

# Efficacy of blue light in mild and moderate facial acne vulgaris

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## Abstract

**Objective** To determine the efficacy of blue light treatment in patients with mild and moderate facial acne vulgaris.

**Methodology** This quasi-experimental study was performed at Department of Dermatology, Services Hospital, Lahore from 31st January 2015 to 30th July 2015. Total 105 patients were included in the study by non-probability consecutive sampling. The patients undergone 16 sessions of blue light for 15 minutes each, twice a week for 8 weeks. Global Acne Score (GAS) was calculated at the start of the treatment and at 8 weeks. Mean reduction in GAS was measured. The statistical analysis was performed using SPSS version 16.

**Results** 91(87%) patients were between 15-30 years of age while 14 (13%) were between 31-45 years of age with mean age of  $22.90 \pm 5.97$  years. 28 (26.7%) were male and 77 (73.3%) were females. Acne was mild in 50 (47.6 %) patients and moderate in 55 (52.4%). Pretreatment mean global acne score was  $18.9905 \pm 6.24884$  and posttreatment mean global acne score was  $15.1143 \pm 5.1143$ . Mean reduction in global acne score after 08 weeks was  $3.87619 \pm 3.33021$  ( $p < 0.0038$ ).

**Conclusion** Blue light is an effective monotherapy in the treatment of mild and moderate facial acne vulgaris in our population.

## Key words

Acne vulgaris, blue light, global acne score (GAS).

## Introduction

Acne vulgaris is a chronic inflammatory disease of the pilosebaceous follicles, characterized by comedones, papules, pustules, nodules, cysts and often scars.<sup>1</sup> The pathogenesis of acne is multifactorial and four major factors involved in the pathogenesis include: increased sebum production, hypercornification of pilosebaceous ducts, follicular colonization by *Propionibacterium acnes* and inflammation.<sup>2</sup>

Prevalence of acne vulgaris in adolescents range from 35% to over 90% and half of them continue to experience symptoms as adult.<sup>3,4,5</sup> Psychological impacts of acne vulgaris are low self esteem, depression, social isolation and suicidal ideation.<sup>6</sup>

The multifactorial etiology of acne vulgaris makes it challenging to treat. Current treatments include topical retinoids, topical and systemic antibiotics, azelaic acid, and systemic isotretinoin. In mild forms of acne, topical therapy is most appropriate, while moderate to severe form is treated with topical retinoids, topical antibiotic and systemic antibiotic and systemic retinoids.<sup>7</sup>

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Among nonpharmacological measures, light-based therapy can be used with or without photosensitizer as alternative or adjuvant to pharmacological management.<sup>8</sup> Among light-based therapy for acne vulgaris, blue light is increasingly being used due to its intrinsic antimicrobial activity. Blue light excites endogenous intracellular porphyrins that leads to the production of highly cytotoxic reactive oxygen species, and transmembrane proton inflow which leads to killing of *P. acnes*.<sup>9</sup>

The present study was undertaken to determine the efficacy of blue light treatment in patients with mild and moderate facial acne vulgaris.

## Methods

A quasi-experimental study was performed at department of dermatology, Services Hospital, Lahore from 31<sup>st</sup> January 2015 to 30<sup>th</sup> July 2015. Patients were enrolled after getting prior approval from hospital ethical committee. An informed written consent was obtained from every patient. A total 105 patient were included in the study by nonprobability consecutive sampling. Inclusion criteria were patients of either sex and age between 15-45 years. Exclusion criteria was history of photosensitivity, intake of phototoxic drugs, use of oral isotretinoin within last 6 months, use of topical therapy within last 2 weeks, laser resurfacing, chemical peel or dermabrasion within the last 8 weeks and patient who was uncooperative and unwilling to continue the treatment. Global Acne Grading system was used to divide patients into mild and moderate acne vulgaris. Baseline demographic information such as name, age, and sex were noted. The patients underwent 16 sessions of Blue Light for 15 minutes each, twice a week for 8 weeks. Global Acne Score was calculated at the start of the treatment and at 8 weeks. Blue light emission was obtained using a specific

light source with spot size 20-20cm<sup>2</sup>, wavelength 405nm to 420nm and power 40-400 mW/cm<sup>2</sup>.

