

<http://www.pjbs.org>

PJBS

ISSN 1028-8880

**Pakistan
Journal of Biological Sciences**

ANSI*net*

Asian Network for Scientific Information
308 Lasani Town, Sargodha Road, Faisalabad - Pakistan

Efficacy of Intense Pulsed Light in Hirsutism

¹E. Khodaeyani, ¹M. Amirnia, ¹S. Babaye-Nazhad, ²H. Alikhah and ¹B. Brufeh

¹Department of Dermatology, Sina Hospital, Tabriz University of Medical Sciences, Tabriz, Iran

²Medical Education Center, Tabriz University of Medical Sciences, Tabriz, Iran

Abstract: Unwanted hair growth presents a significant problem for many patients and considerable resources are spent to achieve a hair-free appearance. Our aim of this study was to further evaluate the efficacy of this method in hirsutism in our region. Sixty patients with idiopathic hirsutism presenting to Dermatology Clinics of Tabriz University of Medical Sciences from September 2007 to March 2009 were classified in three groups regarding the site of hirsutism (chin, face, or mustache). All patients underwent IPL-therapy every month for six sessions. The changes in number and diameter of regional hairs were recorded at the end of each session. The patients had the mean age of 25.50 ± 3.01 years (18-33 year). The disease was in chin in 26 cases (43.3%), face in 18 patients (30%) and mustache in 16 (26.7%). The skin type was III in 49 (81.7%) or IV in 11 (18.3%) patients. The positive therapeutic response after sixth session in total and in chin, face and mustache were 86.43, 88.66, 86.95 and 82.19%, respectively. The therapeutic response was not statistically significant in different body regions. The hair number in all treated regions was decrease significantly in each session in comparison with the first therapeutic session ($p < 0.05$). Also, the hair diameter at the end of last session was decreased significantly in comparison with the first session in all treated regions ($p < 0.05$). Regarding the high efficacy (86.42%) of IPL in treatment of facial hirsutism and absence of side effect, it is recommended as an effective treatment modality in hirsutism.

Key words: Hair removal, laser therapy, photodepilation, hypertrichosis, hyperandrogenism

INTRODUCTION

Unwanted hair growth remains a significant problem for many patients and considerable resources are spent for finding an effective and safe treatment modality in order to achieve a hair-free appearance (Serrano-Grau *et al.*, 2009; Marayiannis *et al.*, 2003; Haedersdal and Göttsche, 2006; Haedersdal and Wulf, 2006). Approximately 80% of women are affected by the presence of excessive hair growth which can cause embarrassment and result in a significant emotional burden and psychological problems such as anxiety, depression and a reduced quality of life (Cameron *et al.*, 2008; Shapiro and Lui, 2006; Dawber, 2005).

It is very important to determine the underlying causes. Although the most are ethnic or hereditary, one must rule out any signs of androgen excess, e.g., an increase in body hair, irregular menstrual cycles, acne, alopecia and seborrhea (Shapiro and Lui, 2006).

A variety of treatment methods are available, including plucking, waxing, depilatories, bleaching, shaving, electrolysis, laser, Intense Pulsed Light (IPL) and eflornithine cream (Marayiannis *et al.*, 2003; Cameron *et al.*, 2008; Shapiro and Lui, 2006; Dawber, 2005;

Haedersdal *et al.*, 2005). Epilation with laser devices and IPL are commonly used although the long-term effect is uncertain (Haedersdal and Göttsche, 2006). Different light sources were developed as the treatment of choice (Serrano-Grau *et al.*, 2009; Toosi *et al.*, 2006). Alexandrite laser, diode laser and IPL were clinically used for this purpose with long-term scarce comparative results (Toosi *et al.*, 2006). Photoepilation has become a very popular procedure in aesthetic and cosmetic practice (Marayiannis *et al.*, 2003). IPL devices are high-intensity pulsed sources, usually xenon arc lamps, emitting broad-wavelength polychromatic light between 550 and 1200 nm (Serrano-Grau *et al.*, 2009). In recent years, the use of broad spectrum white light sources has proved to be safe and efficacious in the removal of hair with minimal short- or long-term side effects (Omi and Clement, 2006). IPL technology has revolutionized the noninvasive treatment of a whole variety of cutaneous cosmetic problems. Today's machines are safer, more diverse, less painful and readily available. Newer, less powerful home-device IPL sources will not replace those used in a physician's office but will augment the use of today's more powerful medical office systems (Ciocon *et al.*, 2009).

