

The effect of intense pulsed light therapy with a wavelength of 560nm in Melasma Pigmentation Repair and Assesed with MASI score and Skin Analyzer

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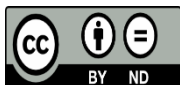


Keywords:

melasma, IPL, MASI score, skin analyzer, facial pigmentation

ABSTRACT

Melasma is a benign yet appearance disturbing in women, typically across Asians. IPL with 560 nm is one energy based therapy that can be used to treat melasma. This study is to examine the effect of Intense Pulsed Light Therapy with a wavelength of 560 nm in melasma pigmentation repair and assessed with MASI score and skin analyzer. This research is a type of analytical experimental research with randomized controlled clinical trials, single bind trials. The number of research subjects was 13 subjects in the control group and 13 subjects in each treatment group, so the total number of subjects was 65 people. The treatment group includes: control, IPL 1 session, IPL 2 sessions, IPL 3 sessions, and IPL 4 sessions. The study included 13 patients in 4 treatment groups and 13 control group patients. Results showed a significant difference in the third session of IPL. ($p = x$) on the difference in decreasing ASI scores between the treatment and control groups, and decreasing pigmentation parameters in the skin analyzer ($p = x$). There was a positive correlation between IPL sessions and MASI score ($r=x$), and a positive correlation between IPL sessions and skin analyzer pigmentation parameters ($r= x$). There is a high correlation relationship on the decrease in MASI score after the third session of IPL treatment, and there is a sufficient correlation on the decrease in MASI score after the third session of IPL treatment.



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1. INTRODUCTION

Melasma is a benign but appearance-disturbing skin condition in women with this phenotype, especially Asians [2]. The clinical appearance of melasma is light to dark brown hyperpigmentation with irregular borders [2], [5]. Clinically it appears in patterns: centofacial, malar and mandibular [3], [4]. Some risk factors include: ultraviolet light, hormonal (pregnancy, contraceptive pills and hormone replacement therapy),

genetics and systemic disease (thyroid), phototoxic drugs [4]. Melanin is found in the epidermis and protects DNA and skin cell organelles from UV radiation [1]. UVB exposure can also cause excessive melanin formation, which causes melasma. manifests clinically as inconsistency of pigmentation with areas of hyperpigmentation [5]. Intense Pulsed Light (IPL) uses light with a wavelength ranging from 515 to 1200 nm and specifically targets melanosomes with the advantage of treating dermal and epidermal types of melisma [5], [6]. Based on these data, a problem was formulated to evaluate the efficacy of 560 nm IPL in improving melasma compared to the control. Evaluation of the treatment of melasma patients will use MASI score and skin analyzer pigmentation parameters.

2. METHOD

Data collection was carried out from September to December 2022 at the Naavagreen natural skincare clinic, Jl. Maesa number 9, Paaldua subdistrict, Manado, North Sulawesi. The population is the entire subject to be studied. The population this study were female patients with melasma who came to visit the clinic. The number of research subject samples was calculated based on the unpaired comparative analytical formula for two groups, so the number of research subjects was 13 subjects in the control group and 13 subjects in each treatment group. The total number of subjects was 65 people. The treatment groups included: control, IPL 1 session, IPL 2 sessions, IPL 3 sessions, and IPL 4 sessions. Data inclusion criteria include: women aged 35-55 years who seek treatment at the clinic, melasma type: epidermal, dermal or mixed, skin type Fitzpatrick II-IV, history of pregnancy, use of hormonal birth control, or hormone replacement therapy (Hormone Replacement Therapy), and cooperative. Meanwhile, the exclusion criteria include: post-inflammatory pigmentation, ochronosis, birthmarks, use of zinc, glutathione, vitamin A, C, E supplements in the last three months.

3. RESULT

This research was conducted on 65 patients who met the research inclusion criteria who underwent IPL treatment at the clinic.

Table 3.1. Characteristics of Patients

Characteristics of Patients	Total (n= 65) Percentage (%)
Age Groups	
45-50	53 (81,5%)
51-55	12 (18,45)
Control	23 (35,3%)
Melasma	42 (64,6%)
Occupation	
Work	40 (61,5%)
Not working	25 (38,4%)
History of hormonal Contraception	
Pill	20 (30,7%)
Injection	17 (26,1%)
Implan	5 (7.6 %)
No hormonal contraception	23 (35,4%)
History of Pregnancy	
No	27 (41,5 %)
Yes	38 (58,4%)

The table shows that the highest proportion of respondents aged 45-50 years, namely 53 people (81.5%). The majority of patients worked, namely 40 people (61.5%). On average, 20 patients used birth control pills (30.7%). A total of 38 patients had a history of pregnancy (58.4%).

