



ORIGINAL ARTICLE

## Evaluation of intense pulse light (IPL) for melasma: Efficacy, safety and patient experience.

Aqsa Naheed<sup>1</sup>, Hamna Siddiqi<sup>2</sup>, Hasnain Ahmad<sup>3</sup>

**Article Citation:** Naheed A, Siddiqi H, Ahmad H. Evaluation of intense pulse light (IPL) for melasma: Efficacy, safety and patient experience. Professional Med J 2023; 30(09):1142-1146. <https://doi.org/10.29309/TPMJ/2023.30.09.7645>

**ABSTRACT... Objective:** To evaluate the efficacy and safety and patient experience of Intense pulse light (IPL) in our population. **Study Design:** Quasi-experimental. **Setting:** Department of Dermatology, HIT Hospital. **Period:** December 2022 to May 2023. **Material & Methods:** 34 females with melasma fulfilling the inclusion criteria were selected for this study. Exclusion criteria include thyroid disease, pregnant and lactating mothers, history of photosensitivity and retinoid intake. mMASI-1 was calculated before treatment. Treatment comprises of 4 sessions of IPL 2 week's apart mMASI-2 was again calculated 2 weeks after the last session. Side effect were monitored, and improvement in mMASI score was assessed using a 4-point scale (Poor, Fair, Good, and Excellent). Additionally, the treatment experience reported by patient was evaluated using a 4-point scale (Not Satisfactory, Satisfactory, Substantial, and Remarkable). **Results:** Results of this study had shown a decrease in the mean baseline mMASI (modified Melasma Area and Severity Index) score from  $14.22 \pm 5.32$  to mMASI II  $7.41 \pm 3.5$ , which was recorded two weeks after the last IPL session. The p-value, was found to be statistically significant ( $<0.000$ ). **Conclusion:** IPL is a valuable treatment option for melasma, offering a significant improvement in pigmentation. It is well tolerated and associated with minimal side effects.

**Key words:** IPL, Melasma, mMASI Score, Patient Experience, Treatment Efficacy, Treatment Safety.

### INTRODUCTION

Melasma is a chronic skin disease characterized by patches and spots of hyperpigmentation occur mainly on face in sun exposed areas. Its frequently observed in individual with skin type III and IV during their reproductive years While melasma does not pose any physical health risks, it has a significant psychological and emotional impact. Individuals with melasma often strive to improve their appearance.<sup>1,2</sup>

Pathogenesis of melasma involves multiple factors, including sun exposure, genetic predisposition, hormone changes, and skin irritation. These factors lead to an increased production of melanin by melanocytes which is then transferred to keratinocytes and the dermis. Therefore, melasma is classified into epidermal, dermal and mixed types based on its appearance under Wood's lamp.<sup>3,4</sup>

There is a wide range of treatment options available for melasma which include use of sunscreens, topical bleaching creams, oral medication that inhibit melanocytes activity so block further melanin pigment formation. Procedural techniques such as microdermabrasion, chemical peels and micro-needling can help remove existing pigment. Additionally, IPL and laser treatments are effective in dispersing melanin pigment.<sup>5,6</sup> In the past few decades use of light-based technology and lasers has modernized the treatment of dermatological condition in recent decades.

IPL is a versatile treatment modality that utilizes a wide range of wavelengths, typically ranging from 400 to 1400nm. By applying cut-off filters, specific wavelengths can be selected to target the absorption spectrum of chromophores and adjust energy accordingly.<sup>7</sup> The effects of IPL

1. MBBS, FCPS, CHPE, Professor Dermatology, HITEC-IMS (Heavy Industry Taxila Education City Institute of Medical Sciences).  
2. MBBS, House Officer Dermatology, HITEC-IMS (Heavy Industry Taxila Education City Institute of Medical Sciences).  
3. MBBS, House Officer Dermatology, HITEC-IMS (Heavy Industry Taxila Education City Institute of Medical Sciences).

