

Intense pulsed light: A promising therapy in treatment of acne vulgaris

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ABSTRACT

Background: Medical treatment of acne vulgaris includes a variety of topical and oral medications. Poor compliance, lack of durable remission, potential side effects are common drawbacks to these treatment. Therefore, there is a growing demand for a fast, safe and side effect free novel therapy. Light-based therapies are an attractive alternative acne therapy because they potentially offer more rapid onset and better patient compliance with a low incidence of adverse events. **Aim:** To study the efficacy of intense pulsed light in treatment of acne vulgaris. **Materials and Methods:** Twenty five patients with acne vulgaris were subjected to IPL. Baseline grading of acne was done. IPL was administered every 2weeks for 4 sessions. Grading was done after the end of treatment. Clinical photographs were taken for evaluation. **Results:** All patients showed a reduction in the number of acne lesions after 4 sessions of IPL. No significant side effects were noted. Patients also noted an improvement in skin texture. **Conclusion:** IPL showed beneficial effects in the treatment of acne.

Key words: Improvement; Acne vulgaris; Novel therapy

INTRODUCTION

Acne vulgaris is an inflammatory disease of pilosebaceous unit, characterised by seborrhoea, comedones, papules, pustules, nodules and cysts, with occasional scarring [1].

Acne is one of the most prevalent skin disorder and single most common cause for visit to a dermatologist [1]. Acne, considered as a “Stigma of Adolescence”, causes significant psychological, social and emotional distress along with a self-perception of poor health [2,3].

The pathogenesis of acne is complex and multifactorial. The major factors in the pathogenesis of acne are increased sebum production, hypercornification of pilosebaceous duct, abnormality of the microbial flora, especially ductal colonization with *Propionibacterium acnes* and inflammation [4].

Current therapies available for acne are mainly targeted towards multiple factors contributing to

the pathogenesis of acne [5]. We are in an era where dermatologists seek to use novel treatment modalities like chemical peeling, laser and light therapies, photodynamic therapy, etc. to circumvent antibiotic resistance, reduce adverse effects seen more commonly with conventional treatment of acne like antibiotics and retinoids. Light-based therapies are an attractive alternative acne therapy because they potentially offer more rapid onset and better patient compliance with a low incidence of adverse events. However, optimal treatment methods and the relative efficacy of light-based therapies as compared to traditional therapies remain unclear. Light-based acne therapies are thought to act via reducing *P. acnes* proliferation or by targeting the sebaceous gland to reduce sebum production; however, other mechanisms may also exist [6]. The trials of IPL on acne vulgaris have been small and conflicting, till date. Hence, it is worthwhile to study the efficacy of IPL in acne vulgaris.

To study the efficacy of IPL in patients with acne vulgaris.

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MATERIALS AND METHODS

The study was done over a period of one year from September 2014 to August 2015. The study design is a randomized open prospective study. The ethical committee clearance was obtained prior to the start of the study. Twenty five patients with mild to severe acne between the age group of 15 years and 40 years, who gave consent for the treatment were included in the study.

Age less than 15yrs and more than 40yrs, patients with extra-facial acne and acneiform eruptions, patients with keloidal tendency, patients on oral retinoids in the past 6 months, pregnant and lactating women, patients with associated systemic diseases and other facial dermatoses, patients with active herpes infection and patients who gave a history of taking treatment for acne in any form in the past one month were excluded from the study.

Baseline acne grading was done based on Global Acne Grading System [7] and acne classified as mild, moderate, severe and very severe (Tab. 1).

Note: Each type of lesion is given a value depending on severity. No lesions = 0, comedones = 1, papules = 2, pustules = 3 and nodules = 4. The score for each area (Local score) is calculated using the formula: Local score = Factor x Grade (0-4). The global score is the sum of local scores, and acne severity was graded using the global score. A score of 1-18 is considered mild; 19-30, moderate; 31-38, severe, and >39, very severe.

Informed consent was taken in all patients after ethical committee clearance from our institution for the study. Filter of 425nm was used. Test dose of IPL was given on forearm and maximum tolerable dose that the patient can tolerate was selected. According the skin type of the patients, fluence varied from 23-28J/cm² and RF energy from 23-27W, with higher energy in fairer skin types and lower energy in darker skin types. Two shots of IPL per site were administered to the acne affected area at the distance of 1-2mm with a gel interface between the skin and the probe to prevent any side effects like blistering and pigmentation. IPL was administered every two weekly for 4 sessions. Post procedure instructions were advised to the patient in the form of bland moisturizers and a sunscreen with sun protection factor of 30. The degree of the improvement (total percentage reduction in the total acne score calculated by Global Acne Grading System)

was noted after four sessions and photographs were taken.

0-25% reduction in score - mild improvement

26-50% reduction in score - moderate improvement

51-75% reduction in score - good improvement

>75% reduction in score - significant improvement.

OBSERVATIONS

In the present study, 15 (60%) were females and 10 (40%) were males. Of these, majority (80%) were students. In most of the patients 19 (76%), the duration of acne was between 1-4 years. The most common skin type noted was Fitzpatrick's skin type IV [8]. 48% of the patients had severe acne, followed by very severe acne in 36% and moderate acne in 16%.