Table 4.2. Patient Characteristics Age Group 45-50

Occupation	Total (n=53)
Outdoor	
Teacher	6
Nanny	5
Mining	3
Merchant	7
Indoor	
Housewife	22
Staff	5
Nurse	4
Chef	1
History of hormonal Contraception	
Pill	19
Injection	13
Implan	3
No hormonal contraception	18
MASI score without IPL (mean)	Moderate (26,7)
MASI score with IPL (mean)	Mild (22,8)

Table 4.3. Patient Characteristics Age Group 51-55

Occupation	Total (n=12)
Outdoor	
Teacher	3
Nanny	2
Mining	0
Merchant	4
Indoor	
Housewife	3
Staff	0
Nurse	0
Chef	0
History of hormonal Contraception	
Pill	1
Injection	4
Implan	2
No hormonal contraception	5
MASI score without IPL (mean)	Severe (37,4)
MASI score with IPL (mean)	Moderate (36,3)

Table 4.4. Occupation and MASI score

Occupation	MASI score		Skor Skin Analyzer	
	Pre IPL	Post IPL	Pre IPL	Post IPL
Outdoor				
Teacher 9 persons	25,5 ~ 26	24,2 ~ 24	16,5 ~ 17	16
Minus		1,3	0,5	
Nanny 7 persons	32,6 ~ 33	29,7 ~ 30	15,7 ~ 16	14,5 ~ 15
Minus	2,9			1,2
Pertambangan 3 persons	35,3 ~ 35	33,3 ~ 33	28,6 ~ 29	27,7 ~ 28
Minus		2		0,9
Pedagang 11 persons	31,8 ~ 32	29,5 ~ 30	37,1 ~ 37	35,9 ~ 36
Minus		2,3		1,2
Indoor				
Housewife 25 persons	33,4 ~ 33	30,2 ~ 30	25	23,4 ~ 23
Minus		3,2		1,6
Pegawai 5 persons	29	22,4 ~ 22	27,6 ~ 28	24,6 ~ 25
Minus		6,6		3
Nurse 4 persons	34,5 ~ 35	31,8 ~ 32	32,8 ~ 33	31,5 ~ 32
Minus		2,7		1,3
Chef 1 person	37	30	32	30
Minus		7		2

According to the results of table 4.4, it was found that the distribution of patients with the highest MASI score in the outdoor group is the mining work by 35 (medium category), while the lowest change in MASI score was found in the teacher group, namely 26 (medium category). According to the skin analyzer, the highest pigmentation score was in the mining group, namely 28.6 (light-moderate category) and the lowest score after IPL was in the teacher group, about 15 (normal-light category). The group that made the most changes to the MASI score was nanny, such as 2.9, while for skin analyzers, the groups that made the most changes were nanny and merchant, such as 1.2.

In the indoor group, the distribution of patients with the highest MASI score was chefs, such as 37 (moderate-bad category), and those giving the lowest MASI score after IPL were employees, by 22 (mild category). According to the skin analyzer, the highest pigmentation score was in the nursing group, by 35 (light-moderate category) and the lowest score after IPL was in the IRT group, namely 23 (normal-light category). The group that made the most changes to the MASI score was chefs, namely 7, while for the skin analyzer, the group that made the most changes was employees, such as 3.

Table 4.5. Melasma MASI score on Patient’s Face

MASI score	Patients Total (n= 65) Percentage (%)

MASI score classification		
Nearly normal	: 0-12	21 persons (32,3%)
Mild	: 13-24	13 persons (20%)
Moderate	: 25-36	24 persons (36,9%)
Severe	: 37-48	7 persons (10,7%)
Melasma Predilection		
Malar		23 persons (35,3%)
Frontal		7 persons (10,7%)
Chin		7 persons (10,7%)
Combination		
Malar + Frontal		11 persons (16,9%)
Malar + Chin		7 persons (10,7%)
Frontal + Chin		4 persons (6,2 %)
Malar + Frontal + Chin		6 persons (9,2%)

Based on the description in table 4.5., it can be seen that the patients with the highest MASI scores were moderate in number are 24 people (36.9%). Apart from that, the most predilection area for melasma is the malar area, 23 people (35.3%) with a combination of malar and total area, namely 11 people (16.9%).

This research shows that IPL does not have a significant relationship with the MASI score and the direction of the correlation is positive, meaning that the higher the frequency of IPL, the higher the MASI score. Meanwhile, the results of the repeated ANOVA between IPL and MASI scores had a significance value of 0.048, where the significance was <0.05 , which means the assumptions were met, so it was concluded that there was a significant difference in melasma pigmentation which was tested with skin analyzer pigmentation parameters after receiving IPL treatment.

IPL has a negative correlation with pigmentation parameters on the skin analyzer, meaning that the more frequent the IPL treatment, the lower the pigmentation value, which means IPL provides good therapeutic results in improving melasma. This research obtained repeated ANOVA results between IPL and the skin analyzer with a value of 0.104, where the significance was >0.05 , which means the assumptions were not met, so it was concluded that IPL did not affect the reduction in melasma pigmentation as tested by the skin analyzer pigmentation parameters.