Studies have claimed IPL to be beneficial in the reduction of the number and/or thickness of the unwanted hair, from terminal hair to vellus (Grippaudo *et al.*, 2009).

To date, we find only one published study about the efficacy of efficacy of IPL in unwanted hair removal in our country (Toosi *et al.*, 2006) and also few studies evaluating the IPL effect on the multiple locations on face. Our aim of this study was to further evaluate the efficacy of this method in hirsutism on chine, face and mustache in our region.

MATERIALS AND METHODS

This is an analytic study performed on patients with hirsutism presenting to Dermatology Clinics of Tabriz University of Medical Sciences from September 2007 to March 2009. Inclusion criteria were having idiopathic hirsutism in facial region. Exclusion criteria were secondary Hirsutism, having systemic disease.

A total of 60 patients were selected randomly and were classified in three groups regarding the site of hirsutism (chine, face, or mustache).

All patients underwent IPL-therapy every month for six sessions. All treatments were made by one expert dermatologist. The changes in number and diameter of regional hairs were evaluated and recorded at the end of each session.

The severity of hirsutism was determined according to the number of hairs in each region and classified as mild (5-20 hair), moderate (20-60 hair) and severe (>60 hair or involvement of all region). The skin type of patients was determined according the Fitzpatrick scale.

The study was approved by the Regional Ethics Committee. Patients signed informed consent before the operation.

The studied variables were age, site of involvement (chine, face, or mustache), severity of hirsutism, duration of disease, skin color, background disease, familial history and the results obtained in sessions 1-6 (the change in number and diameter of hairs).

The collected data were analyzed by SPSS-15 statistical software. The collected data were expressed as percentage and Mean±SD. Continuous (quantitative) variables were compared by student t-test or one-way ANOVA (Independent samples). Categorical (qualitative) variables were compared by contingency tables and chi-square test or fisher's exact test. p-value = 0.05 was considered statistically significant.

RESULTS

All of 60 studied patients with idiopathic hirsutism were classified in three groups according the site of involvement: group C (chine involvement), group F (face involvement) and group M (mustache involvement). The demographic and basic characteristics of patients are presented in Table 1.

Table 2 shows the percent of hair removal in various sessions. In group C, the number of hairs was decreased significantly in all sessions, except for 3rd session. In group F, the hair decrease was significant in all sessions. In group M, the significant hair decrease was seen in all sessions, except for 2nd session (Table 2). In comparison with the first session, the hair removal was significant at the last session in all groups (p<0.001).

Table 1: Demographic and basic characteristics of studied patients

Variable	Group C	Group F	Group M	Total	p-value
Number (%)	26 (43.3%)	18 (30%)	16 (26.7%)	60 (100%)	>0.05
Mean age (y)	25.46±3.68 (range: 21-31)	26.11±3.99 (range:18-30)	24.88±2.63 (range:19-29)	25.50±3.51 (range:18-33)	0.598
Disease duration	3.69±2.72y (range: 6 m-8 year)	3.42±2.62y (range:6 m-10 year)	4.31±2.87 year (range:1-10 year)	3.78±2.71 year (range:6 m-10 year)	0.624
Disease severity					
Mild	1 (3.8%)	1 (5.6%)	0 (0.0%)	2 (3.3%)	>0.05
Moderate	11 (42.3%)	4 (22.2%)	6 (37.5%)	21 (35%)	>0.05
Severe	14 (53.8%)	13 (72.2%)	10 (62.5%)	37 (61.7%)	>0.05
Familial history (+)	13 (50%)	11 (61.1%)	6 (37.5%)	30 (50%)	>0.05
Skin type					
III	22 (84.6%)	15 (83.3%)	12 (75%)	49 (81.7%)	>0.05
IV	4 (15.4%)	3 (16.7%)	4 (25%)	11 (18.3%)	>0.05

Table 2: The average change of hair number in therapy sessions

Session	Chine		Face		Mustache		Total (%)
	%	p-value	%	p-value	%	p-value	
1st	58.46±22.03	<0.001	63.33±15.34	<0.001	50.0±21.60	<0.001	57.67±20.45
2nd	63.08±21.50	<0.001	71.11±16.41	0.007	63.75±15.44	0.059	65.67±18.63
3rd	70.00±16.73	0.069	77.22±9.58	0.001	66.88±20.89	<0.001	71.33±16.52
4th	78.08±14.43	<0.001	77.22±18.09	<0.001	71.88±21.67	0.018	76.17±17.57
5th	81.15±15.83	<0.001	84.44±9.84	<0.001	80.00±22.80	<0.001	81.83±16.42
6th	89.62±10.38	<0.001	88.33±7.07	<0.001	85.31±21.72	<0.001	88.08±13.53

