

Evaluation of the relationship between clinicoepidemiological features of melasma and the level of involvement on wood's lamp Examination

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INTRODUCTION

Melasma is a common hypermelanosis that

Background: Melasma is a common acquired hyperpigmentation disorder often appearing on the face of young women. Melasma is classified into four groups based on Wood's lamp examination: epidermal, dermal, mixed, and indeterminate. The goal of this study was to evaluate the relationship between clinicoepidemiological characteristics of melasma and the level of involvement under Wood's lamp examination.

Method: In a cross sectional study, 50 melasma patients who were visited at the dermatology clinic of Imam Reza Hospital from March 2010 to September 2011 were studied. The level of melasma involvement in all patients was determined using a Wood's lamp, and the patients' information such as age, occupation, location of melasma, marital status, pregnancy, oral contraceptive pill consumption and Fitzpatrick skin type was collected in a questionnaire.

Result: In single patients, dermal involvement and in married patients, epidermal involvement was more common. Involvement was more frequently dermal in jobs with exposure to sun and more epidermal in indoor jobs. In the malar region, epidermal involvement was more common. In patients with a history of pregnancy, epidermal involvement was more prevalent as well, while in the participants without a history of pregnancy, dermal involvement was more frequent. In the pregnant patients with melasma, epidermal involvement was more frequent. In patients without a family history of melasma, epidermal involvement was more frequently observed than the other two levels of involvement.

Conclusion: Based on the findings of this study, melasma in cases with the involvement of the malar region, starting in pregnancy, in patients without a family history of melasma, and in the individuals who have indoor occupations is most likely to be epidermal and may have a better response to treatment. On the other hand, melasma in single persons and in those who have outdoor occupations and are exposed to sun light is mostly dermal with a worse response to treatment according to previous studies.

Keywords: clinico-epidemiology, dermal involvement, epidermal involvement, melasma, wood's lamp

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typically occurs in sun-exposed areas of the face. The pathogenesis of melasma is not well known, but genetic and hormonal factors are important along

with ultraviolet radiation¹. Some of the favorable factors for melasma include oral contraceptives, estrogen replacement therapy, ovarian tumors, mild ovarian or thyroid dysfunction, cosmetics, nutrition, phototoxic and photoallergic drugs, and the drugs used for treatment of epilepsy¹. Melasma is rarely reported before puberty, and is more often seen in women of childbearing age¹. About 90% of the infected individuals are female and 10% are male, and the cause of melasma in men is not well understood². Melasma lesions appear as brown macules with irregular borders and a symmetrical distribution on the face, which are often connected with a reticular pattern³. This disease is more frequent in dark skin types (IV, V, VI). Three main distribution patterns of melasma include centrofacial (involving the forehead, nose, chin and upper lip), malar (involving nose and cheeks) and mandibular (involving the ramus of mandible). The middle and upper chest and extensor aspect of the arm can also be affected^{1,3}.

In addition to melasma classification based on the clinical schema, on examination with the Wood's lamp, melasma is divided into four groups including epidermal, dermal, mixed and indeterminate types (the latter is seen in patients with very dark skin). The most common type is epidermal. Theoretically, the lesions caused by increased epidermal melanin are exacerbated on Wood's lamp examination, and the lesions due to dermal melanin become less clear^{1,3,4}. Thus, the epidermal type of melasma exhibits sharp limits and darkening of the lesion when examined under the Wood's lamp, as the light irradiated by the Wood's lamp is absorbed by extra melanin on the surface. The dermal type does not show this exacerbation and has less clarity. The mixed type has a dotted blotchy appearance resulting from melanin precipitation in both the epidermis and dermis, with color intensification seen with Wood's light in some parts with no intensification in other parts³⁻⁵. In addition, some of these patients are classified in the fourth group known as indeterminate or Wood's Light unapparent^{3,4}.

It has been recommended to perform examination using the Wood's lamp to determine the depth of melanin pigmentation before treatment to help diagnose the melasma type and evaluate treatment prognosis⁴, because the epidermal type mainly

responds well to topical treatment while dermal melasma does not^{3,4}. In most cases, dermatologists do not perform this examination due to lack of time, Wood's lamp, or dark room conditions; even in clinical trials, various therapies are considered regardless of the melasma type, and some of them have set melasma involvement as their inclusion criteria⁶. To be able to more confidently comment on the likelihood of response to treatment in patients, it is prudent that we determine the level of involvement before treatment and due to the limitations of the use of the Wood's lamp in the office, if an association is found between other clinicoepidemiological and etiological features of melasma with the level of involvement, those features can be used to predict the treatment prognosis in terms of the possible level of involvement. According to the previous statements, knowledge of epidemiological features and their relationship with the melasma involvement level on examination by the Wood's lamp can be helpful in predicting response to treatment, which was dealt with in our study.

