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A COMPARATIVE STUDY OF DIODE LASER AND INTENSE PULSED LIGHT THERPAY IN FACIAL HAIR REDUCTION

Dermatology

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ABSTRACT

BACKGROUND: The desire to effectively remove unwanted body hair is a trend that continues to become more prevalent in our society, and photo epilation by laser or other light based technology is one of the fastest-growing procedures in cosmetic dermatology. There are many methods that temporarily treat unwanted hair, including: bleaching, plucking, shaving, waxing, and they may produce unwanted side effects such as irritation and infection of the skin. While there are various modalities for the removal of unwanted hair, with recent advances in technology Lasers have become the main stay. But the choice of right laser for the right skin type is very important. Before starting with laser therapy, it is important to assess the skin type, the fluence, the pulse duration and the type of the laser to be used. **OBJECTIVES:** To study the efficacy and side effects of Diode laser versus IPL in treatment of unwanted facial hair removal in females **METHODS:** Hospital-based, prospective study. A total of 60 patients diagnosed with Hirsutism or Hypertrichosis attending the Department of Dermatology, Venereology, and Leprology at Chigateri General Hospital and Bapuji Hospital, attached to J.J.M. Medical College, Davangere, over a period of 2 years were enrolled. Detailed clinical history was collected, and cutaneous and systemic examination was done. Relevant investigations were done. Patients were counselled about the procedure and randomly allocated into group A and group B and they were treated with 6 sessions of Diode Laser and Intense pulsed light therapy respectively. A 4-week interval was given between each session. The therapeutic response to treatment was assessed at each follow-up visit and then the final assessment was conducted 6 months after the last treatment by means of hair counts using close-up photographs. The overall satisfaction of the patient with any adverse effects was noted. **RESULTS:** At the time of the final assessment, an excellent response was observed in group A patients while group B patients showed an average to good response. The number of terminal hairs was significantly reduced in both groups. The number of hair shafts was significantly reduced with the diode laser and IPL. Mean hair count reduction achieved by the diode laser group 89.69% and 77.64 % in the IPL group by the end of the study indicating that for both long term and short-term hair reduction diode laser is better. Intense pulsed light therapy induced significantly more pain when compared to diode laser. Overall side effects were more with Diode laser. No severe side effects were observed for either therapy. **CONCLUSION:** Both Diode laser and IPL treatments are highly effective, long-lasting, and safe. Diode laser, was observed to be more effective than Intense pulse light therapy in unwanted facial hair removal.

KEYWORDS

INTRODUCTION :

The desire to effectively remove unwanted body hair is a trend that continues to become more prevalent in our society, and photo epilation by laser or other light-based technology is one of the fastest growing procedures in cosmetic dermatology. Excess hair growth ranges in severity and may present as Hypertrichosis or Hirsutism [1, 2]. Hirsutism refers to abnormal hair growth in women in androgen dependent sites while hypertrichosis is excess hair growth in any body site. [3].

There are many methods that temporarily treat unwanted hair, including: bleaching, plucking, shaving, waxing, and they may produce unwanted side effects such as irritation and infection of the skin. [4]

Electrolysis offers a more permanent hair removal by inserting a fine needle deeply into the hair follicle and using electricity to destroy the follicle, but is monotonous and the efficacy in achieving permanent hair removal is variable. Tolerance is variable among patients. Side effects of these methods vary significantly and are operator dependent. [5]

While there are various modalities for the removal of unwanted hair, with recent advances in technology Lasers have become the main stay. But the choice of right laser for the right skin type is very important. Before starting with laser therapy, it is important to assess the skin type, the fluency, the pulse duration and the type of the laser to be used [6, 7] [3].

There is no 100% guaranteed permanent hair removal method available till date. Permanent hair removal is defined as 'long term, stable reduction in the number of hairs regrowing after a treatment regime' by the United States FDA. This may include multiple sessions.

LASER or Light Amplified by Stimulated Emission of Radiation for hair removal works on the basic principle of Selective Photo thermolysis. This method is site specific and causes thermal injury of tissue targets by selectively absorbed pulses of radiation.[3] After a given treatment , there is a significant reduction in the number of terminal hair.

