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ORIGINAL ARTICLE

Intense Pulsed Light (IPL) therapy in acne vulgaris management: Assessing efficacy and safety.

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ABSTRACT… Objective: To evaluate efficacy and safety of IPL in the treatment of Acne vulgaris. **Study Design:** Quasi-experimental study. **Setting:** CMH, Peshawar. **Period:** 15th January 23 to 15th May 23. **Material & Methods:** 35 participants having acne vulgaris with age range from 18-35 years were selected. Participants who had used any form of topical, oral, or alternative treatments for acne, including retinoids, within the six months preceding the commencement of the study, history of systemic steroid intake, photosensitivity and herpes simplex, were excluded. Global Acne Grading System (GAGS) score was used to ascertain the severity of acne vulgaris. Four sessions of weekly Intense Pulsed Light (IPL) sessions, utilizing filters of 420nm, 510nm and 560nm for participants having skin type III, IV and V respectively were employed. GAGS score was calculated one week after the last session. Side effects were recorded, degree of improvement and patient reported outcome was noted using a four-point scale limited =<25%, marked =25%-50%, promising 50-75% and profound =>75%. **Results:** Mean age of participants was 21.63 ± 4.63 years, with a mean duration of acne was 4.26 ± 2.20 years. The mean baseline GAGS score I decreased from 22.00±5.26 to 11.58±4.80, as observed one week following the last IPL session. The calculated p-value was statistically significant (<0.000). 54% of patients encountered no adverse reactions. **Conclusion:** Intense Pulsed Light (IPL) emerges as a secure and efficacious treatment choice, particularly in the initial stages, to enhance the response to therapy.

Key words: Acne Vulgaris, GAGS Score, IPL.

INTRODUCTION

Acne, a prevalent dermatological condition affecting individuals across various age groups, poses significant challenges in both its physical manifestations and its psychological impact. As a multifaceted skin disorder, acne is characterized by the formation of comedones, papules, pustules, and, in severe cases, nodules and cysts.[1,2] These unsightly blemishes often lead to distress and diminished self-esteem among those afflicted, influencing their social interactions and overall well-being.[3] The search for effective treatment modalities has driven the exploration of innovative approaches, among which Intense Pulsed Light (IPL) therapy stands out as a promising non-invasive option for ameliorating the distressing symptoms of acne.[4]

Intense Pulsed Light therapy, commonly referred to as IPL, is a cutting-edge technology that has garnered attention for its potential in addressing various dermatological concerns. Based on the principle of utilizing controlled pulses of broad-spectrum light, IPL targets specific chromophores within the skin, thereby offering a versatile solution for a range of skin conditions.[5] While IPL's primary application has traditionally been in hair removal and skin rejuvenation, recent research has begun to shed light on its potential effectiveness in managing acne.[6]

The efficacy of IPL in acne treatment is rooted in its ability to target two key factors contributing to acne development: the proliferation of Propionibacterium acnes bacteria within the skin's sebaceous follicles and the overproduction

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of sebum, an oily substance that clogs pores and fosters the growth of bacteria.[6] By emitting high-intensity pulses of light, IPL generates heat that selectively destroys the acne-causing bacteria and shrinks the sebaceous glands responsible for sebum production. Furthermore, IPL's anti-inflammatory properties help mitigate the redness and irritation associated with active acne lesions.[7]

Research in this context has highlighted the effectiveness of Intense Pulsed Light (IPL) both as a standalone treatment and in combination with topical agents. Shehzad et al. supported the burst-pulse mode in IPL therapy, showcasing superior improvement percentages compared to the single-pulse mode.[8] Chen et al. explored a novel IPL filter targeting inflammatory acne lesions, yielding promising results.[9] Mokhtari et al. compared the effectiveness of combining IPL with benzoyl peroxide or adapalene, both revealing significant improvements.[10] This study aims to determine the effectiveness of IPL and safety in our population with Asian skin.

