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Original Research Article

The improvement after IPL treatment in meibomian gland dysfunction patients

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ABSTRACT

Introduction: This study aims to evaluate the improvement in meibomian gland dysfunction (MGD) patients following intense pulsed light (IPL) treatment. A prospective study was conducted with 60 patients, aged 15 to 75, at Dr. Anil Kulkarni Eye Hospital from September 2021 to March 2022. All patients had a diagnosis of MGD with a secretion quality of degree 2 or higher and exhibited symptoms of dry eye disease (DED). The evaluation included Schirmer's test and meibography. The EYE-LIGHT device was used for IPL treatment, with severity levels assessed via the Me-check screening device. Patients' symptom responses were categorized as good, better, or no response using the OSDI-6 questionnaire.

Results: From 120 eyes showed a mean patient age of 42.46 years, with 57% being female. Improvement was noted in 50% of patients (30) reporting good results, 21.66% (13) reporting better results, and 28.33% (17) reporting no response. Significant improvements in MGD symptoms were observed, with positive changes in clinical examination and subjective scoring.

Conclusion: IPL plays a valuable role in DED. And the software using Eye-light is fully automated and upgradeable. No adverse effects after the IPL treatment, along with significant improvement in the symptoms. Satisfactory significant improvements were found in the symptoms of MGD. The positive change in objective clinical examination findings and subjective scoring data.The results of this research indicate the importance of IPL treatment and help to relieve the symptoms of moderate to severe dry eye disease (DED).

1. Introduction

Intense Pulsed Light (IPL) therapy in improving the symptoms and signs of Meibomian Gland Dysfunction (MGD). MGD is a common condition that can lead to dry eye syndrome, and current treatments often provide limited relief. IPL therapy has shown promise in previous studies, and this research seeks to systematically assess its impact on gland function, tear film stability, and patient-reported symptom improvement. By comparing pre- and post-treatment measurements, the study aims to provide evidence on the potential benefits of IPL therapy for MGD patients, potentially establishing it as a viable therapeutic option.[1–5]

Dry eye disorder of the tear film due to reduced production or excessive evaporation of tears**.** It is a common ocular condition that needs prompt diagnosis and careful treatment interventions. If left untreated, it can lead to numerous sight-threatening complications, including ulceration of the cornea, blepharitis, alterations of the tear film, conjunctivitis, and in severe cases, significant drying of the eye may lead to scarring, thinning, and even perforation of the cornea. Henceforth, early diagnosis and proper are necessary to prevent further complications and to restore vision as well as maintain the integrity of eyelids. The cause

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of dry eye varies from treatment obstructive such as age-related disorder to evaporative such as MGD.

Meibomian gland disfunction is a chronic, diffuse meibomian gland disease. Excessive evaporation of tears (cause of 86 % of dry eye cases) is caused by the obstruction or malfunction of the meibomian glands that are in eyelids and are responsible for producing the lipid layer of tears. When not working properly, they do not produce enough oil components in the tear film, so tears evaporate more rapidly. An insufficient or absent lipid layer can cause evaporation of the tear up to 16 times faster. It may result in alteration of the tear film, symptoms of eye irritation, clinically apparent inflammation, and ocular surface disease. [6,7]

1. Causes
   (a) Aging (< 50years)
   (b) Hormonal imbalance -Menopause
   (c) Other systemic conditions - such as Sjogren's syndrome (SS), Stevens-Johnson Syndrome (SJS), Psoriasis, Atopy, Polycystic Ovary Syndrome (PCOS), and Hypertension.
   (d) Ophthalmic factors –aniridia, chronic blepharitis, contact lens wear, eyelid tattooing, trachoma, and Demodex follicular infection have been shown to impact Meibomian gland function.
   ME-CHECK is a Dry eye and meibomian Gland Screening System.
2. Indications
   (a) MGD level (Meiboscale)
   (b) Dry Eye Severity level (OSDI -6)
3. Uses
   (a) HD imaging
   (b) Objective and fully automated screening
   (c) Short exam time (3 min)
   (d) No contact examination
   (e) Easy to use
   (f) Immediate result

IPL is a polychromatic light that is used to thermal pulses to stimulate the meibomian glands to resume normal activities.

It is performed with 500nm to 1200nm light pulses for 20 to 30 minutes.

It is applied to the periorbital areas and cheekbone.

It is not painful.

It works -

1. Stimulates contraction of the glands
2. Increasing the lipid stream
3. Reducing the evaporation of tears

It lasts a few minutes and allows an immediate return to normal activities. A few sessions (2 to 4) at different intervals (15 /20 days) are necessary to achieve an optimal result.