The statistical analysis was performed using SPSS version 16. The quantitative variables like age and reduction in GAS were calculated as mean and standard deviation. The qualitative variables like gender and type of acne were calculated as frequency and percentages. Mean reduction in GAS was measured by subtracting posttreatment GAS from pretreatment GAS. Paired sample T test was applied. *P* value  $\leq 0.05$  was considered significant. Data were stratified for age, gender to address the effect modifiers. Poststratification T test was applied.

## Results

105 patients fulfilling the inclusion/exclusion criteria were enrolled in study. Age distribution of patients showed that 91 (87%) patients were between 15-30 years of age while 14 (13%) were between 31-45 years of age. Mean age was  $22.90 \pm 5.97$  years. There were 28 (26.7%) male and 77 (73.3%) were females. Type of acne was recorded as mild in 50 (47.6%) patients and moderate in 55 (52.4%) (**Table 1**). Pretreatment mean global acne score was  $18.9905 \pm 6.24884$  and posttreatment mean GAS was  $15.1143 \pm 5.1143$  (**Table 2**). Mean reduction in global acne score after 8 weeks was  $3.87619 \pm 3.33021$ ,  $p < 0.0038$ , (**Table 3**).

## Discussion

Medical treatments for acne vulgaris include a variety of topical and oral medications. Poor compliance, lack of durable remission, and potential side effects are common drawbacks to these treatments. Therefore, there is a growing demand for a fast, safe, and side-effect-free novel therapy. Acne often improves after exposure to sunlight, and this has led to the

**Table 1** Age, Sex and type of Acne vulgaris in study population (n=105).

Age (years)	n (%)	Gender	n (%)	Type of acne vulgaris	n (%)
15-30	91 (86.7)	Male	28 (27)	Mild	50 (47.6)
31-45	14 (12.3)	Female	77 (73)	Moderate	55 (52.4)

**Table 2** Mean Global Acne score pretreatment and posttreatment (n=105).

	Mean	Std. Deviation	Std. Error Mean
Pretreatment Global Acne score	18.9905	6.24884	0.60982
Posttreatment Global Acne score	15.1143	5.1143	0.50967

**Table 3** Mean reduction in Global Acne Score

	Mean	Std. Deviation	Paired Differences		P value	
			Std. Error Mean	95% Confidence Interval of the Difference		
				Upper	Lower	
Pretreatment Global Acne Score - Posttreatment Global Acne Score	3.87619	3.33021	0.32500	3.23171	4.52067	<0.00038

development of laser and other light therapies resulting in the overall ease of treatment, with minimal adverse effects.<sup>10</sup>

Blue light excites endogenous intracellular porphyrins in *P. acnes* that leads to the production of highly cytotoxic reactive oxygen species, and transmembrane proton inflow which leads to killing of *P. acnes*.<sup>9</sup>

Age distribution in current study was 87% between 15-30 years, which was comparable with studies by Dawson and Dellavalle<sup>3</sup> and Bhate and Williams<sup>11</sup> which showed age distribution around puberty in acne vulgaris.

Current study showed more prevalence of mild and moderate facial acne vulgaris in female patients which was in accordance with previous studies.<sup>12,13</sup> This could be due to more cosmetic concern in females as whole as compared to males.

In this study pretreatment mean global acne score was 18.99±6.24 and posttreatment mean

global acne score was 15.11±5.11, which was comparable with previous study.<sup>14</sup>

Mean reduction in global acne score after 08 weeks was 3.87±3.331 ( $p<0.0038$ ), similar result were shown in a study conducted by Faghihi *et al.*<sup>14</sup>

### Conclusion

Blue light is an effective monotherapy in the treatment of mild and moderate facial acne vulgaris in our population. Comparative studies of blue light and other treatments used in mild and moderate facial acne vulgaris are required, to recommend blue light as first-line monotherapy.

### Conflict of interest

Authors declared no conflict of interest.

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