Table 3: The average change of hair diameter in therapy session

Session	Chine		Face		Mustache		Total (%)
	%	p-value	%	p-value	%	p-value	
1st	58.46±22.03	<0.001	63.33±15.34	<0.001	50.00±21.60	<0.001	57.67±20.45
2nd	59.62±20.49	0.449	64.44±15.04	0.013	62.50±15.28	0.726	61.83±17.51
3rd	65.77±19.01	0.047	76.11±8.50	0.001	61.25±19.96	<0.001	67.67±17.60
4th	74.62±13.03	0.001	75.00±18.23	<0.001	71.25±21.87	0.032	73.83±17.8
5th	79.23±15.47	<0.001	82.78±10.74	<0.001	76.88±24.42	<0.001	79.67±17.07
6th	87.69±11.42	<0.001	85.56±8.56	<0.001	79.06±22.38	<0.001	84.75±14.71

Table 4: The average decrease of hair number in different therapy sessions

Session	Chine		Face		Mustache		Total
	----- (%) -----						
1-2	4.62±12.40		7.78±16.29		13.75±17.46		8.00±15.27
1-3	11.54±21.67		13.89±12.43		16.88±16.21		13.67±17.75
2-3	6.92±19.34		6.11±12.43		3.13±17.02		5.67±16.71
1-4	19.62±20.10		13.89±22.53		21.88±14.24		18.50±19.47
2-4	15.00±18.38		6.11±20.33		8.13±15.59		10.50±18.45
3-4	8.08±10.59		0.00±18.47		5.0±5.16		4.83±12.82
1-5	22.69±26.16		21.11±19.97		30.0±18.26		24.17±22.42
2-5	18.08±25.30		13.33±21.14		16.25±15.44		16.17±21.56
3-5	11.15±13.06		7.22±14.06		13.13±8.73		10.50±12.41
4-5	3.08±12.25		7.22±22.18		8.13±8.34		5.67±15.11
1-6	31.15±22.86		25.00±17.90		35.31±16.88		30.42±20.05
2-6	26.54±22.97		17.22±19.04		21.56±15.68		22.42±20.16
3-6	19.62±14.55		11.11±11.32		18.44±7.69		16.75±12.48
4-6	11.54±13.47		11.11±18.75		13.44±6.51		11.92±13.78
5-6	8.46±11.56		3.89±10.37		5.31±6.18		6.25±10.07

Table 5: The average decrease of hair diameter in different therapy sessions

Session	Chine		Face		Mustache		Total
	----- (%) -----						
1-2	1.15±7.66		1.11±13.23		12.50±17.70		4.17±13.44
1-3	7.31±17.79		12.78±11.79		11.25±10.25		10.00±14.38
2-3	6.15±16.99		11.67±12.95		-1.25±14.55		5.83±15.76
1-4	16.15±20.80		11.67±21.21		21.25±15.00		16.17±19.58
2-4	15.00±19.03		10.56±20.43		8.75±16.28		12.00±18.67
3-4	8.85±15.83		-1.11±18.11		10.00±7.30		6.17±15.41
1-5	20.77±24.32		19.44±17.98		26.88±17.02		22.00±20.65
2-5	19.62±24.57		18.33±18.86		14.38±18.61		17.83±21.24
3-5	13.46±15.99		6.67±12.83		15.63±10.94		12.00±14.12
4-5	4.62±13.03		7.78±22.11		5.63±7.27		5.83±15.10
1-6	29.23±21.53		22.22±16.29		29.06±15.73		27.08±18.60
2-6	28.08±21.54		21.11±17.45		16.56±18.86		22.92±19.96
3-6	21.92±18.33		9.44±9.38		17.81±10.80		17.08±15.02
4-6	13.08±13.79		10.56±19.84		7.81±8.36		10.92±14.71
5-6	8.46±11.56		2.78±10.74		2.19±9.83		5.08±11.10

Table 3 shows the percent of decrease in hair diameter in various sessions. As showed in this table, the hair removal in total patients was significant ($p < 0.05$) except for second session in group C ($p = 0.449$) and group M ($p = 0.726$) in which the decrease in hair diameter was not statistically significant. Also, in comparison with first session, the hair removal in total patients was significant ($p < 0.001$ for all sessions and $p = 0.020$ for the second session).

