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The Relationship Between Melasma and Disturbances in the Serum Level of Thyroid Hormones and Indices

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Abstract

Introduction: Melasma is a relatively common skin disorder that primarily affects areas exposed to sunlight. The cause of melasma is not well understood yet. Few studies have been performed on the relationship of melasma and thyroid disorders. In this study, we have investigated the association between melasma and thyroid parameters. *Material and Method:* In this study, 102 patients with melasma, referred to dermatology clinic of Kashan Shahid Beheshti hospital, were enrolled and compared with 55 healthy controls. Patients with melasma were divided into two groups: melasma with a known cause and idiopathic melasma. Patient information such as age, sex, duration of disease, menstrual status, underlying disease, cause of melasma and its severity (MASI score) were recorded in a questionnaire. T3, T4, TSH, Anti TPO and Anti Thyroglobulin were measured in all participants using the Immuno-chemiluminescence method. The data was then analyzed using SPSS version 16. *Results:* Mean serum levels of T3 and T4 were similar in all three groups. The mean serum level of TSH, Anti TPO and Thyroglobulin antibodies in patients with melasma were higher than the control group, but there was no statistically significant difference. The frequency of abnormal TSH levels in patients with idiopathic melasma was significantly higher than the other two groups (p=0.012). *Conclusion:* In this study, it was found that abnormal levels of TSH are associated with a higher risk of developing melasma. Also, it was found that serum levels of TSH, anti TPO and anti-thyroglobulin are higher in patients with melasma.

Keywords

Melasma, Thyroid Gland, TSH, Anti TPO, Anti-Thyroglobulin

1. Introduction

Melasma (Chloasma) is a commonly acquired skin disease. It is a hypermelanosis that is primarily found on areas of skin with high sun exposure, such as the face. It is more common in women. Causes are multi-factorial and not ascertained. The different factors that can cause it include: oral contraceptives, genetics, U.V. exposure, ethnicity, cosmetics or it can be caused idiopathically (1, 2, 3). It is often seen on the forehead, upper lip, cheeks and chin. It has three dominant forms: centro-facial, mandibular and malar. It also has many risk factors such as systemic diseases and thyroid dysfunctions. The relationship between thyroid dysfunctions and skin signs is complex and there are few studies about it (4, 5, 6). Both hyper and hypo-thyroidism can be associated with melasma. Each of them can cause specific and unspecific rashes. Based on one study, thyroid dysfunctions are associated with dry skin 56% of the time, telogen effluvium 37.5% of the time, hair loss 40.62% of the time, melasma 18.7% of the time, and vitiligo, alopecia areata, xanthelasma palpebrarum 22% of the time, as well as pemphigus rarely (7). In some studies, a relationship between autoimmune thyroid disease and melasma has been shown. They measured anti-thyroglobulin antibodies and anti-microsomal antibodies and found that thyroid disorders are 4 times more likely in patients who have melasma, as opposed to the control group (4). Another study showed a relationship between melasma and Carney Complex (neoplastic syndrome involving the pituitary, thyroid, and testicles) (6). In many studies systemic disorders are believed to be involved with the appearance of melasma, but few studies have analyzed thyroid indices in melasma patients (3). Due to a dearth of studies and evidence, we decided to do

this study to assess the frequency of thyroid disorders in melasma patients.

Keyword Definitions:

Melasma: A common hyper-pigmentation macular disorder that usually happens on regions of the face exposed to sunlight

Thyroid indices: These are specific antibodies that increase in auto-immune thyroid disorders, such as anti-thyroid microsomal antibody and anti-thyroglobulin antibody.

2. Materials and Method

The study consisted of patients referred to the Beheshti Clinic of Dermatology for melasma in 2010-2011. After obtaining their consent, we added them to the study. We matched both groups based on age, sex and underlying diseases. We divided patients into three groups: Group one consisted of patients with idiopathic melasma, group 2 was patients with melasma of a known cause, and group 3 was our controls (patients without melasma). The exclusion criteria were: 1) patients with a history of thyroid disease 2) patients with a history of auto-immune disease 3) patients who take anti-thyroid agents, and 4) patients who take thyroid replacement hormones.

T3, T4, TSH, Anti-TPO Ab and Anti-thyroglobulin Ab were measured in all patients by Imunochemoluminisense kits at the same time after freezing. Intensity of melasma was measured based on MASI criteria (0-8 mild, 9-16 moderate and 17-24 severe).

At the end of the study the data was entered into SPSS 16 software. We analyzed the data via ANOVA, Chi square and Fisher's exact test or the Kruskal Wallis test. The results are measured by frequency or mean+_ standard deviation. A P-value<0.05 is considered significant.

3. Results

In our study we had 102 patients with melasma (in two groups: idiopathic and known causes) and 55 patients without melasma.