MATERIAL & METHODS

This quasi-experimental study was carried out over the period from 15th Jan 23 to 15th May 23 in CMH (Combine Military Hospital), Peshawar. 35 participants having acne vulgaris within the age bracket of 18-35 years presented in hospital's Dermatology outpatient department were selected.

Sample size was calculated using.[11]

$$\text{Sample size} = \frac{2SD^2(Z_{a/2} + Z_{\beta})^2}{d^2}$$

Taking difference in Global Acne Grading System (GAGS) score 3.53 and Standard deviation 5.5.[12] Those participants who had actively employed any form of topical, oral, or alternative treatments for acne, including retinoids, within the six months preceding the commencement of the study, as well as individuals with a documented history of systemic steroid intake, and those who had experienced instances of photosensitivity and herpes simplex, were intentionally excluded from participation in the study.

Ethical approval (letter no 00248/23) and informed consent obtained through a combination of verbal discourse and comprehensive written documentation. Essential demographic details, encompassing parameters such as age, gender, duration of acne, and pertinent familial history pertaining to acne, were systematically documented employing a standardized form.

The participants' clinical assessments were conducted by experienced dermatologists, employing the Global Acne Grading System (GAGS) system to ascertain the severity of acne vulgaris exhibited by each individual. The GAGS score framework discerns the categorization of acne as follows: 0 (Absence), 1-18 (Mild), 19-30 (Moderate), 31-38 (Severe), and > 39 (Highly severe).[13]

Throughout the course of the study, the subjects were subjected to a series of weekly Intense Pulsed Light (IPL) sessions and utilizing filters of 420nm, 510nm and 560nm for participants classified as having skin type III, IV and V respectively. Energy level was adjusted according to the setting of IPL machine. Cooling gel was applied on acne lesions before giving IPL shorts. Patients were advised to apply ice packs for 15 minutes after the procedure. In conjunction with the IPL treatment, participants were emphatically instructed to refrain from utilizing any topical acne creams or traditional home remedies, thereby upholding methodological consistency. A total of four IPL sessions were administered, culminating in a post-treatment follow-up one week subsequent to the final session. During this follow-up evaluation, the participants' GAGS scores were meticulously recalculated and conscientiously documented, facilitating an accurate assessment of treatment outcomes. Side effects were recorded, degree of improvement and patient reported outcome was noted using a four-point scale limited =<25%, marked =25%-50%, promising 50-75% and profound =>75%.

The statistical analysis of data was carried out employing SPSS version 28. Descriptive statistics, including the calculation of mean and standard deviation, were applied to quantify age,

duration of acne, and GAGS score. Meanwhile, gender, skin type, marital and employment status were presented using frequency and percentage distributions. To assess the discernible variations in GAGS scores before and after IPL treatment, a paired t-test was employed. The threshold for determining statistical significance was set at a p-value of less than 0.05.

RESULTS

This study comprised 35 participants who underwent a series of four weekly sessions of Intense Pulsed Light (IPL). The mean age of the study participants was 21.63 ± 4.63 years, with a mean duration of acne of 4.26 ± 2.20 years. Of the participants, 11.42% were male, while 88.57% were female. Demographic variables are enlisted in Table-I. The findings indicated a notable reduction in the mean baseline GAGS score I from 22.00±5.26 to GAGS score II 11.58±4.80, as observed one week following the last IPL session. The calculated p-value was deemed statistically significant (<0.000) as shown in Table-II.

Marked improvement in acne was observed in 45.71% of participants, succeeded by promising outcomes in 40%, limited improvement in 8.5%, and profound changes in 5.71%. In terms of Patient Reported Outcome, 42.85% reported promising results, followed by marked improvements in 37.14%, limited improvements in 11.42%, and profound changes in 8.57% as shown in Figure-1.

