

# Effect of intense pulsed light on topical steroid-dependent facial dermatitis

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**Abstract** *Objective* To study the efficacy of intense pulsed light (IPL) in the treatment of topical steroid induced dermatitis.

*Methods* A total of 40 patients were selected for study based on the inclusion and exclusion criterion. They were subjected to IPL (560nm, 20J/cm<sup>2</sup>) at an interval of 3 weeks for 3 doses. The response was evaluated by telangiectasia count, dermatology life quality index (DLQI) scoring and 10-point visual analogue scale (VAS) for erythema and telangiectasia. Statistical analysis was done using SPSS 22.00.

*Results* After three sittings, there was significant reduction in telangiectasia count and VAS erythema and telangiectasia compared to baseline ( $P<0.001$ ). After treatment, DLQI also showed significant improvement with a band shift from very large effect to small effect on patient's quality of life.

*Conclusion* IPL significantly reduces erythema and telangiectasia of steroid-induced facial dermatitis and results in significant improvement in patients' quality of life.

**Key words**

Rosacea, IPL, telangiectasia.

## Introduction

Topical corticosteroids were first introduced for use in 1951.<sup>1,2</sup> Since then their uncontrolled use (abuse) has been a common problem. The excessive, regular use of topical fluorinated steroids on the face often produces an array of skin complications, including an eruption clinically indistinguishable from rosacea - 'steroid-induced rosacea' or 'iatrosacea'.<sup>1,3,4</sup> This dermatosis is known by various names like light-

sensitive seborrheid, perioral dermatitis, rosacea-like dermatitis and steroid dermatitis resembling rosacea.<sup>1,5-9</sup> Its treatment consists of discontinuation of the topical steroid application and administration of oral tetracyclines or macrolides and non steroidal topical applications.<sup>1</sup> Various lasers and light therapies have also been used.

Vascular laser therapy for rosacea began in the early 1980s with the use of argon laser (488-514 nm).<sup>10-13</sup> In addition to telangiectasia, the focus of laser and light therapies in rosacea now encompasses a broader approach, including the reorganization and remodeling of dystrophic dermal connective tissue and strengthening of the epidermal barrier.<sup>14</sup>

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Intense pulsed light (IPL) systems are high-intensity light sources which emit polychromatic light. They work with noncoherent light in a broad wavelength spectrum of 515-1200 nm.<sup>15,16</sup> In vascular lesions, the mechanism of action of IPLs is their selected absorption by hemoglobin within the blood vessels.<sup>17</sup> These devices have a bigger spot size; hence larger areas can be treated efficiently with less discomfort. The different filter settings of the IPL enable a higher selection of a broad range of vessel colors of the vascular system. The longer wavelength emitted by this system can penetrate deeply into the tissues, theoretically improving the clinical efficacy.<sup>18</sup>

## Methods

This study was conducted in the Department of Dermatology, Venereology and Leprosy, Shri Ram Murti Smarak Institute of Medical Sciences, Bhojipura, Bareilly, over a period of one and a half year from January 2013 to June 2014. This study had been retrospectively submitted in Central Trial Registry of India (REF/2016/03/010995). Enrollment of the patients was done taking into account the inclusion and the exclusion criteria. Patients with clinical diagnosis of topical steroid-dependent facial dermatitis (TSDFD), aged 18-65 years, history of topical steroid application for  $\geq 1$  month immediately preceding their presentation, visible telangiectasia and erythema on face, patient willing for regular follow-up visits were included in the study after taking informed consent. Exclusion criteria were use of photosensitizing drugs and any other concurrent illness/condition affecting face.

A detailed history and examination were done and noted on a predesigned proforma developed for the study. Detailed examination was recorded for every patient at 0, 3, 6 and 9<sup>th</sup> week. IPL sessions were given at baseline, 3 weeks, 6

weeks and the improvement was assessed at 9<sup>th</sup> week. DLQI assessment was done at baseline and 9<sup>th</sup> week. The following parameters were assessed at baseline and each visit: 1) Visual Analogue Scale for severity of erythema by treating physician and patient both; 2) Visual Analogue Scale for severity of telangiectasia by treating physician; and 3) telangiectasia count by treating physician.