Table 1 indicates that 92.2% of idiopathic melasma cases and 96.1% of known-cause melasma cases were women. 92.7% of controls were also females. Gender difference between the groups was not statistically significant. Most of the patients were under 30 years of age and most of those with melasma had no other diseases. Menstruation was mostly normal in all three groups.

The duration of disease in both groups was similar (p=0.083). Most of the idiopathic group was moderately afflicted, while the known causes group was severely afflicted in a manner that was significantly different (p=0.02).

A Kolmogorov Smirnov test showed that data distribution of T3 and T4 were normal and the rest were abnormal. The ANOVA test showed an insignificant difference between the levels of T3 and T4. The Kruskal-Wallis test did not show a significant difference between Anti TPO, TSH and Anti Thyroglobulin, but the levels of these three parameters were higher in the melasma groups.

In examining the relationship between melasma and thyroid parameters, it was determined that in all cases, T3 and T4 levels were normal. Also the level of Anti TPO and Anti Thyroglobulin did not have a significant relationship with the causes. Abnormal levels of TSH were most frequent in idiopathic cases. There was a significant statistical relationship between TSH and type of disease.

The TSH level in patients with idiopathic melasma of <6months of duration is significantly higher than in non-idiopathic melasma (p=0.013). Duration has no impact on thyroid parameters in relation to melasma type.

When disease severity was considered in relation with thyroid parameters and melasma type, it was determined that mild and severe idiopathic melasma is related to TSH disturbance (p=0.037 and p=0.002 respectively).

4. Discussion

Thyroid hormones play an important role in monitoring the health and appearance of the skin. Thus, thyroid dysfunction causes skin disorders (11). Niepomniszcze et al showed different types of skin disorders in relation to thyroid diseases such as melasma, vitiligo and leukomelanoderma (5).

Table 1. *Demographic characteristic of study cases*

P value	control	causes		Characteristic	
		Known causes	idiopathic		
0.679*	51 (%92.7) 4 (%7.3)	49 (%96.1) 2 (%3.9)	47 (%92.2) 4 (%7.8)	female Male	sex
0.013*	25 (%45.5) 30 (%54.5)	10 (%19.6) 41 (%80.4)	14 (%27.5) 37 (%72.5)	<30 >30	Age group
0.334*	5 (%9.1) 50 (%90.9)	9 (%17.6) 42 (%82.4)	5 (%9.8) 46 (%90.2)	yes No	Other diseases
0.37**	32.67 9.61	34.76 5.7	34.06 7.29	Mean standard deviation	age
0.333*	43 (%84.3) 6 (%11.8) 2 (%3.9)	36 (%73.5) 12 (%24.5) 1 (%2)	39 (%83) 8 (17) 0	Regular irregular menopause	menstruation

* Chi square

** ANOVA

Table 2. *Characteristic of patients according to the cause of melasma*

P value	causes		characteristic	
	known	idiopathic		
0.083	7.25 5.48	5.6 3.77	Mean standard deviation	duration
0.02	8 (%15.7) 19 (%37.3) 24 (%47.1)	15 (%29.4) 25 (%49) 11 (21.6)	Mild moderate severe	severity

Table 3. *Comparison of serum thyroid parameters in groups*

P value	control	cause		Thyroid parameters	
		known	idiopathic		
0.486*	127.68 21.13	126.37 17.58	123.03 22.11	Mean SD	T3
0.17*	8.68 1.28	8.15 1.48	8.26 1.83	Mean SD	T4
0.485**	2.51 1.45	4.97 18.76	3.9 5.2	Mean SD	TSH
0.177**	56.24 184.55	103.78 320.1	115.4 258.31	Mean SD	Anti TPO
0.118**	57.73 100.53	89.09 148.36	129.86 325.83	Mean SD	Anti-Thyroglobulin Ab

* ANOVA
** Kruskal-Wallis Test

Table 4. *The frequency of thyroid parameters in group*

P value	control	cause		Thyroid parameters	
		known	idiopathic		
N/A	55 (%100)	51 (%100)	51 (%100)	Normal	T3
N/A	55 (%100)	51 (%100)	51 (%100)	Normal	T4
0.012*	49 (%89.1) 6 (%10.9)	47 (%92.2) 4 (%7.8)	37 (%72.5) 24 (%27.5)	normal abnormal	TSH
0.636*	42 (%76.4) 13 (%23.6)	40 (%78.4) 11 (%21.6)	36 (%70.6) 15 (%29.4)	normal abnormal	Anti TPO
0.648*	44 (%80) 11 (%20)	37 (%72.5) 14 (%27.5)	38 (%74.5) 13 (%25.5)	normal abnormal	Anti-Thyroglobulin Ab