PATIENTS AND METHODS

This cross-sectional study was conducted on 50 patients with melasma who were visited at the dermatology clinic of Imam Reza Hospital in Mashhad from April 2010 to September 2011. The participants were selected by an objective-based non-potential method from all melasma patients visited at the dermatology clinic. Exclusion criteria included the use of tretinoin during the last three months, use of hydroquinone in the last six months, coexistence of other pigmentation disorders, and application of topical steroids in the past month. The use of questionnaires for recording the demographic data, inspection to determine the skin type and location of melasma, and evaluation of the involvement level using the Wood's lamp by a dermatologist were among data collection methods. The level of melasma lesion involvement was divided to epidermal, dermal, mixed, and indeterminate using the Wood's lamp. After obtaining the patient's consent, examination was performed and demographic information was recorded in the questionnaire.

The data were analyzed using the statistical software SPSS-16. The data were described by

frequency tables, and Fisher's exact test and non-parametric Kruskal-Wallis test were used to examine the relationship between data. Multiple False Discovery Rate (FDR) tests were used to compare relative frequency among different groups. The significance level was set at 0.05.

RESULTS

The study population consisted of 49 women (98%) and one man (2%). The mean age of the participants was 27.54 years (range: 17-43 years). The highest incidence was seen in the age group

Table 1. Evaluation of the relation between melasma level under wood lamp and patients sex, age , marriage, family history and occupation

Variables	Melasma type under wood's lamp				Test Result	
	Epidermal	Dermal	Mixed	Total		
Sex						
M						
No	0	1	0	1		
%	0	5.9	0	2		
F					Fisher's Exact test Pv=0.596	
No	20	16	13	49		
%	100	94.1	100	98		
Total						
No	20	17	13	50		
%	100	100	100	100		
Marriage						
Single						
No	0	12	4	16		
%	0	75	25	100		
Married						
No	20	5	9	34	Fisher's Exact test Pv=0.000	
%	59	15	26	100		
Total						
No	20	17	13	50		
%	100	100	100	100		
Age						
1st Quarter	24.25	20.5	24		Non parametric Kruskal wallis test Pv= 0.118	
2nd Quarter	29.5	26	27			
3rd Quarter	35	29	29.5			
Family history of melasma						
Yes						
No	5	11	8	24	Fisher's Exact test Pv=0.027	
%	21	46	33	100		
No						
No	15	6	5	26		
%	58	23	19	100		
Total						
No	20	17	13	50		
%	100	100	100	100		
Occupation						
Out door						
No	1	10	4	15	Fisher's Exact test Pv=0.002	
%	7	67	26	100		
In door						
No	19	7	9	35		
%	54	20	26	100		
Total						
No	20	17	13	50		
%	100	100	100	100		

25-30 years with 17 persons (34%) and the lowest in the age group over 40 with 1 individual (2%). Sixteen participants were single (32%) and 34 were married (68%); 15 participants worked outdoors and were exposed to sun (30%) and the remaining 35 worked indoors (70%). The highest incidence was observed in individuals with skin type IV with 36 people (72%). The frequency of skin types III and V was 7 patients (14%) each. The malar region was involved in 21 patients (42%). Twenty patients (40%) had malar + centrofacial and 7 patients (14%) had malar + centrofacial + mandibular involvement. Only two people (4%) had centrofacial involvement alone. There was no single involvement in the mandibular or extrafacial regions. Out of 49 women, 31 (63.3%) had a history of pregnancy most of whom (13 persons or 41.9%) mentioned the occurrence of melasma during pregnancy. Melasma occurred before and after the pregnancy in 10 (32.3%) and 8 patients (25.8%), respectively. Among 49 women, 13 had a history of OCP use. Seven individuals (14%) had a history of using other medicines. Twenty-four patients (48%) had a family history of melasma in their first and second degree relatives.

Based on the level of melasma involvement using the Wood's lamp, the epidermal involvement was more common with 20 patients (40%) followed by dermal with 17 patients (34%) and mixed with 13 patients (26%).

In single patients, dermal involvement and in married patients, epidermal involvement was more common. Involvement was more frequently dermal in jobs with exposure to sun and more epidermal in indoor jobs. In the malar region, epidermal involvement was more common. In patients with a history of pregnancy, epidermal involvement was more prevalent as well, while in the participants without a history of pregnancy, dermal involvement was more frequent. In the pregnant patients with melasma, epidermal involvement was more frequent. In patients without a family history of melasma, epidermal involvement was more frequently observed than the other two levels of involvement.