Telangiectasia was measured by telangiectasia count in a standard anatomically defined area from lateral canthus to the tragus superiorly and the ala of the nose to angle of mandible inferiorly.

Three IPL treatments were administered at three-week intervals. Precautions and guidelines as given by Srinivas *et al.*<sup>18</sup> Papageorgiou *et al.*<sup>19</sup> and Kautz *et al.*<sup>20</sup> were followed. A thin coat of coupling gel was used to ensure even contact of the treatment tip. The 560nm filter was used throughout. A double pulse of 6ms and 8ms width with a 20ms delay at 20J/cm<sup>2</sup> was used for all the patients (Zigma Nikkiso, Dermaindia).

Patients were advised to the patients in treatment group and they were asked to avoid sun exposure. An identical and appropriate sunscreen and moisturizer was prescribed to all the patients.

Final statistics were done using paired t-test and independent t-test using SPSS 22.00 with significant *P* value taken as <0.001.

## Results

*Demographics* A total of 40 patients were recruited out of which 2 were males and 38 were females. They had a mean age of 24 years (range 18-65 year). The most common presenting symptom was erythema (n=40) followed by burning (n=33) itching (n=24), reddish lesion

(n=9) and darkening (n=2). The most common aggravating factor was sun exposure followed by heat, emotions and hot beverage.

The type and potency of topical steroid used by patients varied from low-mid potency (45%) followed by mid potency (25%) and superpotent corticosteroids (30%). The duration of topical steroid application varied from 1 month to more than 2 years. Maximum number of patients (47.5%) used it for duration of 1-6 months followed by 30% for 6-12 months followed by 7.5% for 12-18 months followed by 5% for 18-24 months and 10% for more than 2 years.

Topical steroid was used as a self-medication by 45% of patients followed by 15% as advised by neighbours, 15% by non-degree practitioners and 12.5% by relatives and 12.5% by general practitioners.

On examination all the patients (100%) showed persistent erythema and telangiectasia followed by papules (30%) and pigmentation (12.5%). Malar area was involved in 100% followed by the chin (17.5%), forehead (15%) and nose (7.5%).

Out of the 40 patients, only 30 completed the study and 10 patients dropped out because of their personal reasons (financial problems, problem in travelling, shifted out due to work) hence the all parameter evaluation was done for 30 patients. There was no statistical difference observed between the baseline parameters of the patients who completed the study and those who dropped out.

*Outcome measures* After the three treatments with IPL, the values of telangiectasia count, DLQI, VAS for erythema and telangiectasia by the physician and patient both improved significantly from baseline to the 9th week ( $p<0.001$ ), (**Figure 1, 2, 3 and 4, Table 1**).

The mean telangiectasia count of right cheek was 56.50 and the left cheek was 54.67. After completion of the treatment at 9th week the mean telangiectasia count on right cheek was 24.73 and left cheek was 23.50, the improvement in mean telangiectasia count on both cheeks was statistically significant ( $p<0.001$ ).

Erythema which was measured by 10-point visual analogue scale both by observer and patient himself, improved significantly at the completion of treatment. Telangiectasia was also measured by 10-point visual analogue scale by observer showed a significant improvement at completion of treatment at 9 weeks.

The DLQI also showed strongest impairment in domain 'symptoms and feelings' followed by 'daily activities', 'leisure' and 'personal relationships', 'professional activities (work and/or school)' and 'treatment' at the starting of the treatment.

After treatment, DLQI scores improved significantly for all the domains. In descending order, this change was maximum for domain 'Symptoms and feelings' followed by 'Personal relationships', 'Daily activities', 'Leisure', 'Treatment' and 'Professional activities (work and/or school)'. DLQI improvement in all domains was statistically significant (**Table 2**).

