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Assessment of Thyroid-Stimulating Hormone (TSH) Levels in Melasma: A Cross-Sectional Study of 50 Patients

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Abstract:

Background: Melasma is a chronic, acquired hyperpigmentation disorder primarily affecting sun-exposed areas of the skin. While ultraviolet radiation and hormonal influences are well-established triggers, recent literature suggests systemic associations, particularly with thyroid function. Objective: To evaluate thyroid-stimulating hormone (TSH) levels in patients with melasma and determine if any association exists between TSH levels and the clinical types or severity of melasma.

Methods: A hospital-based, prospective, cross-sectional study was conducted over two years. Fifty adult patients (age >18 years) clinically diagnosed with melasma were recruited from the dermatology outpatient department of MVJ Medical College and Research Hospital. Patients with pre-diagnosed thyroid disorders or on medications influencing thyroid function were excluded. Melasma severity was assessed using the modified Melasma Area and Severity Index (mMASI), and Wood's lamp examination was employed to classify melasma as epidermal, dermal, or mixed. TSH levels were measured using standard chemiluminescent immunoassay techniques. Statistical analysis was performed using SPSS v23.

Results: The mean age of the study population was 37.4 ± 7.9 years, with 83% being female. Mixed melasma was the most prevalent type (39%), followed by epidermal (32%) and dermal (29%). The mean TSH level among all participants was 3.05 ± 1.52 mIU/L. Mean TSH levels by melasma type were: dermal (3.39 ± 1.57 mIU/L), epidermal (2.80 ± 1.56 mIU/L), and mixed (3.02 ± 1.44 mIU/L). No statistically significant difference was observed in TSH levels among melasma types ($p = 0.313$). A weak, non-significant negative correlation was found between TSH levels and mMASI scores ($r = -0.025$; $p = 0.807$).

Conclusion: While elevated TSH has been previously proposed as a potential contributor to melasma pathogenesis, this study did not demonstrate a statistically significant relationship between TSH levels and the type or severity of melasma. Further multicentric studies with larger sample sizes and inclusion of healthy controls are necessary to validate any potential endocrine linkage.

Keywords:

Melasma, TSH, Thyroid Dysfunction, Hyperpigmentation, mMASI, Endocrine Dermatology

Introduction

Melasma is an acquired hypermelanosis of sun-exposed skin, typically manifesting as symmetrical brown macules over the face. It disproportionately affects women and is influenced by genetic, hormonal, and ultraviolet radiation (UVR) factors.1,2
While external triggers are well-known, systemic contributors, particularly endocrine and autoimmune factors, are increasingly recognized.5

Among these, thyroid dysfunction—especially subclinical hypothyroidism—has garnered interest. Thyroid hormones regulate skin homeostasis, and elevated thyroid-stimulating hormone (TSH) may influence melanogenesis through the melanocortin system or indirectly via inflammatory and oxidative stress pathways.6,7 However, published data on the correlation between TSH levels and melasma remain inconsistent.

This study aimed to explore TSH levels in melasma patients and examine their relationship with clinical patterns and severity.

Materials and Methods

Study Design and Duration:
Prospective descriptive cross-sectional study conducted over 1 year.

Study Setting:
Department of Dermatology, MVJ Medical College and Research Hospital, Bangalore.

Sample Size:
50 patients clinically diagnosed with melasma.

Inclusion Criteria:
1.Age >18 years
2.Clinical diagnosis of melasma
3.No prior thyroid disorders or systemic conditions affecting thyroid function

Exclusion Criteria:
a.Pregnancy or lactation
b.History of thyroid disease or use of thyroid-altering medications (e.g., lithium, amiodarone)
c.Use of oral contraceptives, HRT, or iron supplements
d.Chronic liver disease or systemic autoimmune illness

Methodology:

1. Detailed demographic and clinical data were collected.
2. Wood's lamp was used to classify melasma into epidermal, dermal, or mixed types.
3. Modified MASI score was calculated using 0.3 x (Darkness of forehead x Area involved of forehead) + 0.3 x (Darkness of right malar x Area involved of right malar) + 0.3 x ((Darkness of left malar x Area involved of left malar)+0.1 x (Darkness of chin x Area involved of chin)10

Region	Intensity of Pigmentation	Homogeneity of Pigmentation	Affected Area	Multiplication Factor	Value
Forehead	**( )**	+	**X**	**0.3**	
Right malar	**( )**	+	**X**	**0.3**	
Left malar	**( )**	+	**X**	**0.3**	
Chin	**( )**	+	**X**	**0.1**	
MASI					**SUM TOTAL**

Intensity and Homogeneity of pigmentation categories:

0 = None, 1 = Mild, 2 = Moderate, 3 = Marked, 4 = Maximal

Affected area categories:

0 = Normal skin; 1 = ≤10%; 2 = 10–29%; 3 = 30–49%; 4 = 50–69%; 5 = 70–89%; 6 = 90–100%

mMASI Score Range	Severity
0 – 8	Mild
8 – 16	Moderate
>16	Severe

4. TSH levels were measured using a standardized chemiluminescent immunoassay.
5. Statistical tests included ANOVA and Pearson correlation; $p < 0.05$ was considered significant.