Table 4 shows the change (decrease) in the number of facial hairs in various therapeutic sessions. Comparison of change in hair number between therapeutic sessions showed that the most decrease in all groups and also in total patients was happen between the sessions 1 and 6 ($p < 0.001$).

Table 5 shows the change (decrease) in the diameter of facial hairs in various therapeutic sessions. Comparison

of change in hair diameter between therapeutic sessions showed that the most decrease in all groups and also in total patients was happen between the sessions 1 and 6 ($p < 0.001$).

According the hairs number and diameter, the rate of response to therapy in three studied regions was not significantly different ($p > 0.05$). The difference of hair numbers in studied groups in sixth session ($p = 0.611$), hair diameters in studied groups in sixth session ($p = 0.176$), hair numbers in first session in comparison with sixth session ($p = 0.321$) and hair diameters in first session in comparison with sixth session ($p = 0.422$) were not statistically significant (Table 4, 5).

Also, the relation between skin type (III or IV) and the rate of response to therapy was not statistically significant ($p > 0.05$). The average decrease in hair numbers in patients with skin type of III was $87.24 \pm 14.62\%$ in

comparison with 91.82±9.03% in patients with skin type of IV ($p = 0.315$). The average decrease in hair diameters in patients with skin type of III was 84.39±15.73% in comparison with 86.36±9.24% in patients with skin type of IV ($p = 0.691$).

The difference of hair numbers in first session in comparison with sixth session was 30.31±21.42% in patients with skin type of III and 30.91±13.00% in patients with skin type of IV ($p = 0.929$, non-significant).

The difference of hair diameters in first session in comparison with sixth session was 27.45±19.64% in patients with skin type of III and 25.45±13.68% in patients with skin type of IV ($p = 0.751$, non-significant).

DISCUSSION

Hirsutism affects 5-10% of unselected women, depending on definition and ethnicity (Sanchez *et al.*, 2002). Female hirsutism is an embarrassing condition that threatens both a woman's perception of her femininity and her self-esteem (Watts, 2006). Hirsutism is defined as the excessive growth of thick dark hair in locations where hair growth in women usually is minimal or absent. Such male-pattern growth of terminal body hair usually occurs in androgen-sensitive locations, such as lips, chin, chest, areola, abdomen, back and femoral region (Stanczyk, 2006; Tekin *et al.*, 2004). The etiology and the age of the patient when hirsutism occurs vary widely. In hirsutism of gradual onset, hyperprolactinemia, insulin-resistance syndromes, hyperthecosis, polycystic ovary syndrome and idiopathic hirsutism may be responsible (Tekin *et al.*, 2004).

The use of light and laser for hair removal has evolved during the past decades (Sanchez *et al.*, 2002; El-Bedewi, 2004). Lasers useful in hair removal may be grouped into three categories based on the type of laser or light source each employs: 1) red light systems (694 nm ruby), 2) infrared light systems [alexandrite laser (755 nm), semiconductor diode laser (810 nm) and neodymium: yttrium-aluminium-garnet (Nd:YAG) (1064 nm)] and 3) Intense Pulsed Light (IPL) source (590-1200 nm) (Sanchez *et al.*, 2002; El-Bedewi, 2004). There is still an increasing demand for safer and more efficient hair removal techniques. The latest and most effective choice in the treatment of hair removal is non-coherent IPL, which is both efficient and safe method (El-Bedewi, 2004). Laser hair removal appears to be a useful adjuvant in the treatment of the hirsute patient (Sanchez *et al.*, 2002; El-Bedewi, 2004; Randall *et al.*, 2006). Lasers are useful for the removal of unwanted hair, using selective destruction of the hair follicle without damage to adjacent tissues (Sanchez *et al.*, 2002; Randall *et al.*, 2006).

The ruby laser, alexandrite laser and diode laser, as well as IPL are commonly used devices for hair laser removal. The long-pulsed Nd:YAG laser is the safest device for hair removal in dark-skinned patients because of its long wavelength, although the diode laser, alexandrite laser and IPL may be used (Wanner, 2005). Treatment with the ruby, alexandrite or diode lasers, or the use of IPL results in similar success rates, although these are somewhat lower for the Nd:YAG laser (Sanchez *et al.*, 2002).

