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Clinical Profile of Male Melasma and Association of its Severity with Serum Testosterone

Sudip Parajuli, Ashu Sharma, Laxman Chapagain, Manisha Gartaula, Pooja Gupta, Upama Paudel

Author(s) affiliation

Department of Dermatology and Venereology, Maharajgunj Medical Campus, Tribhuvan University Teaching Hospital, Institute of Medicine, Kathmandu, Nepal

Corresponding author

Upama Paudel, MBBS, MD
upama_ups@yahoo.com

ABSTRACT

Introduction

Melasma is a common skin condition presenting with symmetric brown pigmentation on sun exposed areas, especially face. Most of the studies in melasma have been focused on females. Few studies in male melasma have revealed lower level of serum testosterone level. This study aimed to describe male melasma in terms of clinical presentation, severity, and relationship with serum testosterone levels.

Methods

This was a descriptive study where cases of male melasma were assessed for clinical patterns and severity using modified melasma area severity index (mMASI). The association of severity of melasma with serum testosterone level was determined.

Results

Forty-two males with melasma were enrolled in the study. The age ranged from 20 years to 57 years, with a mean age of 32.7±7.5 years. Majority had Fitzpatrick's skin type IV and malar pattern was predominant. Average time of sun exposure ranged from 30 minutes to 8 hours. mMASI score ranged from 2.40 to 14.90. Serum testosterone level was lower than the reference range in 14 (33.3%) cases. However, multiple linear regression analysis showed that serum testosterone was not independently associated with melasma severity after adjusting for age and sun exposure in hours.

Conclusion

Male melasma was common in Fitzpatrick type IV skin with predominant malar pattern. This study showed that serum testosterone was not associated with melasma severity in males after adjusting for age and duration of sun exposure.

Keywords
Male melasma; mMASI; serum testosterone

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INTRODUCTION

Melasma is characterized by symmetric, light to dark brown pigmentation on sun exposed areas, mostly face, seen in all races and both genders. It is more common in women of childbearing age and dark-skinned individuals of Hispanic, Asian, and African origin.[1]

The prevalence ratio of females to males is highly variable, ranging from 4:1 to 39:1.[2] The frequency of melasma in men was reported to be very high (20.5%) in an Indian study.[1] It is more common in individuals with Fitzpatrick skin types IV–V.[3] Three clinical types of melasma have been described: centro-facial type (on forehead, cheeks, nose, upper lip and chin), mandibular type (on mandibular ramus) and symmetrical malar type (localized to cheeks and nose).[4] Multiple factors have been implicated in the causation of melasma besides hormonal factors including genetic factors, sunlight, cosmetics, thyroid dysfunction, phototoxic and anti-seizure drugs.[5] Hormonal factors like pregnancy, oral contraceptive pills, and hormonal therapy are some of the common etiological factors in the development of melasma in women.[6] Few studies have been published regarding melasma in men, hence, the cause is not fully understood. Sialy et al described high levels of luteinizing hormone and lower levels of testosterone in 15 men with melasma.[7] Low level of testosterone was noted in a male who developed melasma after receiving ethinyl estradiol for prostate cancer.[8]

Very less is known about the clinical and etiological factors in male melasma. This study aimed to describe male melasma in terms of clinical presentation, severity, and relationship with testosterone levels.

METHODS

It was a hospital-based observational cross-sectional study carried out at the Outpatient Department of Dermatology at Tribhuvan University Teaching Hospital (TUTH) from 1st August 2024 to 31st January 2025. Melasma was diagnosed clinically based on a classical presentation of distinct, hyperpigmented macules or patches on photo-exposed areas, especially face, and without symptoms.

The inclusion criteria included males more than 18 years of age and those consenting for the study. Patient with known hypogonadism, on drugs known to cause phototoxicity and increase androgen level on the blood were excluded from the study. Non-probability convenience sampling was done, and sample size estimation was based on the number of male melasma patients seen and available from the records of the Department of Dermatology and Venereology, TUTH in last past 6 months. Clinical examination and Wood's light examination was done. Severity of Melasma was assessed using modified melasma area severity index (mMASI) which is a simple, reliable, and validated tool commonly used in assessing melasma severity.[9,10]

mMASI is a tool to assess the severity of melasma. Calculation of the mMASI score was performed by rating area of involvement (A) and darkness (D) of 4 areas of the face, namely forehead, right malar, left malar and chin. Area of involvement (A) was rated 0 to 6: 0 indicating absent; 1, < 10%; 2, 10% to 29%; 3, 30% to 49%; 4, 40% to 69%; 5, 70% to 89%; 6, 90% to 100%. Darkness (D) was rated as 0 to 4: 0 indicating absent; 1, slight; 2, mild; 3, marked; 4, severe.

These figures were then inserted into an equation [(0.3) x A x D], resulting in the final mMASI score. Total mMASI score ranges from 0 to 24 and calculated by adding scores for 4 areas of the face. mMASI score was interpreted as mild (0-4.9), moderate (5-7.9) and severe (≥8).[9]

To avoid observer variation in assessing the severity of melasma, same observer (Co-investigator) was assigned for calculation of mMASI and was verified again by principal investigator. A sheet of paper with diagram of face was used to depict the areas of hyperpigmentation.