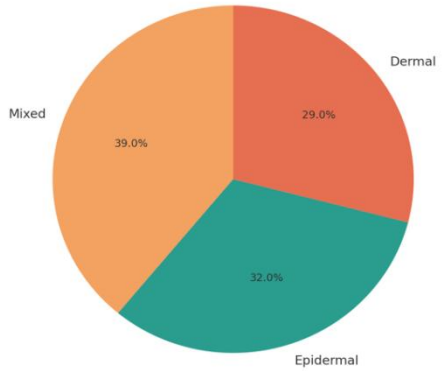
Results

Demographic Characteristics:

a. Mean age: 37.4 years (range 22–54)
b. Female predominance: 83% women

Clinical Distribution:

- **Mixed Melasma:** 39%
- **Epidermal Melasma:** 32%
- **Dermal Melasma:** 29%



Mean TSH Levels by Melasma Type:

a. Dermal: 3.39 ± 1.57 mIU/L
b. Epidermal: 2.80 ± 1.56 mIU/L
c. Mixed: 3.02 ± 1.44 mIU/L
d. ANOVA p-value: 0.313 (not significant)

Correlation Analysis:
TSH vs. mMASI score: r = -0.025, p = 0.807 (non-significant)

Discussion

Thyroid hormones play a critical role in skin physiology, including melanogenesis, through direct effects on melanocyte metabolism and indirect modulation via the hypothalamic-pituitary-thyroid (HPT) axis. Elevated TSH levels, particularly in subclinical hypothyroidism, have been proposed as potential contributors to hyperpigmentation. However, our study, despite documenting a mildly elevated mean TSH level, did not establish a statistically

Trivedi et al. (2015) demonstrated elevated TSH and thyroid antibodies in melasma patients, highlighting a potential role of thyroid autoimmunity2. Achar and Rathi (2011) presented epidemiological evidence supporting hormonal influences in melasma, particularly in women.3

Kheradmand et al. (2019) conducted a systematic review and meta-analysis that confirmed a statistically significant association between thyroid dysfunction—especially hypothyroidism—and melasma, thereby supporting the theory of endocrine contribution.4

Kim et al. (2020) examined the interplay of thyroid autoimmunity and oxidative stress, suggesting that autoantibodies may amplify melanogenesis through inflammatory cascades. 5

Babu et al. (2015) observed a higher frequency of thyroid dysfunction in melasma patients, although without statistically significant differences in mean TSH levels.6

Shah and Desai (2016) found elevated anti-TPO antibodies and subclinical hypothyroidism, supporting an autoimmune pathogenesis.7

Mehmood et al. (2020) identified that 60% of melasma patients exhibited clinical or subclinical hypothyroidism, reinforcing the recommendation for thyroid function screening in affected individuals.8
Chandrakanth and Shilpa (2022) provided additional insight by linking iron deficiency with thyroid dysfunction in female melasma patients, emphasizing the need to assess both hormonal and nutritional status when managing chronic pigmentary disorders.9

Together, these studies build a compelling narrative that melasma is not merely a result of cutaneous photodamage but may reflect underlying systemic disturbances. Although our study did not reveal statistically significant findings, the trends observed support broader screening protocols. Limitations such as absence of a control group, modest sample size, and lack of anti-TPO and ferritin testing must be addressed in future research.

Comprehensive studies incorporating thyroid profiles, autoantibodies, micronutrient levels, and environmental factors will help clarify the multifactorial pathogenesis of melasma. Such efforts could eventually guide holistic, multidisciplinary therapeutic approaches.

Figure 1 melasma noted over the bilateral malar and upper lip

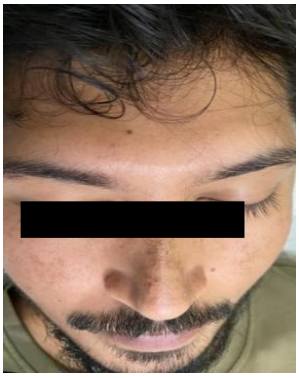
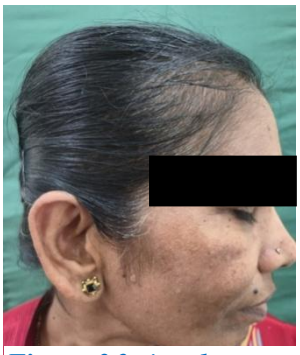


Figure 2melasma noted over the nasal bridge



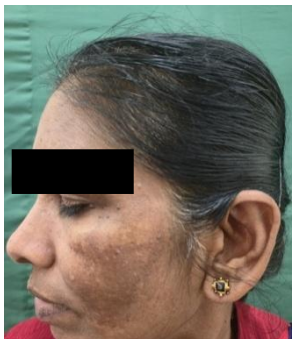


Figure 3& 4 melasma noted over the temple and b/l malar area

Conclusion

This study found no significant association between TSH levels and clinical variants or severity of melasma in 50 patients. While thyroid dysfunction remains a plausible systemic contributor to pigmentary disorders, TSH alone may not serve as a reliable biomarker for melasma.

Future studies should focus on thyroid autoantibodies, free T3/T4, and comparative analysis with healthy controls to elucidate the role of thyroid function in melasma more comprehensively.

Conflicts of Interest:None declared.

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Ethical Clearance: Obtained from the Institutional Ethics Committee, MVJ Medical College and Research Hospital, Bangalore.

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