

## Role of Intense Pulse Light Therapy on Dry Eyes in Pakistani Population

Murtaza Sameen, Muhammad Shahid, Muhammad Adnan, Abdul Rauf, Jawwad Ahmad, Khalid Naimat

Department of Ophthalmology, Armed Forces Institute of Ophthalmology/National University of Medical Sciences (NUMS), Rawalpindi Pakistan

### ABSTRACT

**Objective:** To observe the role of Intense Pulse Light therapy on dry eyes in Pakistani population.

**Study Design:** Analytical cross-sectional study.

**Place and Duration of Study:** Armed Forces Institute of Ophthalmology, Rawalpindi Pakistan, from Feb to Dec 2022.

**Methodology:** A total of 88 patients with meibomian gland related dry eyes were included in this study, with age ranging between 25-65 years. Intense pulsed light therapy was used to treat Meibomian Gland Dysfunction related dry eyes. Tear film break up time before and after the sessions was recorded on a data collection tool and data analysis was done.

**Results:** Out of 88 patients with Meibomian Gland Dysfunction related dry eyes, 60(68.2%) were females and 28(31.8%) were males. Mean age of the patients was 45.5±8.0 years and median tear film break up time (per Intense Pulse Light) was 4(5-3) seconds, whereas median tear film break-up time (post Intense Pulse Light) was increased to 12(13-11) seconds. Follow up was done until 4 months, which showed significant improvement in symptoms of patients. Tear Breakup Time did not improve in 2 patients as they were already on anti-glaucoma treatment ( $p$ -value <0.01).

**Conclusion:** Intense Pulse Light was found to be the safest way of treating Meibomian Gland Dysfunction-related dry eyes which showed significant improvement in patient symptoms.

**Keywords:** Dry Eyes, Intense Pulse Light Therapy, Meibomian Gland Dysfunction.

**How to Cite This Article:** Sameen M, Shahid M, Adnan M, Rauf A, Ahmad J, Naimat K. Role of Intense Pulse Light Therapy on Dry Eyes in Pakistani Population. *Pak Armed Forces Med J* 2024; 74(6): 1478-1480. DOI: <https://doi.org/10.51253/pafmj.v74i6.9958>

This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<https://creativecommons.org/licenses/by-nc/4.0/>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

### INTRODUCTION

Dry Eye Disorder (DED) is a multi-categorical ocular surface disease which results in unstable tear film, with the most common cause being Meibomian Gland Dysfunction (MGD) which causes evaporative dry eyes, due to decreased secretion from meibomian ducts and less contribution to lipid layer of tear film, occurring 3.5% to 70%, globally.<sup>1</sup> MGD can occur independently or in combination with dry eyes, called "MGD related DED", and classified<sup>1,2</sup> into two subtypes: evaporative and aqueous deficiency,<sup>3,4</sup> having multiple treatment options, such as, lubricants, tears substitute, immune modulators and warm compresses and low level light therapy.<sup>5,6</sup> Despite the availability of multiple treatment options, it is difficult for the patients to get relief from the symptoms, however, Intense Pulsed Light (IPL) therapy has shown promise in research.<sup>7,8</sup> A high intensity polychromatic light of wavelength 400 to 1200 nm is emitted from xenon flashlamps and a filter is used to restrict the wavelength to approximately 500nm of visible spectrum and absorbed by the abnormal vessels (telangiectatic) leading to their closure.<sup>9-11</sup> IPL liquefies the abnormal viscous meibum and dilates the

ducts, allowing expression of meibum more easily, relieving dry eye symptoms.<sup>11,12</sup>

To the best of our knowledge, no such study has been conducted in Pakistani population, therefore, the rationale of this study was to investigate the role of intense pulsed light therapy in treating MGD related dry eye disorder.

### METHODOLOGY

This study was carried out at Armed Forces Institute of Ophthalmology (AFIO), Rawalpindi Pakistan, from February to December 2022, after gaining approval from hospital Ethics Review Committee via letter 261/ERC/AFIO. We estimated a sample size of 92 patients, using 95% confidence interval, 5.5% absolute precision and reported prevalence of IPL as 92%.<sup>1</sup> Non-probability consecutive sampling technique was used to enroll the patients.

**Inclusion Criteria:** Male and female patients, above the age of 20 years, with posterior meibomitis and evaporative dry eyes, diagnosed with the help of ocular surface disease index, and a Tear Break-up Time (TBUT) of <10 seconds were included.

**Exclusion Criteria:** Patients with anterior blephritis and systemic disorders, like rheumatoid arthritis, diabetes mellitus and inflammatory diseases were excluded.