Serum testosterone level of the enrolled cases was evaluated after assessing the severity of melasma. The timing of collection for serum testosterone was in 1st half of the morning (8 am-12 noon). Serum testosterone level was measured using ARCHITECT 2nd generation testosterone assay which is chemiluminescent microparticle immunoassay for the quantitative determination of testosterone in human serum and plasma. For this study purpose, normal range to be considered was 494 to 980ng/dl, as per the reference value of lab of Tribhuvan University Teaching Hospital, Kathmandu, Nepal.

The data from the proforma were entered and analyzed using SPSS 26. Socio-demographic and clinical information was organized into tables, and descriptive statistics such as frequencies, percentages, means, and standard deviations (SD) were computed. Chi-Square test was used to compare categorical data. Multiple linear regression analysis was done to see an association between age, duration of sun exposure, duration of melasma, and serum testosterone level. A p-value of less than 0.05 was considered statistically significant.

The study was approved by Institutional Review Committee of Institute of Medicine, reference no. 538 (6-11) E2 080/081).

RESULTS

A total of 42 males with a clinical diagnosis of melasma were enrolled in the study. The age of the

Table 1. *Clinical and demographic characteristics of males with melasma*

Characteristics	No.
Total number of cases	42
Age	20 to 57 years (Mean: 32.7±7.5)
Age groups	
≤ 25 years	8 (19%)
26-35 years	19 (45.2%)
36-45 years	14 (33.3%)
46-55 years	0 (0%)
56-65 years	1 (2.4%)
>65 years	0 (0%)
Duration of melasma	
<6 months	13 (31%)
6-12 months	4 (9.5%)
1-2 years	9 (21.4%)
2-4 years	11 (26.2%)
>4 years	5 (11.9%)
Fitzpatrick's skin type	
Type III	1 (2.4%)
Type IV	28 (66.7%)
Type V	13 (31%)
Clinical type of melasma	
Malar	17 (40.5%)
Centrofacial	15 (35.7%)
Mixed	10 (23.8%)
Wood's lamp examination findings	
Level of pigmentation	
Epidermal	25 (59.5%)
Dermal	0 (0%)
Mixed	17 (40.5%)

patients ranged from 20 years to 57 years, with a mean age of 32.7±7.5 years. Maximum number of cases belonged to the age group of 26-35 years (n=19, 45.2%). The duration of melasma ranged from 3 months to 15 years. Most of the cases were suffering from melasma for less than six months followed by 2-4 years. Majority of cases had Fitzpatrick's skin type IV followed by type V. There was single case of Fitzpatrick's skin type III, and none were type I, II and VI. Malar pattern of melasma was predominant followed by centro-facial and mixed.

On Wood's light examination, epidermal melasma outnumbered mixed type, none had pure dermal melasma. (Table 1)

Family history of melasma was present in only 6 (14.3%) cases. Average time of sun exposure ranged from 30 minutes to 8 hours, with a mean of 2.34±1.6. Majority of cases (n=30, 71.4%) had daily sun exposure of less than 2 hours followed by 2-4 hours and >4 hours in 6 (14.3%) cases each. Modified MASI score ranged from 2.40 to 14.90 with a mean of 6.51±2.97. Number of cases of mild and severe melasma were equal (n=16, 38.1%), 10 (23.8%) cases had moderate melasma.

The serum testosterone level ranged from 160.730 ng/ml to 1196 ng/ml, with a median of 600.680 ng/ml. The level was lower than the reference range in 14 (33.3%) cases and within the normal range in 28 (66.7%) cases. Majority of cases with mild (n=14, 87.5%) and moderate (n=7, 70%) melasma had normal level of serum testosterone, whereas nine (56.2%) out of sixteen cases of severe melasma had low serum testosterone level.

On categorical analysis of the data, the association of melasma severity with low serum testosterone level was found to be statistically significant (p= 0.031) (Table 2). Correlation analysis showing relationships between serum testosterone levels and clinical variables in male patients with melasma has been in shown in Table 3. This table shows that serum testosterone was negatively correlated with age and mMASI but was not statistically significant. However, sun exposure was weakly correlated with severity of melasma and was statistically significant. On multiple linear regression analysis, serum testosterone was not independently associated with severity of melasma and duration after adjusting for age (β=-0.339, p=0.028) and sun exposure in hours (β=0.442, p=0.008) . The model explained 25.7% variance in serum testosterone (R^2= 0.257, p=0.024).