There was no significant correlation between the level of melasma involvement and age, gender, skin type, duration of melasma, age at first pregnancy, number of pregnancies and OCP or other medicines intake (table 1 and 2).

DISCUSSION

In our study population, there were 49 women (98%) and one man (2%), with a female to male ratio of 49 to 1. In a study by Chan, 95.4% of the participants were female and 4.6% were male⁷. In a study by Goh, the female to male ratio was 2 to 1⁸. Achar found a prevalence of 20% in the male patients⁹. The mean age of our patients was 27.54 years (range: 17 to 43 years). The highest incidence was in the age group 25-30 years. The mean age of patients in studies performed by Achar⁹, Ortonne¹⁰, Chan⁷, and Goh⁸ was 33.45, 34, 45, and 42.3 years, respectively. The lower mean age of our patients was probably due to lower age of first pregnancy in most of the patients (15-20 years).

In single individuals, dermal involvement was more prevalent than epidermal and mixed involvement while in married individuals; epidermal involvement was significantly more prevalent than dermal and mixed involvement. As the prevalence of epidermal melasma was significantly higher in women with a history of pregnancy, it is logically expected that married people be subject to epidermal melasma more frequently.

The prevalence of dermal involvement was significantly higher than epidermal involvement in people who had outdoor jobs which exposed them to the sun. Since involvement in patients with indoor jobs was mainly epidermal, it seems that in addition to UV, other factors including pregnancy and OCP intake had a major role in the occurrence of melasma in our patients. However, it seems that the sun has probably a more important role in the dermal type of melasma. Although, visible light has also a role in the pathogenesis and exacerbation of melasma², working indoors alone does not indicate that light is not involved in the pathogenesis of melasma.

Our patients had three skin types of III, IV, and V. The highest incidence was observed in the skin type IV. According to other studies, melasma is more frequent in darker skin types (III and IV), which is consistent with our study^{1,7,8,11}. We found no association between the skin type and involvement level, and no study has been performed in this field yet.

According to our results, the most common clinical picture was malar in 21 patients (42%)

Relationship between clinicoepidemiological features of melasma and the level of involvement

Table 2. Evaluation of the relation between melasma level under wood lamp and melasma location, history of pregnancy, OCP consumption and skin type

Variables	Melasma type under wood's lamp				Test Result
	Epidermal	Dermal	Mixed	Total	
Melasma location					
Centerofacial					
No	1	0	1	2	
%	50	0	50	100	
Malar					
No	14	5	2	21	
%	66.7	23.8	9.5	100	
Centerofacial & Malar					
No	4	9	7	20	Fisher's Exact test Pv=0.018
%	20	45	35	100	
Centerofacial & Malar & Mandibular					
No	1	3	3	7	
%	14.3	42.9	42.9	100	
Total					
No	20	17	13	50	
%	40	34	26	100	
History of pregnancy					
Yes					
No	19	3	9	31	
%	61	10	29	100	
No					
No	1	13	4	18	Fischer's Exact test Pv=0.000
%	6	72	22	100	
Total					
No	20	16	13	49	
%	100	100	100	100	
Age of first pregnancy					
1st Quarter	20	19	20		Non parametric Kruskal wallis test Pv= 0.408
2nd Quarter	21	22	20		
3rd Quarter	28	-	23		
OCP consumption					
Yes					
No	8	1	4	13	
%	62	8	30	100	
No					
No	12	15	9	36	Fischer's Exact test Pv=0.027
%	33	42	25	100	
Total					
No	20	16	13	49	
%	100	100	100	100	
Fitzpatrick skin type					
III					
No	5	1	1	7	
%	72	14	14	100	
IV					
No	15	13	8	36	Fischer's Exact test Pv=0.052
%	42	36	22	100	
V					
No	0	3	4	7	
%	0	43	57	100	
Total					
No	20	17	13	50	
%	100	100	100	100	

followed by centrofacial + malar in 20 patients (40%) and centrofacial + malar + mandibular involvement in 7 patients (14%). Only two people (4%) had centrofacial involvement alone. Mandibular or extrafacial involvement were not observed alone. In a study by Goh, the majority of the lesions (89%) were in the malar region⁸. In a study by Chan, all the patients had facial melasma and only 11 out of 260 patients had extrafacial involvement. The malar region had the highest involvement⁷, but in a study conducted by Achar, the centrofacial pattern was the most common involvement⁹.

In a study by Kim-Ny, 63% of the patients had centrofacial, 21% had malar, and 16% had mandibular distribution¹². Those with malar melasma mainly had epidermal involvement.