4. DISCUSSION

Melasma is a pigmentation condition that often attacks the face and tends to occur in individuals with darker skin types. Prevalence increases with pregnancy and oral contraceptives [26], [34]. The general clinical picture is mild to dark brown asymptomatic hyperpigmentation with irregular borders. Based on the characteristics of 65 patients, the age data for the most respondents was 45-50 years old, namely 53 people (81.5%). The gender of all of these patients is female. This is in accordance with research which states that it is more often observed in women than men of the same age, a female: male predominance of 9 - 10:1 is observed [10]. The majority of patients worked, namely 40 people (61.5%). On average, 20 patients used birth control pills (30.7%). A total of 38 patients were pregnant (58.4%) [48]. This is in accordance with research which stated that the prevalence of melasma was 50.8% reported in 2,000 randomly selected pregnant women [10], [48]. In the history of birth control in this study, it was found that the most participants who used progestin pills were 20 people, this is in accordance with studies which stated that birth control in the form of progestin pills had a greater tendency to melasma [49], [50].

This also is in accordance with studies which state that birth control in the form of progestin pills is more

likely to cause melasma [49], [50]. The dominant MASI score in this study was close to normal, namely 24 people (36.9%). In this study, it was found that the most predilection area for melasma was the malar-frontal combination, namely 26 people (27.6%). These findings are in line with research that states the most common clinical pattern is centrofacial at around 50-80%, followed by the maxilla and then the mandible, as observed in various parts of India, Brazil and Indonesia [10], [50].

According to the results of table 4.1, it was found that the distribution of patients with the highest MASI score in the outdoor group with the mining work classification was 35 (moderate category). According to the skin analyzer, the highest pigmentation score was in the mining group, namely 28.6 (light-moderate category). Study in Of 200 patients, 160 (80%) patients suffered from melasma with extreme sun exposure while 65.5% suffered from melasma with intermittent exposure. This is almost similar to research conducted by Nanjundaswami et al. where 64% of melasma patients received fairly high sun exposure.

The study conducted by Jagannathan et al. showed a significant percentage of sunlight with lower exposure (22%). As many as 42.5% of patients told a history of exacerbations in the summer [53]. In the indoor group, the distribution of patients with the highest MASI score among chefs was 37 (medium-poor category). According to the skin analyzer, the highest pigmentation score was in the nurse group, namely 35 (medium category), followed by housewives, namely 33 (medium category). This is in accordance with research studies, where the majority are housewives, because housewives enjoy outdoor activities and indoor activities [53].

So it is likely that significant sun exposure may contribute to the development of melasma, due to ethnic and regional variations and etiological factors such as sunlight [53] IPL is an excellent modality for addressing multiple aspects of skin aging using a single treatment method, including dyschromia, telangiectasia, and skin texture [25]. This involves the use of intense light, focused by a focusing mirror and emitted by a specific intense luminous wavelength, through a filter system in the footprint [55]. The results of this study found a specific relationship ($p > 0.05$) with a medium-strong intensity relationship between IPL frequency and skin analyzer pigmentation parameters, which means that the more frequent IPL intervention, the more pigmentation in melasma decreases.

This is supported by research which states that the term "selective thermolysis" has become the conceptual basis for IPL as a method for treating pigmented skin lesions. It is effective on epidermal types of melasma rather than mixed or dermal types [34]. In contrast to a retrospective study evaluating the effectiveness of IPL on melasma, MASI scores decreased by 33.4% in two IPL sessions. A study performed 3 to 5 IPL sessions at 40-45 day intervals in 38 patients with melasma, in 47.7% of patients excellent results and in 28.95% of patients good results were not achieved [35]. This research also found that the correlation between IPL and MASI scores was positive, meaning that the higher the frequency of IPL, the higher the score. Repeated ANOVA between IPL and MASI score with a value of < 0.05 , which means the assumptions are met, so it can be concluded that IPL affects the reduction of melasma pigmentation as tested using skin analyzer pigmentation parameters.

5. CONCLUSION

The results of this research conclude that IPL has an important role in reducing the amount of melasma. Therefore, IPL modality can be used in the treatment of melasma. The result of repeated ANOVA concluded that IPL provided significant results in changing the MASI score for melasma, which played an important role in reducing the number of melasma. The first and second sessions of IPL gave significant results on skin analyzer pigmentation parameters, so there was no significant difference from IPL from the first to the fourth

session on the MASI score.

In the correlation analysis, there were no significant differences in IPL from the first to fourth sessions in the MASI score, so it can be concluded that there was no significant difference in MASI score data between IPL sessions 1-4. With multiple treatment modalities, no topical treatment, oral monotherapy treatment, or light-based treatment guarantees improvement in melasma. Melasma is a clinical condition caused by many etiopathogenetic factors and mechanisms for which more effective management is needed. By increasing awareness of this condition, we hope that physicians and patients can be better informed to discuss screening options and to avoid preventable risk factors, especially in patients predisposed to this disease.

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