IPL was first applied in dermatology and has a good effect in the treatment of skin vasodilation, cavernous haemangioma, and other diseases. Recently, some scholars have proposed that the application of IPL can improve the stability of the tear film and improve the clinical symptoms of patients. [8–10] However, there are few reports on the short- and long-term efficacy and safety of IPL in the treatment of MGD dry eye, and there are few randomized controlled trials of IPL in the treatment of MGD dry eye. So, this study sought to compare the effects of IPL treatment and those of the traditional treatment in terms of short- and long-term efficacy, relief, and the incidence of adverse reactions during treatment in patients with MGD dry eye to provide a scientific theoretical basis for the clinical application and promotion of IPL in the treatment of MGD.

1.1. Clinical examination

All the patients underwent comprehensive eye examinations. After doctor consultation, the dry eye workup was performed on all the dry eye suspected patients.

1.2. Dry eye workup

Dry eye suspected patients underwent Schirmer's test-1 which is Non-invasive Technique. Photographs of meibomian glands of lower lids were taken using the Meiboscale of the Me-check machine in degree and percentage. The grading was done to check the severity of dryness.

Once the grading was done and the reports were analysed, IPL sittings to be given to the patients were decided. It may require about 2 or 3 sittings of IPL as per the degree of dryness present.

1.3. Treatment protocol

1. Before starting the therapy patients should wash their face and remove any type of makeup that is applied to the face.
2. Total duration of the procedure is about 20 minutes.
3. Patients were placed in either a prone or supine position.
4. Protective eyewear is indicated during the treatment; the mask treats only the periorbital area, and the patient is instructed to keep their eyes closed, to ensure the light therapy acts fully on the upper and lower lid.
5. Same procedure is performed on the other side of the face. At the end of the session, removed the protective eyewear.
6. Finally sun protection cream is applied to avoid exposure to sun for the first 48 hours.

After that, the improvements seen in the Schirmer's-1, MGD degree, and Symptoms of the patient were noted. [11–13]

1.4. Follow up

Instruct the patient to come for review after 1 month or so in between.

In the follow-up visit the Visual Acuity, Schirmer, meibography, and improvements in the symptoms were noted accordingly ophthalmologists suggested further treatment.

2. Materials and Methods

1. Study site: Dr. Anil Kulkarni Eye Hospital, Miraj.
2. Study design: Prospective cross-sectional study
3. Study duration: September 2021 to March 2022
4. Sample size: 60 cases (120 eyes)

2.1. Inclusion criteria

1. Patients complaining of Dryness.
2. Patient aged 15 -75 Years.
3. Diagnosis of MGD with poor quality of secretion.

2.2. Exclusion criteria

1. Corneal Disorders.
2. Uncontrolled systemic disease.
3. Patients below 15 and above 75 years.
4. Pregnancy
5. History of ocular trauma

2.3. Methodology

The Prospective study was conducted at Dr.Anil Kulkarni Eye Hospital, Miraj. The study included 120 eyes of 60 patients aged between 15 – 75 years. All patients selected had a diagnosis of MGD of poor quality of secretion and symptoms of dryness and with uncontrolled systemic disease, contact lens wear, pregnancy, Corneal Disorder, and history of any ocular trauma were excluded from the study. The ophthalmological record included objective ocular tests such as Schirmer's test and MGD test in the Me-check machine. The materials used in this study are as follows: [14,15]

Table 1:

S.No.	Material Name	Company & Model No.	Use
1.	Me-check Machine	Eye light line rev 2.1	Dry eye and Meibomian glands screening
2.	IPL Mask	My mask- (red center gross) 44050 funo ITALY	Intense Pulsed Light Therapy
3.	Schirmer's Strips	Tear Touch Blue	Measure the quantity of tears

3. Results

Patients were examined This graph shows43% male and 57% female were included in study.Figure 1

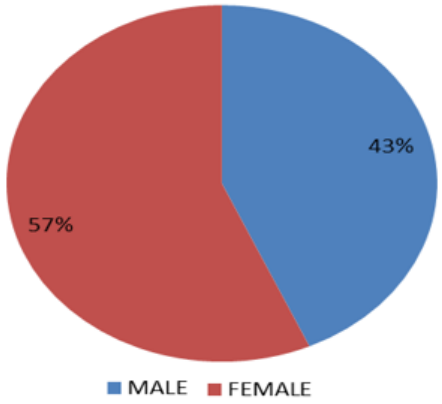

Figure 1: Graphical representation of gender criteria of the participants

Table 2: Age distribution

Age group	No. of Patients
15-35	20
36-55	31
56-75	9

The age ranged 15-75 years, among which majority of the subjects were from age group of 36-55 years (52%) and least from age ranging 56-75 year (15%).Table 2

This graph shows groups of occupation were included in study, among which majority groups are House wife (39%) followed by Computer users (25%), student 15%, business 10%, none 5%, teacher 3%, farmer 3%, among teacher and farmer the risk of dry eye is least, housewife and computer user showed the highest risk of dry eye than the other groups of occupation.