**Correspondence Address:**

Dr. Aqsa Naheed  
Department of Dermatology,  
HITEC-IMS (Heavy Industry Taxila Education  
City, Institute of Medical Sciences).  
[aqsanahid@gmail.com](mailto:aqsanahid@gmail.com)

**Article received on:** 05/04/2023  
**Accepted for publication:** 04/07/2023

are cumulative, and multiple treatment sessions, usually ranging from 3 to 6 sessions scheduled every two to four weeks or monthly, are often required to achieve a satisfactory clinical response.<sup>8</sup>

Melasma is a prevalent yet aesthetically concerning skin condition. Its resistance to treatment poses a challenge for physicians and contributes to psychological distress for patients, primarily due to its high likelihood of recurrence. The utilization of IPL and laser technology has provided a ray of hope for effectively reducing melanin pigmentation in the skin. In light of this, we undertook a study to evaluate the efficacy and safety of IPL in treating melasma.

## MATERIAL & METHODS

This experimental study was conducted from Dec 2022 to May 2023 after a formal permission of Institutional Review Board of HIT hospital (HITEC-IRB-32-2023), we selected 34 females with melasma visiting the laser clinic of Dermatology Department for this Qausi experimental study from December 22 to May 23. Sample size was calculated using.<sup>9</sup>

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

Taking difference in mMASI (modified melasma and severity index) score 5.02 and Standard deviation 7.2. A total of 34 willing female participants between the ages of 25-47 years, fulfilling the study's inclusion criteria, were consecutively enrolled. Exclusion criteria included lactating or pregnant females, individuals with a history of photosensitivity, thyroid disease, oral contraceptive drug use, and retinoid intake. Written informed consent was obtained, and the procedure was explained in Urdu by a consultant dermatologist who conducted a comprehensive history and examination. The baseline mMASI-1 (modified melasma and severity index) score was recorded before the session, ranging from 0-24 (Mild=<8, Moderate=8-16, Severe=>16). Prior to the session, participants were instructed to wash their face with soap, followed by the application of a transparent gel. Cut-off filters of

510nm and 560nm were utilized for Fitzpatrick skin types III and IV, respectively, with pulse duration and fluence adjusted accordingly. After the IPL session, participants were advised to use ice packs for a few minutes and were instructed to apply sunscreen with an SPF >40. A total of four sessions were conducted at 2-week intervals, and the post-treatment mMASI-2 score was calculated two weeks after the last session. Side effects were recorded, and the improvement in MASI score was assessed using a 4-point scale: Poor (≤25%), Fair (25-50%), Good (50-75%), and Excellent (>75%). The treatment experience reported by patients was also evaluated using a 4-point scale: Not Satisfactory, Satisfactory, Substantial, and Remarkable.

The data collected in this study were analyzed using the Statistical Package for the Social Sciences (SPSS) software, version 28.0. Descriptive statistics such as frequencies and percentages were used to summarize categorical data, while numerical data were described using means and standard deviations. To assess the difference in means of the mMASI score before and after the intervention for each patient, a paired t-test was employed. A significance level of p<0.05 was chosen as the threshold for determining statistical significance.

## RESULTS

This study included 34 participants who underwent four IPL sessions, with each session being two weeks apart. Results of this study had shown a decrease in the mean baseline mMASI (modified Melasma Area and Severity Index) score from 14.22±5.32 to mMASI II 7.41±3.5, which was recorded two weeks after the last IPL session. The p-value, was found to be statistically significant (<0.000), indicates that the observed improvement is likely due to the IPL treatment and not just random chance as shown in Table-II. Demographic variables are enlisted in Table-I.

The results of the study indicated that IPL treatment led to improvements in melasma for the participants. The degree of improvement among the participants and treatment experience is shown in Figure-1.