## Discussion

Age of patients in our study varied from 18-45 years as per other similar studies. Mean age of patients in our study was  $24.55\pm 7.42$  years. Bhatt *et al.*<sup>1</sup> in their study on steroid-induced rosacea showed maximum number of patients i.e. 76% were in the age group of 11-30 years.

In our study the sex distribution analysis showed 5% males and 95% females with the male to

**Table 1** Comparison between baseline and final values of parameters in patients who completed the study (n=30).

Parameters	Treatment category	N	Mean + SD	P value
Left cheek telangiectasia count	Baseline	30	54.67 + 31.35	0.001*
	9th week	30	23.50 + 15.76	
Right cheek telangiectasia count	Baseline	30	56.50 + 36.67	0.001*
	9th week	30	24.73 + 18.07	
Doctor's VAS erythema	Baseline	30	5.83 + 0.79	0.001*
	9th week	30	2.90 + 1.24	
Doctor's VAS telangiectasia	Baseline	30	5.23 + 1.33	0.001*
	9th week	30	2.43 ± 1.16	
Patient's VAS erythema	Baseline	30	6.33 ± 1.02	0.001*
	9th week	30	3.00 ± 1.36	
Patient's VAS telangiectasia	Baseline	30	5.50 ± 1.27	0.001*
	9th week	30	2.63 ± 1.47	
DLQI score	Baseline	30	14.73 ± 3.08	0.001*
	9th week	30	5.46 ± 2.06	

DLQI: dermatology life quality index, VAS: visual analogue scale

**Table 2** Comparison of different domains of dermatology life quality index (DLQI), n=30.

Category	Mean DLQI	Mean DLQI	p value
	Before treatment	After treatment	
Symptoms and feelings (max. score = 6)	4.3 ± 0.96	1.76 ± 0.63	<0.001*
Daily activities (max. score = 6)	3.3 ± 0.91	0.90 ± 0.96	<0.001*
Leisure (max. score = 6)	2.2 ± 0.77	0.83 ± 0.46	0.001*
Work and school (max. score = 3)	1.6 ± 0.93	0.36 ± 0.56	0.001*
Personal relationships (max. score = 6)	2.2 ± 0.61	0.96 ± 0.67	0.001*
Treatment (max. score = 3)	1.0 ± 0.26	0.66 ± 0.47	0.001*

Improvement in erythema and telangiectasia



**Figure 1** Left cheek before treatment.



**Figure 2** Left cheek at 3 weeks after last treatment.



**Figure 3** Right cheek before treatment



**Figure 4** Right cheek at 3 weeks after last treatment

female ratio of 1:16. In a similar study by Rathi *et al.*<sup>9</sup> on topical corticosteroid-induced rosacea-like dermatitis showed 11% males and 89% females. This female predominance in the present study may be due to consciousness of females for their looks and application of these topical preparations as and when advised by anyone.

In our study all the patients i.e. 100% presented with the main complaints of redness followed by burning (80%), itching (60%) and papules and pustules (22.5%). Hameed *et al.*<sup>21</sup> in their study on steroid dermatitis resembling rosacea observed redness in 93%, telangiectasia in 77%, burning or itching in 97 % patients.

Triggering or the aggravating factors in our study were sun exposure in 100% followed by heat in 75%, while cooking in 65%, stress/emotions in 52.5% and consumption of hot drink in 25%. This is in accordance to a study by Hameed *et al.*<sup>21</sup> on steroid dermatitis resembling rosacea showed aggravation in 100% with sun exposure, 94% on heat exposure, 93% with emotional stress.