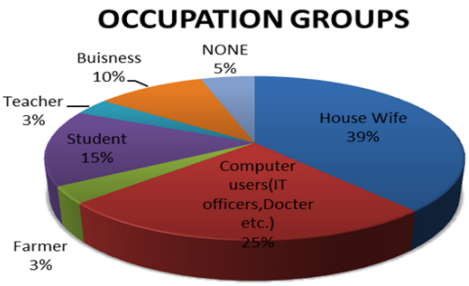

Figure 2: Graphical representation of occupational criteria of the participants.

Total level for OSID-6 questionnaire range. From level (0-4) and are interpreted as.Figure 3

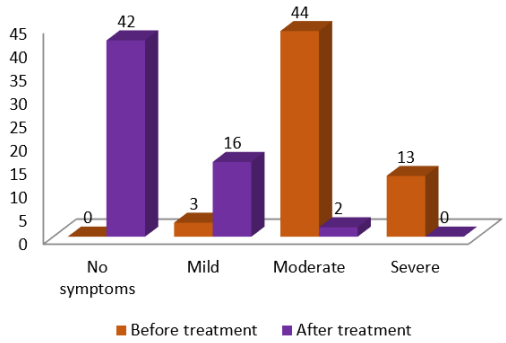

Figure 3: Shows Dry eye symptom severity according to the OSID-6 Dry eye questionnaire (on Me-check) before and after IPL treatment.

This Graph shows reduction of symptoms in patients after treatment.

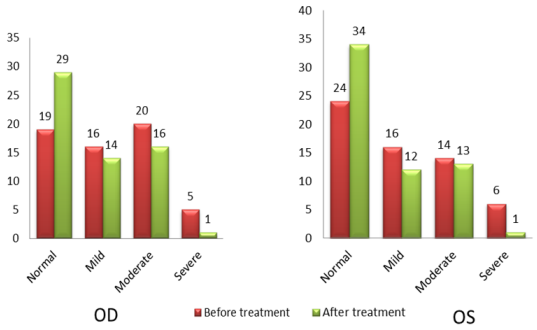

Figure 4: This graph shows the severity of dryness by assessing the schirmers test (typ- 1)before and after IPL treatment.

This Graph shows improvement in schirmer's-1 level after treatment and after treatment and majority range is Normal.Figure 4

4. Discussion

The findings of this study align with the growing body of evidence supporting the efficacy of Intense Pulsed Light (IPL) therapy in the treatment of Meibomian Gland Dysfunction (MGD), particularly in patients with evaporative dry eye disease (DED). Our results, where 50% of patients reported good outcomes, 21.66% reported better outcomes, and 28.33% reported no response, are consistent with recent studies showing variability in patient outcomes due to differences in disease severity, compliance, and IPL protocols. Studies by Dell et al. (2021) and Toyos et al. (2020) also reported significant improvements in tear break-up time (TBUT), meibomian gland secretion quality, and ocular surface health.[16] IPL's mechanisms of action, including reducing inflammation, heating meibomian glands, and decreasing bacterial load, contribute to these improvements. Our study demonstrated significant post-treatment improvements in Schirmer's test results, OSDI scores, and MGD grades, corroborating findings in the literature.[17] While comparing outcomes across studies is challenging due to methodological variations, our results emphasize the potential of IPL as a viable treatment for patients unresponsive to conventional therapies.[18] Future research should focus on standardizing IPL protocols and assessing the long-term effects of treatment to develop comprehensive care strategies for chronic MGD and evaporative DED patients.[19,20]

5. Conclusion

IPL plays a valuable role in MGD. And the software using Eye-light is fully automated and upgradeable. No adverse effect after the IPL treatment, along with significant improvement in Schirmer's test-1 and geography grades with an associated improvement in the patient's subjective satisfaction after treatment also seen in patients' symptoms. The present study showed a good 50%, better 21.6% no response 28.33% were noted after the treatment. IPL could be considered safe, highly accepted among patients, and could be applied in clinical settings. More research is needed with more patients and longer follow-up times to assess the long-term outcomes of IPL treatment.

6. Conflict of Interest

None.

7. Source of Funding

None.

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