Regarding side effects, a noteworthy 54% of patients encountered no adverse reactions during the treatment. For the remaining participants, comprising 46%, they reported only transient side effects, such as mild discomfort, temporary erythema (skin redness), or a slight stinging sensation. Encouragingly, these minor side effects promptly resolved with the application of ice packs, as illustrated in Figure-2.

DISCUSSION

This study included 35 participants subjected to a regimen of four consecutive weekly sessions of IPL.

	Percentage % (N=35)	Mean and SD
Age		21.63 ±4.63
Gender		
Male	11.42% (4)	
Female	88.57% (31)	
Duration		
< 5 years	42.85% (15)	4.26±2.20
>5 years	57.14% (20)	
Skin Type		
III	71.4% (25)	
IV	25.7% (9)	
V	2.8% (1)	
Marital Status		
Married	14.2% (5)	
Unmarried	85.7% (30)	
Employment Status		
Employed	25.7% (9)	
Unemployed	74.2% (26)	

Table-I. Demographic variables

Pre-Treatment GAGS score I	Post-Treatment GAGS score II	P-Value
22.00±5.26	11.58±4.80	0.000

Table-II. GAGS score before and after treatment

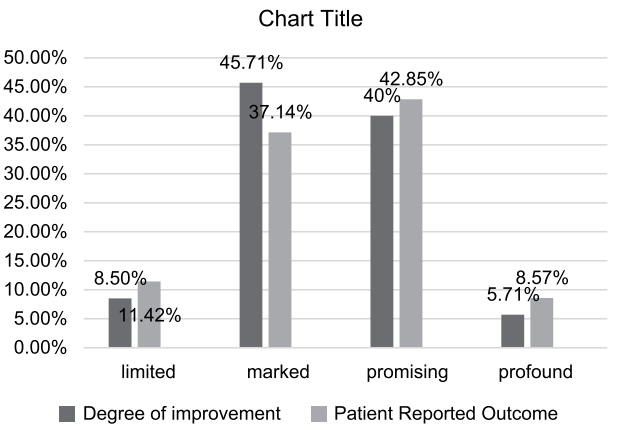

Figure-1. Degree of improvement among the participants and patient reported outcome

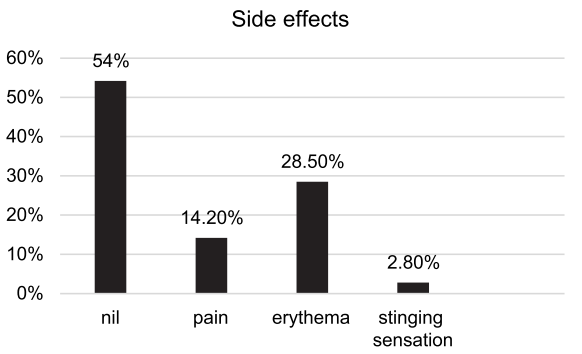

Figure-2. Side Effect Noted among Participants

The study population, with a mean age of 21.63 ± 4.63 years and an average acne duration of 4.26 ± 2.20 years, comprised 11.42% males and 88.57% females. Notably, a substantial reduction in the mean baseline GAGS score I from 22.00±5.26 to GAGS score II 11.58±4.80 was observed a week after the final IPL session. The computed p-value was determined to be statistically significant (<0.000). The findings in our study are in aligned with the other studies.

Piccolo et al concluded that IPL treatment yields expedited results compared to conventional systemic and antibiotic therapies. This study utilized four sessions of IPL (cut-off wavelength of 400nm) two weeks apart as a monotherapy for acne vulgaris treatment. 96% of treated patients showed improvement after the fourth session, all without encountering any side effects.[14]

Barakat et al stated that IPL effectively targets acne, especially inflammation, and dual action on inflammation and sebaceous glands contributes to its efficacy. This study included twenty-four patients received six IPL sessions, and lesion counts were assessed two weeks after the last session. Histopathological and morphometric analyses were conducted on skin biopsies before and after treatment. Microscopic analysis showed reduced inflammatory infiltrate and sebaceous gland size ($p < .05$).[15]

