

Efficacy of Nd: YAG Laser in Comparison with Intense Pulsed Light (IPL) for Treatment of Unwanted Body Hair- Preliminary results of a Prospective Comparative Study

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Abstract

Background: Laser epilation is a standard method for permanent hair removal. Intense pulsed light is another accepted and comparable method for the same. The previous studies were in conclusive about the efficiency and mandates further research.

Aim: To study the efficacy of Nd: YAG laser in comparison with Intense Pulsed Light (IPL) for treatment of unwanted body hair.

Methods: The study was conducted from April 2014 to November 2015. This is a preliminary result of an ongoing thesis project. All patients between 6 to 60 years of age with unwanted hair who consented to participate in the study with Fitzpatrick skin types IV, V & VI. Patients who had previous laser to the same area, Gross hormonal dysfunction, Waxing, depilation, electrolysis or bleach use within six weeks, history of keloid scarring and pregnant patients were excluded. Twenty patients were included in the study, they were Randomized into 2 groups. Group 1- patients were treated with Nd:YAG Laser. Group 2- patients were treated with IPL. Parameters studied were: Hair Counts, Mean Hair Reduction, Pain Severity, patient satisfaction and complication rates.

Results: Total 20 patients were included in the study. Of which 19 were females and one was male. The mean age of the patients was 27. Based on skin

type, 19 patients were Fitzpatrick type-5 and one was type-6. After randomization 12 patients were selected into group-A and received Nd:YAG laser for hair removal and 8 patients were selected in to group-B and received IPL for hair removal. The mean fluence used for Nd:YAG was 24 and for IPL 4.3. Of the IPL group, 5 out of 8 patients and Nd:YAG, 9 out of 12 patients had mild burning sensation during the treatment. The mean patient satisfaction score during all 5 sections were 87.3 for Nd:YAG and 86 for the IPL group. The mean pain scores during the 5 treatment sections were 11 for Nd:YAG and 12 for IPL. One patient treated with IPL had hyperpigmentation post-treatment, which disappeared completely with conservative management in 3 weeks' time. The mean hair reduction was calculated as 40.23 % for Nd:YAG and 32.49 for IPL.

Conclusion: The mean hair reduction rates by Nd:YAG was relatively higher for Nd:YAG than IPL in our study. However, a study with large sample size is required for better analysis

Keywords: Nd: YAG; Intense Pulsed Light; Laser; Epilation.

Introduction

Unwanted hair is a common problem especially in females. There are various causes for unwanted hair including mainly hormonal disturbances. It is a major concern to the patient due to social and aesthetic reasons. Laser is one of the modalities of treatment of unwanted hair. Of various lasers used for this purpose, Nd:YAG Laser is the one most commonly and effectively used [1-3]. Intense Pulsed Light (IPL)

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is another light based method of hair removal, but different from laser [4,5].

Department of plastic surgery, JIPMER is fully equipped with different Lasers including Nd:YAG and IPL system. Both modalities are being used regularly for unwanted hair removal in Department of Plastic Surgery JIPMER for more than 3 years. But no comparative study has been done so far. So this study is being conducted to compare between Nd:YAG and IPL. Nd:YAG versus IPL has been compared in studies done before [6,7]. But there are no similar studies done in India, we are doing this study to compare Nd:YAG versus IPL in patients of unwanted hair. The FDA (Food and Drug Administration) has approved both Intense Pulsed Light and Nd:YAG laser systems for hair removal in darker skin phototypes.

Methodology

The present study is a Randomized Clinical Trial, conducted in department of Plastic Surgery JIPMER, Pondicherry from April 2014 to November 2015. This is a preliminary result of ongoing thesis project.

Inclusion Criteria

1. Patients with Fitzpatrick skin types IV, V & VI with unwanted hair.
2. All sites
3. Between 6 to 60 years of age
4. Patient is willing to participate in the study.

Exclusion Criteria

1. Previous laser to the same area
2. Gross hormonal dysfunction
3. Waxing, depilation, electrolysis or bleach use within six weeks.
4. History of keloid scarring
5. Pregnancy.

All patients attended the plastic surgery OPD for laser hair removal in the described period of study. Twenty patients were included in the study, They were Randomized into 2 groups. Group 1- patients were treated with Nd:YAG Laser. Group 2- patients were treated with IPL.

Parameters studied

1. Hair Counts

2. Mean Hair Reduction
3. Pain Severity Assessment
4. Study of safety parameters.

Brief Procedure

Patient details were recorded in the standard proforma. The patients who are participating in the study were grouped into group-1 (Nd:YAG Laser) and Group-2 (IPL) randomly using computerised randomisation. The DEKA Synchro HP System used for our patients have both Nd:YAG and IPL Systems integrated in the same machine.

Long-pulse Nd:YAG laser system have an output wavelength of 1064 nm through an Nd:YAG source; the parameters were 30–40 ms pulse duration, 20-30 J/cm² fluence, and a 7-mm spot size (round spot). The doses used were according to the standard protocol. The IPL used was having following specifications: Xenon Lamp source with an output wavelength range of 650–950 nm, 25–45 ms pulse duration, 3.5–4.5 J cm⁻² fluence, and a 4.6 cm² spot size (rectangular spot). We have used icepacks for pre-cooling and Zimmer cryonon-contact cooling system and for Cooling during treatment. The doses were according to standard protocol.