In terms of side effects, the study found that 47% of the patients did not experience any side effects. Among the remaining participants, 53% reported transient side effects such as pain, erythema, or blebs. These side effects resolved after applying ice packs. Only 2.9% of the participants experienced 1<sup>st</sup> degree burns as shown in Table-III. Overall, the study suggests that IPL treatment is an effective and a safe option for melasma, with a majority of participants experiencing improvements in their condition.

Variables (N=34)	Mean and SD	Percentage %
Age	34.74 ± 6.32	
Duration (years)	3.89 ± 2.44	
<b>Marital Status</b>		
Married		97% (33)
unmarried		3% (1)
<b>Skin Type</b>		
Type III		70.5% (24)
Type IV		29.4 % (10)
<b>Use of Sunscreen</b>		
Positive		55.8% (19)
Negative		44.11% (15)

Table-I. Demographic variables

	N	Mean	SD	P-Value
mMASI 1	34	14.22	±5.32	0.000
mMASI2	34	7.41	±3.5	

Table-II. MASI score before and after IPL treatment

Side Effects	N (Percentage %)
Nil	16 (47%)
Pain (pricking sensation)	7 (20.5%)
Erythema	5 (14.7%)
Bleb	3 (8.8%)
Pain and Erythema	1 (2.9%)
Erythema and Bleb	1 (2.9%)
Burn	1 (2.9%)

Table-III. Frequency of side effects

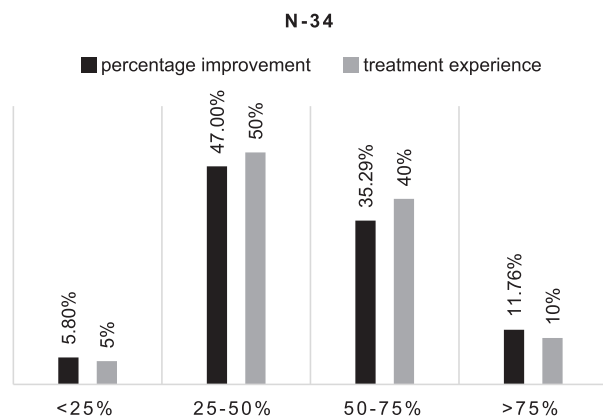


Figure-1. Percentage Improvement in MASI score after treatment and Treatment Experience of patient

## DISCUSSION

In my study 34 female participants were included with age range 25-47 years and mean was 34.74 ± 6.32. These findings are similar to the study done in India by Choudhary et al.<sup>10</sup> Skin type of the females in my study were III and IV, 70.5% and 29.4% respectively which is parallel to a study done in Brazil by Tamega et al.<sup>11</sup>

Our findings demonstrated a statistically significant decrease in the mean baseline mMASI score from 14.22±5.32 to mMASI II 7.41±3.5, as observed two weeks after the final IPL session. The calculated p-value, which was less than 0.000, further supports the statistical significance of these results. These findings suggest that the observed improvement in melasma can be attributed to the IPL treatment administered.

The literature on the use of IPL in melasma treatment is varied and encompasses several studies from different regions. In Egypt, a split-face study conducted by Arwa et al in 2018 compared the efficacy of IPL with PDL (Pulsed Dye Laser). This study, which included 28 female melasma patients, demonstrated that IPL is more effective than PDL specifically in treating epidermal melasma with a vascular component.<sup>12</sup> Another study in Egypt by Ilgen et al (2019) found a significant relationship between the number of IPL sessions and a decrease in the mean MASI score, further supporting the effectiveness of IPL in melasma treatment.<sup>13</sup>

In the current study, the results revealed that 5.8% of participants showed a fair response, 47% showed a good response, 35.4% had a very good response, and 11.76% showed an excellent response to IPL treatment for melasma. This aligns with the findings from a study conducted by Giovanni Zoccali in Italy. In Zoccali's study, which included 38 melasma patients followed up for a year, excellent results were observed in 47.37% of the patients, good results in 28.95%, moderate results in 13.16%, and poor results in 10.52% of the cases. Both studies concluded that IPL is an effective tool in the treatment of melasma.<sup>14</sup>

