

Intense Pulsed Light and Red Light Photo Rejuvenation for Skin Rejuvenation: A Split Face Clinical Trial

Hamideh Moravvej¹, Mohammad Saeedi²

¹Laser Application in Medical Sciences Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran

²Skin Research Center, Department of Dermatology, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Abstract:

Introduction: Intense pulsed light (IPL) has long been used for skin rejuvenation. Photo rejuvenation with red light (with or without photo sensitizer) is a newer noninvasive way for this purpose; but, until now few comparative studies between these modalities have been performed. The aim of this study was to compare efficacy, adverse effects, and compliance of intense pulsed light rejuvenation and red light photo rejuvenation in a homogeneous group of women.

Methods: In this clinical trial, ten female volunteers with Fitzpatrick skin types I, II, and III were enrolled. Patients underwent 6 sessions of IPL rejuvenation at 4-week intervals on one side, and 30 photo rejuvenation sessions (twice a week) with red light on the other side of their face. Improvement of the skin texture and reduction in the wrinkles were determined in two ways. Firstly, by comparing the photographs, and secondly, by measuring the skin elasticity with Reviscometer MPA 9 system, before and after the procedure.

Results: Both treatments were associated with improvement in the skin texture and wrinkle depth, but red light was more effective on the nasolabial fold and IPL was more effective on the fine wrinkles.

Conclusions: Red light photo rejuvenation without the use of photosensitizer can be a new, effective and safe procedure for rejuvenation.

Keywords: IPL; Red Light; Rejuvenation

Please cite this article as follows:

Moravvej H, saeedi M. Intense Pulsed Light and Red Light Photo Rejuvenation for Skin Rejuvenation; A Split Face Clinical Trial. J Lasers Med Sci.2011;2(2):63-6

***Corresponding Author:** Hamideh Moravvej M.D; Associate Professor of Dermatology, Laser Application in Medical Sciences Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran. Tel: +98-21-22749221; Email:hamideh_moravvej@yahoo.com.

Introduction

Facial skin rejuvenation remains a hot topic and a very popular elective procedure in cosmetic dermatology. Various types of interventions have been introduced till now and each one has been associated with a different success rate. Intense pulsed light (IPL) has long been used for skin rejuvenation. It has a broad wavelength spectrum (515–1200 nm). Unlike lasers, IPL systems are

flash Lamps with non-coherent light (1). Traditional IPL sources have the “V-shaped” energy peak of pulses that could increase the risk of skin burning and post-inflammatory hyper- pigmentation (PIH). New generations of IPL use a higher technology that emits homogenous ‘squared off’ pulses, and makes the device more controllable and safer, especially suitable for darker skins (2).the effect of IPL on skin texture seems to be due to heating the collagen within the dermis or selective

absorption of light in hemoglobin or tissue water, leading to the formation of a dermal repair zone and subsequent collagen synthesis (1, 3).

On the other hand, photo rejuvenation with visible light is recently introduced as an effective method for face rejuvenation. Visible light has several superiorities to other modalities. First, it has a non-significant adverse effect, and is completely safe for the eyes. It does not associate with vaporization or burning of the tissue, and therefore, no pain, inflammation, or erythema will develop. It is also usable for all skin types, and does not stimulate PIH.

Red light is especially important for this purpose, because its effect on the dermal fibroblasts is stronger than other wavelengths of visible light, and can penetrate deeper in the skin (4, 5).

The aim of this study was to compare the efficacy, compliance, and adverse effects of IPL and red light phototherapy for face rejuvenation.

Methods

This study included 10 healthy female (mean age; 54.2 years) with Fitzpatrick photo skin types I–III. All patients suffered from various degrees of peri-oral and peri-orbital wrinkles and nasolabial fold.

Our exclusion criteria were pregnancy, age more than 70 years or less than 30 years, history of any photo-aggravating diseases, or use of any kind of photosensitizing drugs within the previous 2 weeks, history of epilepsy, use of oral isotretinoin within the last 6 months, diseases associated with koebner phenomena, any pre-cancerous lesion, skin malignancies or local infection, and use of topical retinoid and alpha-hydroxy acids within 3 months prior to the study.

Before treatment, the patients were thoroughly informed about the treatment and the possible side effects, and then each signed a detailed informed consent form.

Each patient underwent 6 sessions of IPL rejuvenation at 4 -week intervals on one side of the face, and 30 photo rejuvenation sessions (2 times a week) with red light on the other side.

We used “FPJ KE medical (Switzerland)” for IPL rejuvenation and “PDT Waldmann 1200” for red light photo rejuvenation. Before each IPL treatment, we used topical cream of EMLA on that side of face for local anesthesia. The initial

energy and pulsed duration of IPL were selected according to the patient’s skin type; the pulses were uniformly distributed without overlapping the area. Eye protection for both the patient and the doctor was used during the treatments. Immediately after the treatment, the area was cooled with cold packs. Patients were advised to avoid sun exposure and to use sunscreens during the treatment period. No special creams, topical antibiotics or steroid were used after the procedure.

For red light photo rejuvenation, we covered the other side of the face with a dark colored piece of cotton sheet. Then, we used the constant dose of 96 j/cm^2 in each session.

One month after the last session, the results were assessed. The improvement of skin texture and wrinkles was evaluated by an independent, blinded dermatologist based on close-up photography taken prior to the first treatment and one month after the last treatment. All treatment results were sorted into four categories: no effect (0), mild improvement (1), good improvement (2), and excellent improvement (3).