The Diode Laser has a long wavelength that allows light to penetrate deeper, gives better fluence and causes less epidermal damage. Diode lasers are very safe with dark skin type. While the treatment of Intense Pulsed Light (IPL) is the high intensity pulses of the noncoherent light in a range of 5901200nm. IPL works on the same principle as lasers but uses polychromatic noncoherent light. The depth of entry can be changed and large areas can be covered in the IPL.[3]

MATERIAL AND METHODS

Type of study: Prospective cross-sectional study

Source of data: Patients attending the outpatient department of the Department of Dermatology of Chigateri Government Hospital and Bapuji Hospital attached to JJM Medical college, Davanagere

Duration of study: October 2020 to October 2022

Study design and method of collection of data:

The study was initiated after obtaining approval from Institutional Scientific Committee and the Institutional Ethical Committee. A pre-formed written consent form was taken from all patients before the start of the study. The sample size was a minimum of 60 patients that fulfilled the inclusion and exclusion criteria.

Method of collection of data

After obtaining ethical committee approval, a prospective cross sectional study was conducted from October 2020 to October 2022 on patients who are diagnosed with hirsutism or hypertrichosis and were willing to get Diode laser hair reduction or IPL therapy who attend the Dermatology department in Bapuji hospital and Chigateri hospital. Prior to the procedure, written and informed consent was obtained.

A detailed history was elicited, thorough physical examination and

details about any previous treatments taken was conducted according to pre-structured proforma.

After application of inclusion and exclusion criteria, the patient underwent the procedure with clinical pictures taken before and after treatment.

Sample Size: 60 patients ; 30 for Diode laser hair reduction and 30 for Intense Pulsed Light therapy.

INCLUSION CRITERIA

- Females presenting to our department with unwanted/excessive facial hair who were willing and consenting to undergo the procedure.
- Females who have attained puberty.

EXCLUSION CRITERIA

- Any history of keloid scarring
- Pregnancy
- Immunocompromised patients
- Vitiligo
- Photosensitivity

The data collected was analyzed by appropriate statistical tests and analyzed through SPSS 23 software.

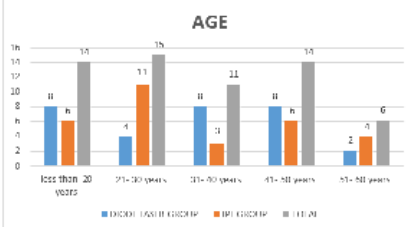
PROCEDURE:

- 60 patients who were diagnosed with Hirsutism or Hypertrichosis were included in the study and randomly allocated into 2 groups- 30 people who would undergo Diode laser Hair reduction and the remaining 30 would undergo IPL therapy
- Patient was comfortably positioned on the treatment table to allow for exposure of treatment area
- Pretreatment photographs were taken
- The area to be treated was shaved
- The skin was cleansed with non-alcohol wipe
- Topical anesthetic if necessary was applied for 45 minutes and then removed
- Any tattoo in the treatment area was covered
- Protective eye wear was used by everyone in the treatment room
- The pulse width and fluence were selected based on the patient's Fitzpatrick skin type, characteristic of hair, color of hair, hair density and coarseness
- Cooling gel was applied to the skin over treatment area
- The handpiece was held perpendicularly to the skin and the tip of the handpiece was placed firmly on the skin such that the entire tip was in contact with the skin
- Initially a single pulse was performed in the given area. The patient's tolerance was assessed and skin was observed for clinical endpoints. If no endpoints were observed, gradually the fluence was increased based on patient's tolerability till a desirable clinical endpoint was achieved.
- If the endpoints were undesirable such as severe erythema or edema, the treatment was discontinued and the skin was cooled using ice packs for 15 minutes.
- A towel wrapped over icepacks were used to cool the treatment area once the procedure was done
- Hydrocortisone cream was advised in patients who developed erythematous areas
- A broad-spectrum sunscreen was applied to sun exposed areas and the patient was asked to use sunscreens regularly and to avoid sun exposure
- The procedure was done at an interval of 4 weeks
- The patients were asked to come for follow up every 4 weeks and they were followed up to 6 months
- The hair reduction was assessed using clinical photographs and patient's satisfaction
- The diode laser machine used in our study had triple wavelength–755nm, 808nm and 1064nm.
- The pulse width was kept between 30- 50 milliseconds
- The fluence was between 15-40 joules/cm^2 and it was variable with each patient depending on patient's tolerability. In darker skin types, fluence was kept low to avoid post inflammatory hyperpigmentation since darker skins are more prone to