Myong et al focused on Korean individuals with

melasma and examined the effects of weekly IPL treatment for six weeks. The participants were randomly assigned to two groups and received IPL treatment at different fluences. Objective measurements of melanin and erythema indices were obtained using a spectrophotometer at baseline, weekly during treatment, and three weeks after the final treatment.<sup>15</sup> Another study by Se Young et al in Korea used a combination of IPL and QS Nd:YAG laser for treating melasma patients. The authors of the study hypothesized that sustaining the notable and speedy improvement achieved through IPL irradiation could be further enhanced by incorporating multiple sessions of QS Nd:YAG laser treatment. Percentage reduction in mMASI score at the end was noted to be 59.35%.<sup>9</sup> These studies further support our results as the percentage improvement in our participants was 47.9%.

A meta-analysis conducted by Jiarong Yi in 2020 demonstrated that IPL-based combination therapy is an effective approach for treating melasma patients, resulting in high patient satisfaction scores.<sup>16</sup> In a randomized controlled trial conducted by Shakeeb et al (Pakistan, 2018), it was found that combining a triple combination cream with IPL treatment was more effective than either treatment alone for melasma. The study included three groups: Group A received the triple combination cream, Group B received IPL treatment alone, and Group C received both IPL treatment and the triple combination cream. The results of the study showed that Group A, exhibited a 68.8% improvement in melasma. Group B, showed a 62.5% improvement. Remarkably, Group C, showed a significant 93.8% improvement in melasma. These findings suggest that combining the triple combination cream with IPL treatment can lead to superior outcomes in managing melasma compared to using either treatment alone.<sup>17</sup>

The side effects observed in my study were mild and transient, and they resolved after the application of ice packs. This finding is consistent with the study done by Se Young et al, who also reported similar results regarding the mild and short-lived nature of side effects associated with

IPL treatment.<sup>9</sup>

These studies collectively contribute to our understanding of IPL's effectiveness in treating melasma and highlight the potential benefits of combining IPL with other therapeutic modalities.

However, studies conducted in India in 2020 and Pakistan in 2014 provided contrasting results. In the Indian study, 26 patients were enrolled the mean MASI score before treatment was  $6.7 \pm 3.53$ , and after treatment, it was  $6.32 \pm 3.90$ . However, the improvement observed was not statistically significant ( $p$ -value=0.681).<sup>10</sup> On the other hand, the study conducted in Pakistan revealed that IPL was not effective for individuals with dark skin. The mean percentage drop in the MASI score was  $29.4 \pm 10.9$ , with only 4% of the patients experiencing a >50% decline in the MASI score.<sup>18</sup>

Small sample size and relatively short follow-up period of two weeks after the final IPL session are the limitations of this study. Longer-term follow-up would provide valuable insights into the durability of the treatment effects and the potential for melasma recurrence

## CONCLUSION

IPL is a valuable treatment option for melasma, offering significant improvements in pigmentation. However, further studies are required to explore optimal treatment protocols and better understand the factors influencing treatment outcomes in different populations.



Copyright© 04 July, 2023.

## REFERENCES

1. Sonthalia S, Sarkar R. **Etiopathogenesis of melasma.** 2021; 2(1):21-7.
2. Dabas G, Vinay K, Parsad D, Kumar A, Kumaran MS. **Psychological disturbances in patients with pigmentary disorders: A cross-sectional study.** J Eur Acad Dermatol Venereol 2020; 34(2):392-9.
3. Ba SR, Castro MB De, Dsc M, Vashi NA. **Melasma pathogenesis: A review of the latest research, pathological findings, and investigational therapies.** 2019; 25(10).