The evidence from controlled clinical trials favors the use of lasers and light sources for removal of unwanted hair (Haedersdal and Wulf, 2006). IPL is not a real laser system because it delivers broad spectrum, non-coherent radiation with wavelength of 550-1200 nm (Sanchez *et al.*, 2002). For the safe and effective removal of unwanted hair, the key optical parameters are wavelength, pulse duration and energy density and can vary dependent upon skin and hair color (Omi and Clement, 2006). The specific light parameters (wavelength, pulse numbers and duration and energy fluence) are individualized by computer according to the skin type and hair color. Histological examination has revealed hair follicle atrophy following IPL (Sanchez *et al.*, 2002).

The method for laser and light assisted hair removal is based on the theory of selective photothermolysis. Selective absorption of hair chromophores from lasers and broad band light sources results in destruction of hair follicles without destroying the adjacent tissues (Sanchez *et al.*, 2002; Lask *et al.*, 1999). These systems are efficient and safe with proper patient selection. Multiple treatments are necessary due to the nature of the hair growth cycle (Lask *et al.*, 1999). Selective photothermolysis relies on the absorption of a brief radiation pulse by specific pigmented targets, which generates and confines the heat to that selected target (Sanchez *et al.*, 2002). The type of laser or IPL and their specific parameters must be adapted to the patient (hair thickness, pigment concentration, Fitzpatrick skin type) (Drosner and Adatto, 2005).

In our study, 81.7% of patients had the skin type III and 18.3% had skin type IV (according the Fitzpatrick skin typing). There was no significant difference between treatment results in both groups. In general, laser hair removal is most successful in patients with lighter skin colors and dark colored hairs (Sanchez *et al.*, 2002). The best candidates for photothermolysis are patients with lighter skin (Fitzpatrick type I-IV) and dark hairs. While successful hair removal with either laser or IPL has been reported in patients with Fitzpatrick skins type V and VI, it is clear that the incidence of complications such as burns, scarring and hypo- or hyperpigmentation increases with the degree of skin pigmentation hair

(skin types II-IV). Adverse effects are minimal and transient (Drosner and Adatto, 2005; Nahavandi *et al.*, 2008; Goh, 2003; Yaghmai *et al.*, 2004). The successfulness of IPL in our patients with skin type of III and IV is in support of its efficacy of these types of skins especially in this region (a Middle East country).

Individuals with dark skin and especially tanned patients, are at higher risk for pigmentary changes (Drosner and Adatto, 2005; Goh, 2003; Yaghmai *et al.*, 2004). In individuals with dark skin the high melanin concentration in the epidermis absorbs high energies that can lead to complications (Yaghmai *et al.*, 2004). Because the skin types of IV and more are less prevalent in our region and this can explain the high success rate for IPL in our study. Another factor that causes the IPL to be the most suitable method for hair removal in our region is the high prevalence of dark hairs. Also, in our study, the dark hairs respond better to IPL hair removal.

Although long-term hair removal in hirsute women remains a challenging issue (Schroeter *et al.*, 2004), Long-term hair removal has been claimed using IPL (Yaghmai *et al.*, 2004). In a study of 14 subjects treated with IPL and followed for >12 months after the last treatment, a mean of 83% hair reduction was achieved after two to six treatments (Sanchez *et al.*, 2002; Sadick *et al.*, 2000). Average rates of long-term hair reduction are reported at between 70 and 90% at 6 months follow-up (Drosner and Adatto, 2005). However, laser or IPL hair removal should not be considered 'permanent' owing to the long growth/rest cycle of normal human hair follicles (Haedersdal and Gotzsche, 2006; Sanchez *et al.*, 2002; El-Bedewi, 2004). Repeated therapies are necessary, although complete alopecia is rarely achieved and it is unclear at what point the maximum benefit is achieved from multiple therapies (Sanchez *et al.*, 2002; El-Bedewi, 2004). Several studies on hair removal with IPL and various laser sources have been done, but adequate data on long-term follow up are scarce (Nahavandi *et al.*, 2008).

Applications for IPL for hair removal are gaining favor among other methods, including lasers, because of its noninvasive nature, versatility regarding different skin and hair types, safety and ease of use (Fodor *et al.*, 2005). Toosi *et al.* (2006) compared the clinical efficacy, complications and long-term hair reduction of alexandrite laser, diode laser and IPL on 232 Iranian patients. The number of sessions to reach optimal result varied between 3 and 7. Six months after the last session, their findings indicated that all three light sources tested have similar effects on hair removal and in Iranian patients, using lower wavelengths minimizes the side effects (Toosi *et al.*, 2006). Bjerring *et al.* (2000) conducted a clinical study on 31 patients to compare the effectiveness of an IPL and ruby laser for hair removal. The patients were treated

3 times with a new IPL on one side of the chin and neck and with ruby laser on the other side. After 6 months, IPL was found to be 3.94 times more effective than the ruby laser for hair removal (Bjerring *et al.*, 2000).