PIHRESULTS:

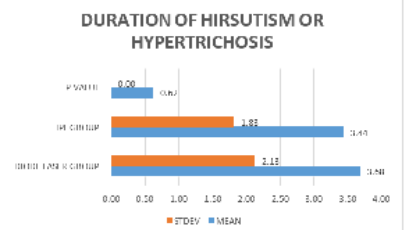
AGE GROUP OF PATIENTS

AGE	DIODE LASER GROUP	IPL GROUP	TOTAL	DIODE LASER GROUP	IPL GROUP	TOTAL
less than 20 years	8	6	14	26.67%	20.00%	23.33%
21- 30 years	4	11	15	13.33%	36.67%	25.00%
31- 40 years	8	3	11	26.67%	10.00%	18.33%
41- 50 years	8	6	14	26.67%	20.00%	23.33%
51- 60 years	2	4	6	6.67%	13.33%	10.00%
TOTAL	30	30	60	100.00%	100.00 %	100.00 %



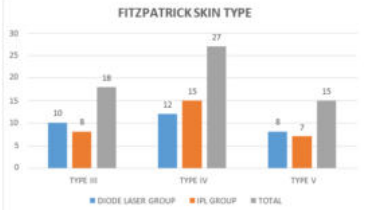
DURATION

The mean duration of disease in the study was 3.68 years SD + 2.13 years in diode laser group, 3.44 years SD +1.83 years in the IPL group , the P value was = 0.62 indicating no significant difference in the groups and hence the groups were comparable .



FITZPATRICK SKIN TYPE

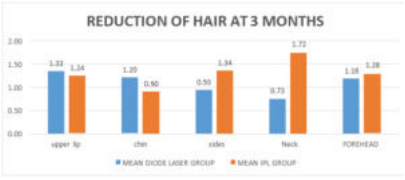
FITZPATRICK SKIN TYPE	DIODE LASER GROUP	IPL GROUP	TOTAL	DIODE LASER GROUP	IPL GROUP	TOTAL
TYPE III	10	8	18	33.33%	26.67%	30.00%
TYPE IV	12	15	27	40.00%	50.00%	45.00%
TYPE V	8	7	15	26.67%	23.33%	25.00%
TOTAL	30	30	60	100.00 %	100.00 %	100.00 %



REDUCTION OF HAIR AT 3 MONTHS

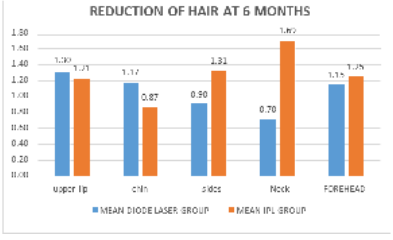
TABLE 13: REDUCTION OF HAIR AT 3 MONTHS

REDUCTION OF HAIR AT 3 MONTHS	UPPER LIP	CHIN	SIDES	NECK	FOREHEAD
MEAN DIODE LASER GROUP	1.33	1.20	0.93	0.73	1.18
MEAN IPL GROUP	1.24	0.90	1.34	1.72	1.28
STDEV DIODE LASER GROUP	0.55	0.66	0.69	0.78	0.23
STDEV IPL GROUP	1.03	1.26	1.03	1.09	0.68
P VALUE	0.00	0.01	0.12	0.03	0.01



REDUCTION OF HAIR AT 6 MONTHS

Reduction of hair at 6 months	upper lip	chin	sides	Neck	FOREHEAD
MEAN DIODE LASER GROUP	1.30	1.17	0.90	0.70	1.15
MEAN IPL GROUP	1.21	0.87	1.31	1.69	1.25
STDEV DIODE LASER GROUP	0.52	0.63	0.66	0.75	0.20
STDEV IPL GROUP	1.00	1.23	1.00	1.06	0.65
P VALUE	0.00	0.01	0.12	0.03	0.01



In our study mean hair count reduction achieved by the diode laser group was 79.09%% and the mean hair count reduction achieved by the IPL group was 73.72 % by 3 months and 89.69% in diode and 77.64 % in the IPL group, by the end of the study that is after 6 sessions.