Evaluations were performed separately for each of the following parameters:

- 1) Reduction in nasolabial folds depth
- 2) Reduction in wrinkles in peri-orbital and peri-oral regions and forehead
- 3) Lifting and tightening of the skin

We also assessed the outcome using the reviscometer MPA9 system before and after the treatment. This device helped us to quantitatively evaluate the skin elasticity. This measurement is based on resonance running time of an acoustical shockwave, according to the mechanical properties of the skin, and the direction of collagen and elastin fibers. The probe head contains two sensors which are placed on the skin. The first emits one acoustical shockwave, the other serves as a receiver. Shockwaves propagate differently through the skin according to the state of the elastic fibers and the moisture content of the skin (6).

Result

The mean age of the patients was 54.2 years (SD: 6.89, range; 46-70 years). After comparison of the photos by a blinded dermatologist, these results were achieved: for nasolabial fold, improvement was seen in 8 patients (80%) of the IPL

side (30% mild improvement and 50% moderate improvement), and in all patients (100%) of the red light side (60% mild, 10% moderate, and 30% excellent improvement). For peri-oral and peri-orbital fine wrinkles, improvement was seen in 8 patients (80%) of the IPL side (60% mild, 10% moderate, and 10% excellent improvement) and 8 patients (80%) of the red light side (50% mild and 30% moderate improvement). Skin lift was seen in 7 patients (70%) of the IPL side (30% mild and 40% moderate improvement) and in 9 patients (90%) of the red light side (60% mild, 20% moderate, and 10% excellent improvement).

In quantitative measure (reviscometer), all patients showed some degrees of improvement, except one patient in the IPL side who showed 1.5% decrease. The average of reviscometer number in the IPL side before and after the treatment was 234.9 and 306.5, respectively (30% improvement, $p=0.007$). For red light side, these averages were 220.4 and 302.9 (37% improvement, $p=0.005$). Thus, both sides showed significant improvement after the treatment. But, this improvement was not significantly different between the two modalities ($p=0.9$).

We did not find any significant correlation between the improvement of reviscometer number with skin type and age, neither in the IPL side nor in the red light side.

There was no significant difference in treatment compliance between the IPL and red light treatments. No cases of major complications (scar, permanent hypo or hyper pigmentation) were seen, but severe erythema without blister formation and scar was seen in 2 patients (20%) in the IPL side. No complication with the red light treatment was seen.

Conclusion

Rejuvenation with IPL has been performed for more than a decade, and its efficacy has been proved in several studies. In our study, 80% of the patients showed some degrees of improvement. This is quite compatible with other studies of this type.

In 2008, Y H Li and his colleagues used IPL for rejuvenation in 152 Chinese women. They achieved good or excellent response in 89% of their patients (2). Hedelund et al performed a randomized controlled split face trial on skin texture and rhytids of 32 photo aged women by

3 intense pulsed light treatments with one-month intervals on one side, or no treatment on the other side. The skin texture was significantly different between the two sides of the face in 82% of them, but improvement was mild, or moderate in most of the patients and more difference was seen one month after the completion of the study. They did not find this difference for skin Rhytids (3).

For the first time, we used visible red light without photosensitizer for rejuvenation. Interestingly, the result was comparable to IPL and even more efficient than IPL for nasolabial fold and for tightening and lifting of the skin. This source of light was also very easy and safe for the patients and doctors. It associated with no pain or any important complication.

Although both treatments were effective in skin rejuvenation, but their effect was different. According to our results, IPL was more effective on the fine peri-oral and peri-orbital wrinkles, and red light was more effective on the nasolabial fold and skin lift.

The other advantage of our study was the use of Reviscometer for measuring the skin elasticity before and after the treatment. Therefore, we could evaluate the responses quantitatively in addition to comparing the photos.

Except a mild pain during the IPL therapy, both procedures were well tolerable.

Only two patients experienced severe erythema and burning sensation for several days in the IPL side. In the red light side, complication rate was quite ignorable.

In conclusion, use of the red light is an effective, safe, and easy way for rejuvenation, and its result is comparable with conventional procedures.

References

1. Fodor L, Carmi N, Fodor A, Ramon Y, Ullmann Y. Intense pulsed light for skin rejuvenation, hair removal, and vascular lesions: a patient satisfaction study and review of the literature. *Ann Plast Surg.* 2009 Apr;62(4):345-9. Review
2. Li YH, Wu Y, Chen JZ, Gao XH, Liu M, Shu CM, et al. Application of a new intense pulsed light device in the treatment of photoaging skin in Asian patients. *Dermatol Surg.* 2008 Nov;34(11):1459-64. Epub 2008 Sep 15.
3. Hedelund L, Due E, Bjerring P, Wulf HC, Haedersdal M. Skin Rejuvenation Using Intense Pulsed Light A Randomized Controlled Split-Face Trial With

Skin Rejuvenation:IPL Vs. Red Light Photo rejuvenation

- Blinded Response Evaluation. Arch Dermatol. 2006 Aug;142(8):985-90.
4. Trelles MA, Mordon S, Calderhead RG. Facial rejuvenation and light: our personal experience. Lasers Med Sci. 2007 Jun;22(2):93-9. Epub 2006 Nov 23.
5. Goldberg DJ. Photodynamic therapy in skin rejuvenation. Clin Dermat. 2008 Nov-Dec;26(6):608-13.
6. Ruvolo EC Jr, Stamatias GN, Kollias N. Skin Viscoelasticity Displays Site- and Age-Dependent Angular Anisotropy. Skin Pharmacol Physiol. 2007;20(6):313-21. Epub 2007 Sep 12.