El Bedewi treated 210 patients with skin type III-V for superfluous hair in different areas of the body (face, extremities, axillae, bikini line and back) for three to five sessions at 6-week intervals using IPL. There was a significant hair reduction of about 80% with no side effects and minimal complications. Follow-up was done 6 months after the last session (El-Bedewi, 2004). IPL is also a safe and reliable method to remove unwanted hair on skin grafts. It can be easily performed with a lower complication. Huo *et al.* (2008) treated 10 patients with hairy skin grafts with IPL for hair removal 3 to 5 times at intervals of 2 months. The hairs were removed completely after 3 to 5 treatments (Huo *et al.*, 2008).

The first published report of the use of IPL for hair removal was for the treatment of terminal beard hairs in two transsexual patients. Repeated treatments appear to improve outcome, although more than three treatments do not appear to increase the success rate (Sanchez *et al.*, 2002; Sadick *et al.*, 2000). Recently, IPL sources have been shown to provide long-term hair removal (Lee *et al.*, 2006; Schroeter *et al.*, 2003). IPL is an ideal hair-removal method because of the credible effect, simple operation, rapid treatment and no serious complications (Huo *et al.*, 2005).

In support of over mentioned studies, the hair removal of 86.42% achieved in our study following 6 sessions of treatment with significant loss in hair count and diameter, was an expected finding which further indicates the efficacy of IPL hair removal. Lee *et al.* (2006) used IPL for hair removal in 28 Korean women in the axillary area. Four treatments were carried out at intervals of 4 to 6 weeks. The unwanted hairs were wholly removed after 3-5 procedures. Follow-up for 8 months after the last treatment showed the average clearances of 52.8 to 83.4% (Lee *et al.*, 2006). Schroeter used IPL for unwanted hair removal in 25 male-to-female transsexual patients in Netherlands. Follow-up lasted an average of 44 months. They achieved a mean hair clearance rate of 90%. The average number of treatments per patient was nine. (Schroeter *et al.*, 2003). Fodor *et al.* (2005), studied the use of IPL for hair removal on 80 patients. Although permanent hair removal could not be guaranteed, based on patient satisfaction rate, they recommend using IPL for hair removal (Fodor *et al.*, 2005).

One study evaluated the efficacy of four popular systems for laser hair removal: 1) IPL with a red filter; 2) IPL with a yellow filter; 3) diode laser and 4) alexandrite laser. Evaluation at 1, 3 and 6 months revealed a significant decrease in hair counts (approximately 50%) and hair coverage (approximately 55%). Treatment with

IPL caused less pain, with efficacy similar to laser systems (Amin and Goldberg, 2006). Marayiannis *et al.* (2003) compared LP-Alex, SP-Alex or IPL for hair removal in 389 patients (skin types II-V), in Greece. There was not any significant difference between the LP-, SP-Alex and IPL with regard to efficacy. Transient side effects were highest with the LP-Alex and least with the IPL (Marayiannis *et al.*, 2003).

Although laser and IPL are very popular because of their non-invasive nature and the speed at which they operate, practitioners and patients have to be cautious to avoid permanent side effects instead of permanent hair reduction (Drosner and Adatto, 2005). Schroeter *et al.* (2003) studied 70 female hirsute patients in the Department of Laser Therapy at the Netherlands. They were subjected to a mean of 8 treatments followed for a mean period of 27.3 months. Using the IPL, 87% hair removal was achieved. Minimal side effects occurred in 10% of the patients. They concluded that IPL is effective in achieving long-term hair removal (Schroeter *et al.*, 2004). Paradoxical hypertrichosis and terminal hair change is a common complication of IPL photoepilation. The other more commonly seen complications were epidermal burning with blisters, erosion and crust formation followed by post-inflammatory hypo- and/or hyperpigmentation (Radmanesh, 2009). Huo *et al.* (2005) used IPL for unwanted hair removal in 341 Chinese patients. The treatment took 3-5 procedures, with an interval of over 2 months. There were blister in 3 cases and infection in 1 case. No pigmentation and scarring happened. Following-up of 3-6 months showed steady results with less regeneration of very thin and soft hair (Huo *et al.*, 2005). Burning and its sequellae, leukotrichia, paradoxical hypertrichosis and folliculitis are four major side effects of IPL hair removal therapy (Radmanesh *et al.*, 2008). However, we found not any significant side effect in our study. This may be due the especial regional distribution of women hairs. So that, the skin types of IV and X are less prevalent and the dark hairs are more prevalent in our region, as indicated in our study.