* Chi square
N\A: Not Available

Table 5. *The frequency of thyroid parameters in groups with respect to the duration*

P value	cause		Thyroid parameter		duration
	known	idiopathic			
N/A	27 (%100)	36 (%100)	normal	T3	<6m
N/A	27 (%100)	36 (%100)	normal	T4	
0.013*	26 (%96.3) 1 (%3.7)	26 (%72.2) 10 (%27.8)	normal abnormal	TSH	
0.126**	22 (%81.5) 5 (%18.5)	23 (%63.9) 13 (%36.1)	normal abnormal	Anti TPO	
0.687**	20 (%74.1) 7 (%25.9)	25 (%69.4) 11 (%30.6)	normal abnormal	Anti-Thyroglobulin Ab	
N/A	23 (%100)	14 (%100)	normal	T3	>6m
N/A	23 (%100)	14 (%100)	abnormal	T4	
0.228*	20 (%87.0) 3 (%13.0)	10 (%71.4) 4 (%28.6)	normal abnormal	TSH	
0.398*	17 (%73.9) 6 (%26.1)	12 (%85.7) 2 (%14.3)	normal abnormal	Anti TPO	
0.267*	16 (%69.6) 7 (%30.4)	12 (%85.7) 2 (%14.3)	normal abnormal	Anti-Thyroglobulin Ab	

* Fisher's exact test
** Chi square

Table 6. *The frequency of thyroid parameters in terms of groups and disease severity*

P value	cause		Thyroid parameters		severity
	known	idiopathic			
N/A	8 (%100)	15 (%100)	normal	T3	mild
N/A	8 (%100)	15 (%100)	normal	T4	
0.037*	8 (%100) 0	9 (%60.0) 6 (%40.0)	normal abnormal	TSH	
0.29*	6 (%75.0) 2 (%25.0)	8 (%53.3) 7 (%46.7)	normal abnormal	Anti TPO	
0.51*	5 (%62.5) 3 (%37.5)	8 (%53.3) 7 (%46.7)	normal abnormal	Anti-Thyroglobulin Ab	
N/A	19 (%100)	25 (%100)	normal	T3	moderate
N/A	19 (%100)	25 (%100)	abnormal	T4	
0.667*	15 (%78.9) 4 (%21.1)	21 (%84.0) 4 (%16.0)	normal abnormal	TSH	
0.214**	12 (%63.2) 7 (%36.8)	20 (%80.0) 5 (%20.0)	normal abnormal	Anti TPO	
0.057*	12 (%63.2) 7 (%36.8)	22 (%88.0) 3 (%12.0)	normal abnormal	Anti-Thyroglobulin Ab	
N/A	24 (%100)	11 (%100)	normal	T3	severe
N/A	24 (%100)	11 (%100)	normal	T4	
0.002*	24 (%100) 0	7 (%63.6) 4 (%36.4)	normal abnormal	TSH	
0.166*	22 (%91.7) 2 (%8.3)	8 (%72.7) 3 (%27.3)	normal abnormal	Anti TPO	
0.381*	20 (%83.3) 4 (%16.7)	8 (%72.7) 3 (%27.3)	normal abnormal	Anti-Thyroglobulin Ab	

* Fisher's exact test
** Chi square

Few studies have been done about the relationship between thyroid diseases and melasma so far. Kasraee et al 2008 showed that methimazole caused beneficial effects on melasma (2). Alka Dogra et al 2006 showed a 23% appearance of melasma in cases of thyroid diseases (7). Lufti et al 1985 showed that melasma was prevalent 70% of the time in thyroid dysfunction associated with pregnancy or OCP consumption, 39.4% in idiopathic melasma and 12.5% in the control group (4).

Our study showed higher levels of Anti TPO, TSH and Anti thyroglobulin in melasma cases, as opposed to controls, but it was not a significant difference. We had the same results as Kiani (12) and Yazdanfar (13).

In our study the frequency of abnormal levels of TSH was significantly higher than two other groups, but this relationship isn't present in patients who have had melasma more than 6 months. Yazdanfar et al showed significantly higher levels of T3 and Anti TPO in melasma cases. They did not provide any information about TSH.

Our study showed that the frequency of abnormal levels of TSH in mild and severe idiopathic melasma cases were significantly higher than in non-idiopathic cases. None of the studies have investigated the level of thyroid parameters in the subgroups of melasma so far. Based on our study, thyroid dysfunction can be one cause of idiopathic melasma. However, there needs to be more studies and more cases. In order to elucidate the role of thyroid abnormalities in this disease, comparing the results of thyroid function tests before and after a patient's melasma appears to be helpful.

5. Conclusion

In this study, we found that abnormal levels of TSH are associated with the development of melasma. It was found that serum levels of TSH, Anti TPO and Anti thyroglobulin are higher in patients with melasma.

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