**Correspondence:** Dr Murtaza Sameen, Department of Ophthalmology, Armed Forces Institute of Ophthalmology, Rawalpindi Pakistan  
Received: 21 Feb 2023; revision received: 05 Jun 2023; accepted: 06 Jun 2023

A TBUT of less than 10 seconds was considered abnormal. Both eyes were treated simultaneously with IPL (E-Eye) across three sessions on day 0, day 15, and day 45, with four pulses of 11.4 J/cm<sup>2</sup> applied to the lower eyelid and one pulse 4 mm temporal to the lateral canthus of each eye. Participants avoided sunlight and heat exposure for 24 hours after treatment, and no eye drops were used throughout the study. Follow-ups occurred at 15 days, 45 days, and 4 months, with TBUT measured at each visit to evaluate treatment progression. Data analysis was conducted using Statistical Package for Social Sciences (SPSS) version 23.0, calculating Mean±SD for continuous variables and frequency/percentage for categorical data. Normality was assessed using Kolmogorov-Smirnov and Shapiro-Wilk tests, and as the data was non-normally distributed, the Wilcoxon signed-rank test was applied to compare pre- and post-treatment results, with a *p*-value ≤0.05 considered statistically significant.

## RESULTS

Data from 88 patients was analyzed, with 2 patients excluded due to loss to follow up. Out of 88 subjects, 60(68.2%) were females and 28(31.8%) were males, having age range between 25 to 65 years, and mean age being 45.5±8.0 years. After follow-up of 4 months, significant improvement was noticed in almost all patients 86(97.7%), while failure was seen in 2(2.27%) patients, who were using anti glaucoma treatment and did not show any improvement with IPL treatment after 3 sessions, as shown in Table-I. The median TBUT (pre-IPL) was 4(5 - 3) seconds, while median TBUT (post IPL) was increased to 12(13 - 11) seconds, with a statistically significant difference (*p*-value <0.001) as shown in Table-II.

**Table-I: Outcomes of Intense Pulse Light Therapy (IPL) (n=88)**

Variables	Frequencies
Age in years (Mean±SD)	45.5±8.0 88
<b>Gender</b>	
Male	28(31.8%)
female	60(68.2%)
<b>Follow Up (04 Months)</b>	
success	86(97.7%)
failure	02(2.27%)

**Table-II: Pre and Post IPL Therapy Association with TBUT (n=88)**

	Pre IPL (seconds)	Post IPL (seconds)	<i>p</i> -value (<0.05)
Intense Pulse Light therapy	4(5 - 3)	12(13 - 11)	< 0.001

## DISCUSSION

Meibum, being the primary component of the outer layer of tear film, plays a vital role to lower the surface tension of tear film and maintain its stability,<sup>13</sup> failure to do so causes MGD, which results in hyper-evaporative dry eyes. Lubrication, along with warm compresses, are commonly used treatment options, but with advancement in the treatment options, the investigation of IPL can lead to it becoming a promising new therapy.<sup>13,14</sup>

In one study, three sessions of IPL, with four pulses, were applied at lower lid and one at temporal of lateral orbital rim,<sup>14</sup> similar to our study.

Another researcher treated refractory MGD with IPL, over 3 week intervals and a total of 8 sessions,<sup>15</sup> however, we applied 3 sessions only with sequence of 0 day, 15 days and 45 days respectively, which resulted in a similar improvement after the sessions of IPL, similar to other studies.<sup>16-18</sup> Another study discussed the combined effect of intense pulse light therapy and low level light therapy, which showed significant improvement in TBUT,<sup>21</sup> similar to our findings in spite of only one modality of IPL being used. Future studies should be carried out to see the effectiveness of IPL in combination with low level light therapy, as they could be cost effective options for patients.

## LIMITATION OF STUDY

We did not categorize the different types of skin as reactivity to IPL varies with different skin types and we also did not calculate the pain threshold during and after application of IPL.

## CONCLUSION

Intense pulsed light therapy can be an effective additive treatment option in treating MGD related evaporative dry eyes which not only improves the symptoms of dry eyes but also the functioning of meibomian ducts.

**Conflict of Interest:** None.

**Funding Source:** None.

## Authors' Contribution

The following authors have made substantial contributions to the manuscript as under:

MS & MS: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

MA & AR: Conception, data analysis, drafting the manuscript, approval of the final version to be published.

JA & KN: Data acquisition, critical review, 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.