PAIN DURING THE PROCEDURE

PAIN DURING THE PROCEDURE	DIODE LASER GROUP	IPL GROUP	TOTAL	DIODE LASER GROUP	IPL GROUP	TOTAL
yes	2	8	10	6.67%	26.67%	16.67 %
no	28	22	50	93.33%	73.33%	83.33 %

SIDE EFFECTS

SIDE EFFECTS	DIODE LASER GROUP	IPL GROUP	TOTAL	DIODE LASER GROUP	IPL GROUP	TOTAL
Erythema	4	2	6	13.33%	6.67%	10.00%
Post-inflammatory hyperpigmentation	3	1	4	10.00%	3.33%	6.67%
blistering	0	1	1	0.00%	3.33%	1.67%

DISCUSSION:

Laser Hair Removal is a commonly used cosmetic procedure to remove unwanted hair. The principle behind Laser removal is Selective Photo thermolysis. (37, 38 , 41) The lasers are equipped with cooling sources like cryogen spray, contact cooling , and air cooling to prevent laser heating complications. The laser therapy mainly depends on the enumerable factors like hair color, skin color, the sensitivity of the skin, type of equipment used. Complications related to lasers are widespread and can be treated with minimal care.

In our study 23.33% belonged to the age group 41- 50 years, 18.33% belonged to the age group 31- 40 years , 25.00% belonged to the age group 21- 30 years , overall 23.33%belonged to the age group less than 20 years .

In the present study, 33.33% in diode laser group , 26.67% in the IPL group 30.00% and overall belonged to Fitzpatrick Skin Type III , 40.00% in diode laser group , 50.00% in the IPL group 45.00% and overall belonged to Fitzpatrick Skin Type IV , 26.67% in diode laser group , 23.33% in the IPL group 25.00% and overall belonged to Skin Type V . the p value was = 0.84 indicating no significant difference in the groups and hence the groups were comparable.

In our study mean hair count reduction achieved by the diode laser was 79.09 % and mean hair count reduction achieved by the IPL was 73.72% after the third setting 89.69% in diode and 77.64 % in the IPL group by the end of the study.

In the present study also we noted that the a adverse effects such as erythema , hyper pigmentation , and blistering appeared on patients treated with diode laser more than those treated with IPL.

CONCLUSION

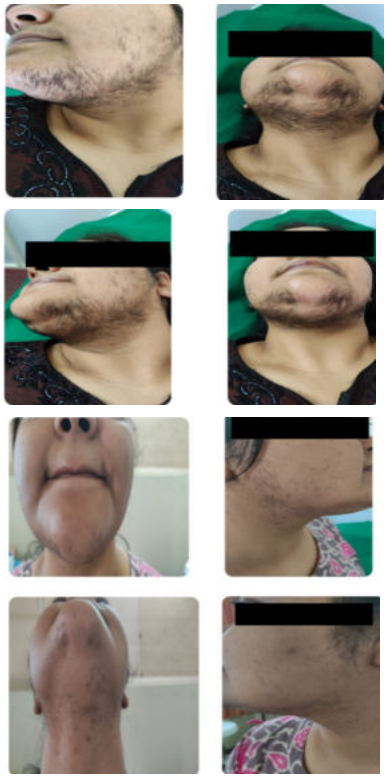
Both diode laser and IPL were effective in hair reduction, hair density , hair diameter , and prolongation of the time of hair regrowth. More pain was observed during the treatment with IPL than with laser. While post treatment side effects such as erythema, hyperpigmentation , and blistering appeared on patients treated with laser more than those treated with IPL. The use of lasers/light-based technology in the treatment of unwanted hair has become common. The acceptance of photo epilation by both physicians and patients is a direct reflection of the high degree of efficacy , few side effects , and few complications.

LIMITATION

The following were the limitations of the study

- Hospital based study
- No long term follow up
- The regrowth of hair was not evaluated .

Clinical photographs of patient in Group A (Diode Laser) before procedure



Clinical photographs of patient in Group A (Diode Laser) after 6 sessions of procedure

Clinical photographs of patient in Group B (Intense pulsed light therapy) before the procedure

Clinical photographs of patient in Group B (Intense pulsed light therapy) after 6 sessions of procedure

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