RESULTS

In the present study, the mean age was 21.7 yrs, with minimum age of 16yrs and maximum age of 32 yrs. The mean score of acne improved from 37.96 to 10.9 i.e., mean improvement noted was 71.3%. The maximum improvement noted was 81.9% and the minimum improvement being 57.9% (Fig. 1). Using Wilcoxon test, the improvement in acne before and after the treatment was found to be significant ($p < 0.005$). All the patients with severe lesions, at the end of treatment had moderate lesions, patients with very severe acne, at the end of treatment had mild to moderate acne and patients with moderate acne had mild lesions. 64% of the patients had good improvement (Fig. 2) and 12% of the patients had significant improvement (Fig. 3). Moderate improvement was noted in 24% of the patients. In addition to clearance of acne, more than 70% patients also noted an improvement in skin texture, reduction in the oiliness of the skin and smoother appearance of the skin. No significant side effect was noted in most of the patients, though transient erythema and burning was noted in 40% of the patient, which spontaneously subsided over a period of few hours. One patient developed post inflammatory dyspigmentation (Fig. 4), who was treated with depigmenting creams and the dyspigmentation cleared in about a period of 1 to 2 months.

DISCUSSION

Intense pulsed light technology involves application of a non-coherent, non-laser broadband, filtered flash lamp source directed to the skin. Modifications of

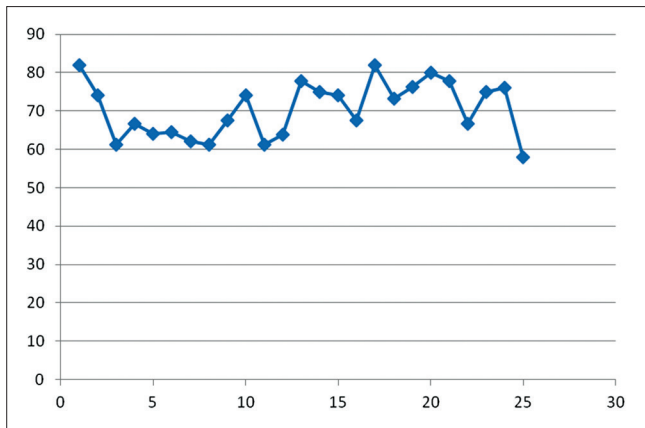


Figure 1: Graphical representation of percentage improvement of acne (in y axis) in each patient (x axis) following 4 sessions of IPL.



Figure 2: A 23 yr old male patient with moderate acne before and after 4 sittings of IPL with significant improvement.



Figure 3: A 20 yr old female patient with moderate acne before and after 4 sittings of IPL with good improvement with improvement in the skin texture.

various parameters allow flexibility in treatment, which include wavelength, energy fluence, pulse duration and pulse delay. IPL acts by photodynamic therapy in treatment of acne vulgaris. P acnes produces porphyrins (protoporphyrin IX and coproporphyrin III) during their growth and proliferation in follicular units. These porphyrins have an absorption spectrum near ultraviolet and visible spectrum of light. The major absorption peak for these porphyrins is at 415nm, which is commonly known as the Soret band. A second peak corresponding to the red light is seen at 630nm. Therefore, devices that utilize either blue light or red light PDT have been developed for treatment of inflammatory acne vulgaris. After exposure to the



Figure 4: A 22 yr old male showing post-inflammatory dyspigmentation in first two photographs and third photograph (right most) shows reduction in the pigmentation after 2months, post use of depigmenting creams.

appropriate light source, there is photo-excitation of the porphyrins. This will cause production of singlet oxygen in the organism, causing selective destruction of the organism [9].

IPL releases yellow, green and red light that is emitted in sequence of short pulses. The yellow/green light damages the bacteria that live in the skin and cause acne, while red light will directly aim at the overactive sebaceous glands that causes outbreaks of pustules and nodules. This targeted heating, deep in the skin causes shrinkage of the inflamed sebaceous gland and helps prevent overproduction of excess sebum [10]. Hence, it is efficacious in nodulocystic acne also.

Elman et al. treated 19 patients with IPL and showed >50% improvement in acne lesions following twice weekly therapy for 4 weeks [11].

Paithankar et al. reported 50% reduction in acne vulgaris [12].

Dierickx reported 72% clearance rate in non-inflammatory acne and 73% improvement in inflammatory acne vulgaris lesions in 14 patients treated for five sessions two to four weeks apart [13].

Rojanamantin and Choawawanich demonstrated that IPL alone and following 5-aminolevulinic acid application can improve inflammatory facial acne [14].

We found a statistically significant decrease in the mean total score with a mean improvement of 71.3%. Our results were compatible with the results of Paithankar et al. but were different from Elman et al. This may have been due to difference in the skin type reaction to IPL therapy in Asians and Caucasians.

In the present study, we did not find any blister formation or scarring following treatment with IPL. Though, erythema and burning was noted in 40%, they

Table 1: Global acne grading system

Location	Multiplying factor
Forehead	2
Right cheek	2
Left cheek	2
Nose	1
Chin	1
Chest and upper back	3

were very trivial and tolerable and hence, all patients completed the study successfully. Also, the beneficial effect remained for atleast 3-4 months after the last IPL session.

CONCLUSION

Briefly, there are few previous studies demonstrating the efficacy of IPL as effective treatment modality in acne. While the previous studies excluded nodulocystic acne and have used IPL in combination with other treatment modalities, we included nodulocystic acne patients and treated successfully without encountering any significant side effects. However, further studies are necessary to define the correct role of IPL as a monotherapy in treatment of facial acne.

Statement of Human and Animal Rights

All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2008.

Statement of Informed Consent

Informed consent was obtained from all patients for being included in the study.

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