## REFERENCES

- Shi Y, Wu Y. Efficacy and safety of intense pulsed light therapy for dry eye caused by meibomian gland dysfunction: a randomised trial. *Ann Palliat Med* 2021; 10(7): 7857-7865. <https://doi.org/10.21037/apm-21-1303>
- Cote S, Zhang AC, Ahmadzai V, Maleken A, Li C, Oppedisano J, et al. Intense pulsed light (IPL) therapy for the treatment of meibomian gland dysfunction. *Cochrane Database Syst Rev* 2020; 3(3): CD013559. <https://doi.org/10.1002/14651858.CD013559>
- Xue AL, Wang MTM, Ormonde SE, Craig JP. Randomised double-masked placebo-controlled trial of the cumulative treatment efficacy profile of intense pulsed light therapy for meibomian gland dysfunction. *Ocul Surf* 2020; 18(2): 286-297. <https://doi.org/10.1016/j.jtos.2020.01.003>
- Egri S, Van Hollebecke I, Guindolet D, Manenti C, Rougier H, Gabison É, et al. Efficacy of intense pulsed light therapy in the treatment of meibomian gland dysfunction-related severe dry eye. *J Fr Ophtalmol* 2021; 44(2): 169-175. <https://doi.org/10.1016/j.jfo.2020.04.061>
- Vergés C, Salgado-Borges J, Ribot FM. Prospective evaluation of a new intense pulsed light, Thermaeye Plus, in the treatment of dry eye disease due to meibomian gland dysfunction. *J Optom* 2021; 14(2): 103-113. <https://doi.org/10.1016/j.optom.2020.08.009>
- Leng X, Shi M, Liu X, Cui J, Sun H, Lu X. Intense pulsed light for meibomian gland dysfunction: a systematic review and meta-analysis. *Graefes Arch Clin Exp Ophthalmol* 2021; 259(1): 1-10. <https://doi.org/10.1007/s00417-020-04834-1>
- Dell SJ. Intense pulsed light for evaporative dry eye disease. *Clin Ophthalmol* 2017; 11: 1167-1173.
- Miao S, Yan R, Jia Y, Pan Z. Effect of intense pulsed light therapy in dry eye disease caused by meibomian gland dysfunction: a systematic review and meta-analysis. *Eye Contact Lens* 2022; 48(10): 424-429. <https://doi.org/10.1097/ICL.0000000000000934>
- Arita R, Fukuoka S. Non-pharmaceutical treatment options for meibomian gland dysfunction. *Clin Exp Optom* 2020; 103(6): 742-755. <https://doi.org/10.1111/cxo.13035>
- Zheng Q, Xue Y, Zhong X, Li G, Shi W, Wang T. Correlation study between abnormal morphology of meibomian glands and meibum in patients with dry eye disease under in vivo confocal microscopy. *Front Med (Lausanne)* 2022; 8: 793338. <https://doi.org/10.3389/fmed.2021.793338>
- Fukuoka S, Arita R. Comparison of intense pulsed light therapy on patients with meibomian gland dysfunction using AQUA CEL and M22 devices. *J Clin Med* 2022; 11(15): 4265. <https://doi.org/10.3390/jcm11154265>
- Toyos R, McGill W, Briscoe D. Intense pulsed light treatment for dry eye disease due to meibomian gland dysfunction; a 3-year retrospective study. *Photomed Laser Surg* 2015; 33: 41-46. <https://doi.org/10.1089/pho.2014.3819>
- Rong B, Tang Y, Tu P, Liu R, Qiao J, Song W, et al. Intense pulsed light applied directly on eyelids combined with meibomian gland expression to treat meibomian gland dysfunction. *Photomed Laser Surg* 2018; 36: 326-332. <https://doi.org/10.1089/pho.2017.4402>
- Toyos R, Toyos M, Willcox J, Mulliniks H, Hoover J. Evaluation of the safety and efficacy of intense pulsed light treatment with meibomian gland expression of the upper eyelids for dry eye disease. *Photobiomodul Photomed Laser Surg* 2019; 37: 527-531. <https://doi.org/10.1089/photob.2018.4599>
- Arita R, Fukuoka S, Morishige N. Therapeutic efficacy of intense pulsed light in patients with refractory meibomian gland dysfunction. *Ocul Surf* 2018; 17: 104-110. <https://doi.org/10.1016/j.jtos.2018.11.004>
- Liu R, Rong B, Tu P, Tang Y, Song W, Toyos R, et al. Analysis of cytokine levels in tears and clinical correlations after intense pulsed light treating meibomian gland dysfunction. *Am J Ophthalmol* 2017; 183: 81-90. <https://doi.org/10.1016/j.ajo.2017.08.021>
- Rong B, Tang Y, Liu R, Tu P, Qiao J, Song W, et al. Long-term effects of intense pulsed light combined with meibomian gland expression in the treatment of meibomian gland dysfunction. *Photomed Laser Surg* 2018; 36: 562-567. <https://doi.org/10.1089/pho.2018.4499>
- Xue AL, Wang MTM, Ormonde SE, Craig JP. Randomised double-masked placebo-controlled trial of the cumulative treatment efficacy profile of intense pulsed light therapy for meibomian gland dysfunction. *Ocul Surf* 2020; 18: 286-297. <https://doi.org/10.1016/j.jtos.2020.01.003>
- Piyacomn Y, Kasetsuwan N, Reinprayoon U, Satitpitakul V, Tesapirat L. Efficacy and safety of intense pulsed light in patients with meibomian gland dysfunction—a randomized, double-masked, sham-controlled clinical trial. *Cornea* 2019; 39: 325-332. <https://doi.org/10.1097/ICO.0000000000002204>
- Tashbayev B, Yazdani M, Arita R, Fineide F, Utheim TP. Intense pulsed light treatment in meibomian gland dysfunction: a concise review. *Ocul Surf* 2020; 18: 583-594. <https://doi.org/10.1016/j.jtos.2020.06.002>
- Marta A, Baptista PM, Heitor Marques J, Almeida D, José D, Sousa P, et al. Intense pulsed plus low-level light therapy in meibomian gland dysfunction. *Clin Ophthalmol* 2021; 15: 2803-2811. <https://doi.org/10.2147/OPTH.S318885>