4. Gopichandani K, Arora P, Garga U, Bhardwaj M, Sharma N. **Hormonal profile of melasma in Indian females.** 2015; (January 2016).
5. Elbuluk OAON. **Melasma : An up-to-date comprehensive review.** *Dermatol Ther (Heidelb)*. 2017; 7(3):305-18.
6. Küçük ÖSU. **Current treatment approaches for melasma.** 2018; 54-62.
7. Husain Z, Alster TS. **The role of lasers and intense pulsed light technology in dermatology.** *Clin Cosmet Investig Dermatol*. 2016 Feb 4; 9:29-40. doi: 10.2147/CCID.S69106. PMID: 26893574; PMCID: PMC4745852.
8. Ash C, Dubec M, Donne K, Bashford T. **Effect of wavelength and beam width on penetration in light-tissue interaction using computational methods.** *Lasers Med Sci*. 2017 Nov; 32(8):1909-1918. doi: 10.1007/s10103-017-2317-4. Epub 2017 Sep 12. PMID: 28900751; PMCID: PMC5653719.
9. Na SY, Cho S, Lee JH. **Intense pulsed light and low-fluence Q-switched Nd: YAG laser treatment in melasma patients.** *Annals of dermatology*. 2012 Aug 1; 24(3):267-73.
10. Choudhary N, De A, Sil A, Chatterjee G. **Evaluation of efficacy and safety profile of intense pulsed light treatment in melasma in darker skin type.** *Serbian Journal of Dermatology and Venereology*. 2020; 12(1):3-8.
11. Tamega AD, Miot LD, Bonfietti C, Gige TC, Marques ME, Miot HA. **Clinical patterns and epidemiological characteristics of facial melasma in Brazilian women.** *Journal of the European Academy of Dermatology and Venereology*. 2013 Feb; 27(2):151-6.
12. Hassan AM, Elfar NN, Rizk OM, Eissa NY. **Pulsed dye laser versus intense pulsed light in melasma: A split-face comparative study.** *Journal of Dermatological Treatment*. 2018 Oct 3; 29(7):725-32.
13. Ilgen Ertam Sagduyu, Fatmagul Dirican, Ayda Acar & Idil Unal. **Efficacy of intense pulsed light therapy for melasma.** *Journal of Cosmetic and Laser Therapy*. 2019; 21:7-8, 378-381, DOI: 10.1080/14764172.2019.1661492
14. Zoccali G, Piccolo D, Allegra P, Giuliani M. **Melasma treated with intense pulsed light.** *Aesthetic plastic surgery*. 2010 Aug; 34:486-93.
15. Bae MI, Park JM, Jeong KH, Lee MH, Shin MK. **Effectiveness of low-fluence and short-pulse intense pulsed light in the treatment of melasma: A randomized study.** *Journal of Cosmetic and Laser Therapy*. 2015 Nov 2; 17(6):292-5.
16. Yi, J., Hong, T., Zeng, H. et al. **A meta-analysis-based assessment of intense pulsed light for treatment of melasma.** *Aesth Plast Surg*. 2020; 44, 947-952. <https://doi.org/10.1007/s00266-020-01637-x>
17. Shakeeb N, Noor SM, Ullah G, Paracha MM. **Efficacy of intense pulse light therapy and tripple combination cream versus intense pulse light therapy and tripple combination cream alone in epidermal melasma treatment.** *Journal of the College of Physicians and Surgeons Pakistan*. 2018 Jan 1; 28(1):13-7.
18. Saeed W, Altaf F, Khurshid K, Rani Z, Pal SS. **Efficacy of intense pulsed light in melasma.** *Journal of Pakistan Association of Dermatologists*. 2014; 24(3):212-6.

### AUTHORSHIP AND CONTRIBUTION DECLARATION

No.	Author(s) Full Name	Contribution to the paper	Author(s) Signature
1	Aqsa Naheed	Concept of study, Data collection, Manuscript writing, Analysis and Discussion.	
2	Hamna Siddiqi	Data collection, Manuscript writing.	
3	Hasnain Ahmad	Data collection, Manuscript writing.	