In our study population, out of 49 women, 31 (63.3%) mentioned a history of pregnancy. In the study performed by Goh, 12.1% of the patients mentioned pregnancy as a predisposing factor⁸. In patients with a history of pregnancy, the level of involvement was primarily epidermal, and in the group with no history of pregnancy, involvement was mainly dermal. The relationship between pregnancy and the level of melasma involvement has not been investigated in other studies.

In our study population, out of 31 patients (63.3%) with a history of pregnancy, the majority (13 persons or 41.9%) experienced simultaneous occurrence of melasma and pregnancy. The onset of melasma was most commonly during the pregnancy (41.9%), with 32.3% affected before and 25.8% after the pregnancy. In a study by Rasnik, 87% experienced melasma during the pregnancy¹³. In another study performed by Ortonne, the onset of melasma was most commonly after pregnancy (42%)¹⁰. In a recent study on women in nine countries, it was found that 41% of the women were affected by melasma after pregnancy and before menopause¹¹. In women in whom melasma had occurred concomitant with pregnancy, epidermal involvement level was higher than dermal and mixed involvements, but in people with melasma before or after pregnancy, there was no significant difference in frequency of involvement.

Out of 49 women, 13 patients (26.5%) had a history of OCP intake. Thirty-six patients (73.5%) had no history of OCP intake. In a recent study, 25% of the patients who took OCP suffered from melasma after medicine intake¹¹. In the study

by Goh, 13.1% of patients mentioned OCP as a predisposing factor⁸. In our study, no link was found between the consumption of OCP and the level of involvement.

In our study population, seven patients (14%) mentioned a history of taking other medicines including alprazolam, fluoxetine, carbamazepine, levothyroxine and clomiphene while 43 patients (86%) did not. In the literature, the intake of phototoxic and photoallergic drugs, anticonvulsants especially phenytoin, and thyroid medicines have been considered as the risk factors of melasma¹. In studies performed by Lutfi and Dogra, a relationship was suggested between thyroid disorders and melasma^{14,15}. Two of our patients were under treatment with levothyroxine because of hypothyroidism. There was no significant relationship between the consumption of other drugs and the level of involvement.

In our study population, 24 individuals (48%) mentioned a family history of melasma. A family history of melasma has been reported in 54.7%, 48%, 10.2%, 33.3%, and 39% of the participants in other studies^{8-10,15,16}. In the individuals without a family history of melasma, epidermal involvement was higher than dermal and mixed involvement.

In our study population, 20 individuals (40%) had epidermal involvement, which had the highest incidence, 17 individuals (34%) had dermal, and 13 individuals (26%) had mixed involvement. According to different studies, epidermal involvement is the most common type of melasma, which is consistent with our results^{1,3,17}.

The epidermal type mainly responds well to topical treatment, while dermal melasma does not³. To be able to comment on the probability of treatment in patients, it is prudent to first determine the level of involvement, which is currently possible only with Wood's lamp examination and biopsy. On the other hand, the use of laboratory methods and sampling, which are often time consuming and costly, is difficult for accurate diagnosis of the involvement level, and assessment of the prognosis and response to treatment. Sanchez conducted a study on skin biopsy samples and found that two basic plans were seen in melasma: epidermal and dermal form. In this study, the results of Wood's lamp examination were in concordance with biopsy results¹⁸. Therefore, Wood's lamp examination can be substituted to assess the type of melasma and thus

judge the prognosis and response to treatment in melasma patients. Grimes, in her review of patients with epidermal and mixed melasma, found that despite the fact that examination by the Wood's lamp reported some lesions as epidermal, in all skin samples it had visualized increased melanin in the dermis and epidermis. Thus, the patients with epidermal melasma based on Wood's lamp examination may also have significant amounts of dermal melanin¹⁹. In the study by Chan, the most common type of melasma involvement was epidermal (58.5%) and mixed (37.7%), and only 3.8% of the cases had dermal melasma; he also showed that hydroquinone alone was less effective in dermal melasma⁷.

The Wood's lamp is a good but not the best method for the evaluation of melasma. Our results showed that epidermal involvement was higher than dermal and mixed involvement in married women working indoors with a history of pregnancy. Therefore, it is expected that melasma in the cases with malar distribution, in those without any family history, those working indoors and in married individuals with simultaneous pregnancy be mostly epidermal with a good prognosis and response to treatment; on the other hand, in single individuals with melasma without a history of pregnancy who work outdoors and are exposed to sunlight, melasma is more likely to be dermal with a poor response to conventional treatments.

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