In the present study maximum patients i.e. 45% had applied class V (low-mid strength) topical steroids i.e. betamethasone valerate 0.1% cream followed by 30% who had applied class I potency (superpotent) topical steroid i.e. clobetasol propionate 0.05% cream or ointment and 25% class IV (low-mid strength) topical steroid i.e. mometasone furoate 0.1% cream. Hameed *et al.*<sup>21</sup> in a study done in Iraq found that the most frequently used fluorinated topical corticosteroids were betamethasone valerate 0.1% in 6% patients and clobetasol propionate 0.05% in 9% patients or both of them in 20% patients while 64% patients had combined any one of the above-mentioned topical corticosteroids.<sup>21</sup> These studies showed variation

may be due to easy availability of the different molecules in a particular area/place of study

In our study the mean telangiectasia count in the patients who completed the treatment decreased from  $54.67 \pm 31.35$  to  $23.50 \pm 15.76$  on left cheek ( $p < 0.001$ ) and from  $56.50 \pm 36.67$  to  $24.73 \pm 18.07$  on the right cheek ( $p < 0.001$ ).

In our study, we used the 560 nm filter for all our patients and the fluence was fixed at  $20\text{J}/\text{cm}^2$  at each visit,<sup>17,19,22,23</sup> 3 sessions at 3 weeks interval and a follow-up at 3 weeks after the final sitting. The visual analogue scale (VAS) for erythema and telangiectasia on baseline and at 9<sup>th</sup> week showed decrease from 5.83 to 2.9 ( $p < 0.001$ ) and 6.33 to 3.00 ( $p < 0.001$ ) and mean telangiectasia counts at baseline and 9<sup>th</sup> week also showed significant difference ( $p < 0.001$ ). While in a similar study done by Papageorgiou *et al.*<sup>19</sup> used 560 nm cut off filter, with fluence range of 24-  $32\text{J}/\text{cm}^2$ , four treatments were administered at 3 weeks interval and measures were repeated 6 months after the treatment showed significant decrease in VAS scores for erythema at baseline and at 6 months follow-up from 7.3 to 3.8 ( $p < 0.001$ ) and photographic assessment of erythema and telangiectasia also showed significant improvement by 46% and 55% ( $p < 0.001$ ).<sup>19</sup> Neuhaus *et al.*<sup>22</sup> in their study on efficacy of nonpurpuragenic pulsed dye laser and intense pulsed light for erythematotelangiectatic rosacea used 560nm cut off filter, with fluence range of 22- $25\text{J}/\text{cm}^2$ , three treatments were given at monthly intervals with a 4-week follow-up after the last treatment session, there was significant decrease in erythema and telangiectasia scores ( $p < 0.01$ ) and the patients VAS for erythema also showed significant decrease ( $p < 0.05$ ) and the malar telangiectasia counts also showed significant reduction ( $p < 0.05$ ).<sup>22</sup>

The 10-point VAS was done by physician and patient for both erythema and telangiectasia at every treatment session and scores of both these parameters reduced post-treatment. The average VAS score for erythema reduced by 3.0 and 3.4 points showing 51% and 53% improvement according to both doctor and patient VAS, respectively. Reduction in the mean VAS score for telangiectasia was by 2.8 showing 53% improvement according to physician's VAS. Papageorgiou *et al.*<sup>19</sup> in their study on treatment of rosacea using intense pulsed light showed that the severity of rosacea was reduced by 3.5 points on the 10-point VAS. Patients' and physicians' assessment of overall improvement were similar, more than 50% improvement was seen.

Our study showed a significant improvement in the different domains of DLQI pre- and post-treatment, with the decrease in the mean of total DLQI score of 14.7 at baseline to 5.4 at 9 weeks ( $P<0.001$ ). Liu and Du in their study<sup>24</sup> on quality of life in patients with facial steroid dermatitis before and after treatment showed that quality of life score decreased significantly from 13.76 at baseline to 3.44 at 6 weeks ( $P<0.001$ ).<sup>24</sup> Menezes *et al.*<sup>25</sup> in their study showed the average DLQI score before pulse dye laser treatment was 5.6 and after three sessions it was 1.5.

## Conclusion

IPL is effective in decreasing the telangiectasia and erythema in the patients of topical steroid-dependent facial dermatitis.

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