On the first visit patient was given a test dose laser behind the ear on the dermal crease according to patient preference. The optimum dose was decided and next visit was scheduled after 3 days. Each patient had undergone 5 sessions with an interval of 4 weeks in between. Hair counting was performed using digital clinical photographs of the sites before 1st treatment session and 2 months after completion of 5 treatment sessions. Mean hair reduction was calculated. Patient satisfaction was recorded on a linear analogue scale (LAS). Pain severity was assessed by VAS after each treatment session. Study of safety parameters by clinical recording of side effects like itching, burning, bullae, scarring & pigmentation changes.

Results

Total 20 patients were included in the study. Of which 19 were females and one was male. The mean age of the patients was 27. Based on skin type, 19 patients were Fitzpatrick type-5 and one was type-6. After randomization 12 patients were selected into group-A and received Nd:YAG laser for hair removal and 8 patients were selected into group-B and received IPL for hair removal. The mean fluence used for Nd:YAG was 24 and for IPL 4.3. Of the IPL group, 5 out of 8 patients and Nd:YAG, 9 out of 12 patients

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treatment, which disappeared completely with conservative management in 3 weeks' time. The mean hair reduction was calculated as 40.23 % for Nd:YAG and 32.49 for IPL. Mean hair reductions of the two groups are plotted in Chart 1.

Discussion

After its introduction in 1990s, hair removal with laser has become a standard treatment modality of treatment for unwanted hairs. Of these the mainstay lasers used for hair removal purpose are Nd:YAG, Alexandrite, Ruby and also IPL. The laser hair removal is mainly performed for unwanted hairs and not for medically excessive hair growth.

The main two types of hair on adult human skin are terminal and villushairs. The terminal hair usually will have more pigmentation and they have greater diameter. So most of the times patients who wants unwanted hair removal will be mainly concerned about terminal hairs. Also counting of the terminal hairs can be well performed using a photographic method.

Skin cooling methods are useful along with both lasers and IPL. This will act in two ways. One by minimizing the epidermal damage by absorption of epidermal melanin which can lead to pigmentation, scarring and blister formation. Therefore, it helps the surgeon to give higher flounces without side effects. The second advantage is by producing a local analgesia and which will in turn reduce the patient discomfort.

Results of previous studies shows some advantages of Nd:YAG over IPL in terms of relatively better patient satisfaction and better hair reduction but results needing further validation. Even with these problems IPL is preferred over Nd:YAG in situations where the area for hair removal is wide especially for trunks and extremities. IPL is versatile with it's very large spot size (120-600mm²) and ability to split the total pulse duration into multiple pulses when higher flounces are required.

Ismail SA concluded from his prospective study that dark skin can be treated by both systems safely and effectively; however, long-pulsed (1064 nm) Nd:YAG laser is more effective as reported by both subjects and clinician [6]. Goh CL concluded from his study the long pulse width 1064 nm Nd:YAG laser would be expected to produce sufficient follicular injury with less epidermal damage in patients with darker skin type compared to shorter wavelength laser and IPL [7]. Rachna Mittal et al



Fig. 1a: The DEKA Synchro HP System **b.** Zimmer cryo cooling machine



Fig. 2a: Settings for Nd:YAG laser **b.** Settings for IPL



Fig. 3a: Pre op & **b.** Post op photograph of treatment area

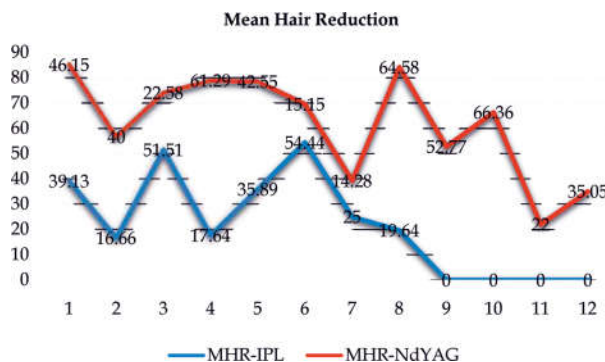


Chart 1: The distribution of mean hair reduction in both Nd:YAG and IPL groups

found from their study that six multiple laser treatment sessions with a long-pulsed, 1064 nm Nd: YAG laser with contact cooling were found to be safe and effective for hair reduction in Indian patients with both terminal and intermediate hair [2]. Breadon JY et al concluded from their study that, to reduce epidermal melanin absorption of energy longer wavelengths are considered safer for use on Fitzpatrick skin types IV to VI [8].

Post treatment we observed even there tained hairs were having lesser thickness and diameter compared to the pre-treatmet terminal hairs. Since we were using the digital counting method we have included those thinner ones also in the count. This may attribute to the relatively lower values for hair reduction rates compared to some of the older results. We have given the safe lower dose to all the patients after an initial test dose and minimized the complication rates. This has definitely helped us to have a better patient satisfaction scores. The patients are under follow up and scheduled for booster doses in future as required.

Conclusion

Both Nd:YAG and IPL are effective lasers for hair removal with comparable patient satisfaction scores and pain scoring. Hyperpigmentation is more common with IPL than Nd:YAG Laser. Theme an hair reduction rates by Nd:YAG was relatively higher for Nd:YAG than IPL in our study. However, a study with large sample size is required for better analysis.

Conflicts of Interest

There are no conflicts of interest.

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