As compatible with the previous findings (Cameron *et al.*, 2008; Schroeter *et al.*, 2004) our study showed that the number of treatments correlated with the amount of hair lost; so that, the best results were achieved at the last (6th) session.

Lasers and IPL are now used worldwide for prolonged photoepilation (Radmanesh *et al.*, 2008). A review of literature in 2008 showed that the patients underwent laser or IPL photoepilation, were treated every 4-6 weeks and for eight sessions or more and all patients were followed for up to 20 months (Radmanesh *et al.*, 2008).

CONCLUSIONS

IPL is a safe and efficient modality for removing waste facial hairs of Iranian women with type 3 or 4 skin type. The fair skin with dark hairs is the best candidate for IPL-therapy for hair removal in hirsutism. We obtained the best results in end of the sixth session. Regarding the high efficacy (86.42%) of IPL in treatment of facial hirsutism and absence of side effect, it is recommended as an effective treatment modality in hirsutism.

REFERENCES

- Amin, S.P. and D.J. Goldberg, 2006. Clinical comparison of four hair removal lasers and light sources. *J. Cosmetic Laser Ther.*, 8: 65-68.
- Bjerring, P., M. Cramers, H. Egekvist, K. Christiansen and A. Troilius, 2000. Hair reduction using a new intense pulsed light irradiator and a normal mode ruby laser. *J. Cosmetics Laser Ther.*, 2: 63-71.
- Cameron, H., S.H. Ibbotson, R.S. Dawe, J. Ferguson and H. Moseley, 2008. Within-patient right-left blinded comparison of diode (810 nm) laser therapy and intense pulsed light therapy for hair removal. *Lasers Med. Sci.*, 23: 393-397.
- Ciocon, D.H., A. Boker and D.J. Goldberg, 2009. Intense pulsed light: What works, what's new, what's next. *Facial Plastic Surg.*, 25: 290-300.
- Dawber, R.P., 2005. Guidance for the management of hirsutism. *Curr. Med. Res. Opin.*, 21: 1227-1234.
- Drosner, M. and M. Adatto, 2005. Photo-epilation: guidelines for care from the European Society for Laser Dermatology (ESLD). *J. Cosmetics Laser Ther.*, 7: 33-38.
- El-Bedewi, A.F., 2004. Hair removal with intense pulsed light. *Lasers Med. Sci.*, 19: 48-51.
- Fodor, L., M. Menachem, Y. Ramon, O. Shoshani, Y. Rissin and L. Eldor, 2005. Hair removal using intense pulsed light (EpiLight): Patient satisfaction, our experience and literature review. *Ann. Plastic Surg.*, 54: 8-14.
- Goh, C.L., 2003. Comparative study on a single treatment response to long pulse Nd:YAG lasers and intense pulse light therapy for hair removal on skin type IV to VI--is longer wavelengths lasers preferred over shorter wavelengths lights for assisted hair removal. *J. Dermatolog Treat.*, 14: 243-247.
- Grippaudo, F.R., M. Angelini, M.R. Chiossi and V. Toscano, 2009. Intense pulsed light photoepilation in hirsute women: The role of obesity. *Lasers Med. Sci.*, 24: 415-418.