Shehzad et al compared single-pulse mode with burst-pulse mode in IPL treatment for acne vulgaris. A randomized controlled trial with 300 patients revealed that by the 4th week, burst-pulse mode resulted in a significantly lower mean score (1.39±0.75) compared to single-pulse mode (1.58±0.50), with $p < 0.05$. Additionally, the mean percentage improvement in burst-pulse mode (63±18.98%) was significantly higher than in single-pulse mode (49.56±16.41%), with $p < 0.001$.[8]

Chen et al reported that the novel IPL filter (wavelengths of 400–600 nm and 800–1,200 nm) proves to be a promising option for inflammatory acne lesions. Twenty-one patients with facial acne vulgaris underwent five IPL sessions at 4-week intervals. Inflammatory lesions significantly decreased ($P = .031$), as confirmed by the Hayashi acne severity assessment ($P = .022$).[9]

Study in Iran by Mokhtari et al compared the efficacy of combining IPL with benzoyl peroxide (BPO) versus IPL with adapalene (AD) for treating mild to moderate acne vulgaris. Three monthly IPL sessions were done. Significant improvements were observed before and after treatment with both AD plus IPL ($P < 0.001$) and BP plus IPL ($P < 0.001$). However, no significant differences were noted between the two groups after treatment ($P > 0.05$).[10]

Another study by Rajar et al studied the impact of different acne treatment protocols on microRNA (miRNA) levels and acne severity index over a three-month treatment duration. The results indicate elevated miRNA levels in patients with acne vulgaris, with isotretinoin administration notably reducing miRNA levels. IPL treatment was turned out to be significantly better than clindamycin in lowering the value of hsa-mir-21.[16]

However, in contrary to this a meta-analysis rigorously assesses IPL's effectiveness and safety in acne vulgaris management. Extensive database search yielded key studies. Incorporating 450 patients from eight RCTs, IPL was less effective among Africans and Asians. IPL was comparable to 1064 nm Nd:YAG [MD = −3.25 (95% CI: −7.01, −0.51), $P = .09$], but less effective than PDL [MD = −28.37 (95% CI: −52.26, −4.18), $P = .02$]. Geographical variations impact IPL's efficacy, though caution is needed due to heterogeneity and limited large-scale studies.[17] Moftah et al compared the efficacy of PDT using liposomal methylene blue (LMB) versus IPL alone for truncal acne vulgaris and concludes that LMB-IPL is more effective than IPL alone.[18]

Concerning side effects, a notable 54% of patients experienced no adverse reactions during the treatment. Among the remaining participants, constituting 46%, reports included only transient side effects such as mild discomfort, transient erythema, or a slight stinging sensation. Encouragingly, these minor side effects promptly

resolved with the application of ice packs. These findings align with those of other studies.[14,15]

In terms of acne improvement, 45.71% of participants exhibited marked improvement, followed by promising outcomes in 40%, limited improvement in 8.5%, and profound changes in 5.71%. Regarding Patient Reported Outcome, 42.85% reported promising results, succeeded by marked improvements in 37.14%, limited improvements in 11.42%, and profound changes in 8.57%. Similar outcomes have been documented by Piccolo et al and other studies.[15,16]

The study's limitations include a small sample size from a single hospital, a short one-week post-treatment follow-up. These limitations should be considered when interpreting the results of the study, and future research in this area should aim to address these issues to enhance the robustness and applicability of the findings.

CONCLUSION

This study underscores the promising role of IPL in the treatment of acne, demonstrating its capacity to alleviate both inflammatory and noninflammatory lesions. IPL, when integrated with conventional treatment approaches, offers a synergistic enhancement in the early stages of acne management.

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4	Muhammad Moeez Badar	Revision, Write up.	Moeez
5	Quratulain Ejaz	Data collection, Revision.	
6	Moazama Afzal	Drafting the manuscript.	