System score (GAGs score) severity category (n=90)

Table: Comparison of Global Acne Grading System score (GAG score) before and after treatment (n=90)

Variable	Pre Treatment Median (IQR)	After Treatment Median (IQR)	*p*-value
GAG Score	20(22–19)	10(12-9)	<0.001

Figure-2: Before and After IPL treatment pictures of the Patient

DISCUSSION

Our study has shown that IPL is an effective and safe treatment for inflammatory acne of all severity, in all age groups and for both genders, with >50% efficacy in 46.7% of patients. Another research carried out on Asian skin with acne vulgaris treated with IPL at 400-700nm and 870-1200nm showed a reduction of 11-12% as compared to baseline.[11] An interventional study conducted on 75 patients in the Pakistani population with four weekly sessions of IPL at 420nm and fluence of 15-21J/cm² reported efficacy of 52%.[12] Previous studies reported an improvement of >50% in 44% of patients.[13,14]

Deshpande *et al.* treated patients of Fitzpatrick Skin Type IV-VI with IPL sessions carried out twice

per week for four weeks, and results revealed that a majority of patients (85%) had more than 50% improvement in their acne vulgaris lesions.[15] Using a higher cut-off filter of 530nm to 1200nm with six passes over the affected area could explain the difference in clinical outcome. Elman *et al*. reported more than 50% improvement in 85% of patients with twice-a-week IPL sittings for 4 weeks.[16] The increased number of sessions and the combination of pulsed light and pulsed heat improved the clinical efficacy. Puttaiah *et al*. reported more than 50% clearance rates in 64% of patients for acne vulgaris lesions.[17] Although the number of sessions and IPL wavelength used was similar to our study, a better result was achieved because of a higher fluence of 23-28J/cm^2 than ours of 25J/cm^2.

Only a 22% reduction in inflammatory acne vulgaris was reported by Yeung *et al*. with IPL in Fitzpatrick Skin Type IV-V, which is considerably low as compared to our study.[18] The difference in the clinical outcome can be explained by a three-week gap between successive IPL sessions and using only single passes in that study.

In our study, only 9% of patients developed transient mild erythema, less than the study by Khan *et al*. where 21% of the patients developed erythema.[13] Mohanan *et al*. reported no adverse effects in their trial. This further establishes the safety of IPL in South Asian skin.[19]

Only a few published studies regarding IPL efficacy for acne vulgaris in the Pakistani population are available. Our study adds to the growing evidence that IPL is safe and effective for acne vulgaris in South Asian skin. However, there is still a gap in choosing an appropriate regime of IPL therapy (fluence, number of sessions) for acne in the skin type of our population, and future research can be directed to compare various regimes. Furthermore, most of the existing research, including ours, focuses on facial acne of inflammatory type, which is a limitation of this study. Hence, more research is needed to explore IPL as a treatment option for non-inflammatory acne and other site-specific acne.

LIMITATION OF STUDY

Our study was limited by including patients with only comedonal acne.

CONCLUSION

IPL was a significantly effective and safe treatment for inflammatory acne of all grades, ages, and genders. However, its dose and treatment regimen needs more optimisation to make it a viable treatment option.

Conflict of Interest: None.

Author's Contribution

Following authors have made substantial contributions to the manuscript as under:

MR: Conception, study design, drafting the manuscript, approval of the final version to be published.

FS: Data acquisition, data analysis, data interpretation, critical review, approval of the final version to be published.

SS: Critical review, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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