Table 2. *Melasma severity and serum testosterone level*

mMASI	Serum testosterone		Total	Chi- square test
	Low (<494ng/ml)	Normal (>494ng/ml)		
Mild (0-4.9)	2(4.8%)	14(33.3%)	16(38.1%	P= 0.031
Moderate (5-7.9)	3(7.1%)	7(16.7%)	10(23.8%)	
Severe (>or=8)	9(21.4%)	7(16.7%)	16(38.1%)	
Total	14(33.3%)	28(66.7%)	42(100%	

Table 3. Correlation matrix showing relationships between serum testosterone levels and clinical variables in male patients with melasma (n=42)

Variables	Age (years)	Sun exposure (hours/day)	Duration of Melasma (years)	mMASI
Serum testosterone	r= -0.28 p=0.06	r= 0.29 p=0.05	r=0.04 p=0.75	r=-0.11 p=0.47
Sun exposure	-	-	-	r=0.39 p=0.009*

Table 4. Multiple linear regression analysis showing factors associated with serum testosterone level in male patients with melasma(n=42).

Predictor variable	Unstandardized coefficient(B)	Standard error (SE)	Standard coefficient (β)	95% CI for B	p value
Age(years)	-10.183	4.74	-0.339	-20.42 to -1.2	0.028
Sun exposure(hours/day)	65.4	23.4	0.44	17.79 to 113.09	0.008
Duration (years)	3.52	12.26	0.04	-21.32 to 28.37	0.775
mMASI	-19.61	12.67	-0.24	-45.29 to 6.061	0.13

DISCUSSION

There are numerous factors enlisted as a cause or aggravating agent in melasma. Multiple factors are supposed to play their part in conjunction. Female melasma is more widely studied. Ultraviolet radiation and hormonal factors are suggested to be the most common precipitating and aggravating factors in melasma of females. Causes of melasma in men is less explored, and role of hormonal factors is suggested by few studies.

The mean age of patients in our study was 32.7±7.5 years, with majority of cases belonging to the age group of 26-35 years. This finding was consistent with few Indian studies.[1,11] Melasma is found to be more common in Fitzpatrick's skin type IV and V. Majority of cases (n=28, 66.7%) had Fitzpatrick's skin type IV in our study. This was in accordance with the studies from India and Indonesia.[11,12,13] In women, the centrofacial pattern is more common whereas in men malar type is mostly seen.[1] Our study had consistent finding with predominance of malar type(n=17, 40.5%). Handa et al and Rajasekhar et al also reported malar melasma to be more common in males with 52% and 65.3% cases respectively.[11,13] Similar findings were reported by few other studies as well.[6,12] Wood's lamp examination of melasma lesions revealed epidermal type in majority (n = 25, 59.5%), similar to that reported by Rajasekhar et al.[13]

Genetic factor, in terms of familial predisposition is a risk factor of melasma.[6,14] Rajasekhar et al reported a positive family history in 58.3% of male melasma cases.[13] This finding was contradictory to our finding where only 14.3% had a positive family history. Ultraviolet light and visible light are now considered to be important factors in melasma causation and aggravation, irrespective of gender.[15] Higher prevalence of melasma was found in outdoor workers and those with prolonged sun exposure.[1,11,12,13] Majority of cases (n=30, 71.4%) had sun exposure of less than 2 hours per day in our study, and was significantly weakly correlated with severity of melasma (Table 3).

Only 14 out of 42 cases of melasma had testosterone level below the reference range in our study. Majority of cases with mild (n=14, 87.5%) and moderate (n=7, 70%) melasma had normal level of serum testosterone, whereas nine (56.2%) out of sixteen cases of severe melasma had low serum testosterone level. Though the association of melasma severity with low serum testosterone level was statistically significant (p =0.031) on chi square test, the testosterone levels were not independently associated with severity of male melasma on multiple regression analysis considering other variables which included age, duration of sun exposure and duration of melasma. The significant association observed on categorical analysis may reflect grouping effect rather than true linear biological relationship. When serum testosterone and melasma severity were analyzed as continuous variable and the potential confounders were adjusted for, the association was no longer significant. This shows that serum testosterone may not be an independent determinant of male melasma. Low testosterone level in male melasma was reported by a study from Indonesia,[12] Sarkar et

al,[1] and Sialy et al.[7] At the same time Rajasekhar et al reported a low serum testosterone level in only two out of 72 men with melasma.[13] Handa et al concluded that hormonal influences possibly do not have a role in the pathogenesis of melasma in males.[11] This study thus concludes that male melasma is not associated with low serum testosterone level after adjusting for confounders.

There are some limitations of this study like small sample size, lack of control group and consideration of timing of assessment of serum testosterone level. A multicenter case and control study with more detailed epidemiological exploration and hormonal profile is needed to delineate the factors that cause or aggravate melasma in men. Future studies should try to address all these issues to define more certainty about association of serum testosterone with male melasma.

CONCLUSION

Male melasma was seen in age ranging from 20 years to 57 years. Malar pattern and epidermal phenotype was common presentation in these patients with majority having Fitzpatrick skin type IV. Though one third of patients with male melasma had low serum testosterone level, serum testosterone was not independently associated with severity of male melasma.

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CONFLICT OF INTEREST

The author(s) declare that they do not have any conflicts of interest with respect to the research, authorship, and/or publication of this article.

AUTHOR CONTRIBUTIONS

SP, UP : contributed to research concept, design, statistical analysis and final review for the research. AS, LC, MG, PG : contributed to data collection, literature review and manuscript preparation for this research.

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