- Haedersdal, M., H.B. Lomholt, P. Bjerring, H. Egekvist and J. Esmann, 2005. Free versus non-free treatments with laser and intense pulsed light in dermatology: distinguishing medical laser treatments to be provided free of charge from cosmetic self-payment treatments. *Ugeskr Laeger.*, 24: 167-167.
- Haedersdal, M. and H.C. Wulf, 2006. Evidence-based review of hair removal using lasers and light sources. *J. Eur. Acad. Dermatol. Venereol.*, 20: 9-20.
- Haedersdal, M. and P.C. Göttsche, 2006. Laser and photoepilation for unwanted hair growth. *Cochrane Database Syst. Rev.*, 18: CD004684-CD004684.
- Huo, M.H., G.Z. Chen and L.Y. Yao, 2005. Hair removal with intense pulsed light. *Zhonghua Zheng Xing Wai Ke Za Zhi*, 21: 288-290.
- Huo, M.H., L.Y. Yao and G.Z. Chen, 2008. Hair removal with intense pulsed light (IPL) for hairy skin grafts. *Zhonghua Zheng Xing Wai Ke Za Zhi*, 24: 32-33.
- Lask, G., S. Eckhouse, M. Slatkine, A. Waldman, M. Kreindel and V. Gottfried, 1999. The role of laser and intense light sources in photo-epilation: A comparative evaluation. *J. Cutan. Laser Ther.*, 1: 3-13.
- Lee, J.H., C.H. Huh, H.J. Yoon, K.H. Cho and J.H. Chung, 2006. Photo-epilation results of axillary hair in dark-skinned patients by intense pulsed light: Comparison between different wavelengths and pulse width. *Dermatol. Surg.*, 32: 234-240.
- Marayannis, K.B., S.P. Vlachos, M.P. Savva and P.P. Kontoes, 2003. Efficacy of long- and short pulse alexandrite lasers compared with an intense pulsed light source for epilation: A study on 532 sites in 389 patients. *J. Cosmetics Laser Ther.*, 5: 140-145.
- Nahavandi, H., R. Neumann, G. Holzer and R. Knobler, 2008. Evaluation of safety and efficacy of variable pulsed light in the treatment of unwanted hair in 77 volunteers. *J. Eur. Acad. Dermatol. Venereol.*, 22: 311-315.
- Omi, T. and R.M. Clement, 2006. The use of a constant spectrum, uniform temporal profile intense pulsed light source for long-term hair removal in Asian skin. *J. Cosmetics Laser Ther.*, 8: 138-145.
- Radmanesh, M., M. Azar-Beig, A. Abtahian and A.H. Naderi, 2008. Burning, paradoxical hypertrichosis, leukotrichia and folliculitis are four major complications of intense pulsed light hair removal therapy. *J. Dermatolog Treat.*, 19: 360-363.
- Radmanesh, M., 2009. Paradoxical hypertrichosis and terminal hair change after intense pulsed light hair removal therapy. *J. Dermatolog Treat.*, 20: 52-54.
- Randall, V.A., S. Lanigan, I. Hamzavi and L.C. James, 2006. New dimensions in Hirsutism. *Lasers Med. Sci.*, 21: 126-133.
- Sadick, N.S., R.A. Weis, C.R. Shea, H. Nagel, G. Nicholson and V.G. Prieto, 2000. Long-term photoepilation using broad spectrum intense pulse light source. *Arch. Dermatol.*, 136: 1336-1340.
- Sanchez, L.A., M. Perez and R. Azziz, 2002. Laser hair reduction in the hirsute patient: a critical assessment. *Hum. Reprod. Update*, 8: 169-181.
- Schroeter, C.A., J.S. Groenewegen, T. Reineke and H.A. Neumann, 2003. Ninety percent permanent hair reduction in transsexual patients. *Ann. Plastic Surg.*, 51: 243-248.
- Schroeter, C.A., J.S. Groenewegen, T. Reineke and H.A. Neumann, 2004. Hair reduction using intense pulsed light source. *Dermatol. Surg.*, 30: 168-173.
- Serrano-Grau, P., A. Campo-Voegeli and D. Romero, 2009. Photodepilation. *Acta Dermosifiliogr.*, 100: 351-361.
- Shapiro, J. and H. Lui, 2006. Treatments for unwanted facial hair. *Skin Ther. Lett.*, 10: 1-4.
- Stanczyk, F.Z., 2006. Diagnosis of hyperandrogenism: Biochemical criteria. *Best Pract. Res. Clin. Endocrinol. Metab.*, 20: 177-191.
- Tekin, O., Z. Avci, B. Isik, A. Ozkara, C. Uraldi and F. Catal, 2004. Hirsutism: Common clinical problem or index of serious disease?. *Med. Gen. Med.*, 15: 56-56.
- Toosi, P., A. Sadighha, A. Sharifian and G.M. Razavi, 2006. A comparison study of the efficacy and side effects of different light sources in hair removal. *Lasers Med. Sci.*, 21: 1-4.
- Wanner, M., 2005. Laser hair removal. *Dermatol. Ther.*, 18: 209-216.
- Watts, J., 2006. Understanding the causes and management of hirsutism. *Nurs. Times*, 21: 26-28.
- Yaghmai, D., J.M. Garden, A.D. Bakus, E.A. Spenceri, G.J. Hruza and S.L. Kilmer, 2004. Hair removal using a combination radio-frequency and intense pulsed light source. *J. Cosmetics Laser Ther.*, 6: 201-207.