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Original Research Article

Unveiling Melasma: A Clinico-Epidemiological Exploration of Its Etiological Factors

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Abstract:

Melasma is a disorder of melanin production; distinguished by presence of symmetrical hyperpigmented macules with varying shades of brown, on the cheeks, forehead, upper lip and chin most commonly.

Objectives: To study the clinico-epidemiology and various etiological and precipitating factors implicated in causation of melasma.

Materials & Methods: A cross-sectional observational study was conducted on 251 clinically diagnosed cases of melasma. Purposive sampling technique was used. SPSS 23 software was used for analysis.

Results: The mean age of the melasma patients was 29.78 years. The most frequently affected population belonged to 18-30 years. Most of the study population was females. A positive family history of melasma was reported by 67.3% patients. Sun exposure was found to be an important aggravating factor. Malar melasma was most prevalent pattern seen (54.6%).

Conclusion: The present study provides valuable insights into the clinical characteristics and demography of melasma, emphasizing the significant impact of sun exposure and genetic predisposition on the condition.

Introduction

Melasma is a disorder of melanin production; distinguished by presence of symmetrical hyperpigmented macules with varying shades of brown, on the cheeks, forehead, upper lip and chin most commonly. [1, 2, 3] Prevalence of melasma ranges from 9% in Hispanic populations to 40% in Southeast Asians. [4] In India, facial melasma affects 20–30% of women between the ages of 40 and 65. Men can also have melasma, albeit it is less prevalent. [5] It primarily affects those with higher levels of skin pigmentation, specifically those classified as Fitzpatrick skin types III and IV. [6] Between the ages of 20 and 40 is when melasma usually first appears. [4] The lesions on the face can be divided into three categories based on their clinical distribution: (i) Centrofacial pattern, (ii) Malar pattern, and (iii) Mandibular pattern. [7]

Potential causes linked to onset of melasma include genetics, pregnancy, oral contraceptive use, UV radiation and sun exposure, stress, genetic susceptibility, hormonal fluctuations, certain cosmetic chemicals, phototoxic medications and hypothyroidism. [6, 7]

Indian studies have also demonstrated a notable occurrence of positive familial backgrounds contributing to the development of melasma. [8] Sun exposure is one of the primary factors that significantly influence melanogenesis, given that melanin synthesis is stimulated by both visible light and ultraviolet radiation (UVR). [9]

Patient Selection and Methods

Study Design: Hospital based Cross sectional study

Study Population: Patients attending the dermatology outpatient department

Inclusion Criteria: All consenting patients with clinical diagnosis of melasma aged 18 years and above of either gender.

Exclusion Criteria: Patients who underwent treatment for melasma within last 4 weeks and those with co-existent other pigmentary disorders.

A total of 251 patients clinically diagnosed with melasma and confirmed with wood's lamp and dermoscopy were enrolled in the study after providing informed and written consent.

Data was collected including demographic details such as age, address, gender, marital status, religion, occupation, socio-economic class, and education status. Detailed clinical history, general physical examination and cutaneous examination were carried out. Based on the site involved patients were categorized into the various clinical subtypes.

Data Analysis: Statistical Package for Social Sciences (SPSS software 23.00 for windows). Appropriate statistical tests were applied.

Results

The mean age of the melasma patients was 29.78 (SD = 7.7) years, ranging from 18 to 59 years. Out of the 251 patients, most of the melasma patients (48.2%) were in the age group of 31 to 40 years of age.

Table 1: Age group distribution of patients

Age group (years)	Frequency (number of patients)	Percentage (%)
18-30	89	35.5%
31-40	121	48.2%
41-50	30	12.0%
51-60	11	4.4%
Total	**251**	**100**

The mean age of onset of melasma patients was 25.9 years (SD = 6.26). Most frequently affected population in my study was in the age group of 18 to 30 years (41%).

Table 2: Age group distribution of age of onset of melasma patients

Age group	Frequency	Percentage (%)
18-30	103	41%
31-40	80	32%
41-50	60	24%
51-60	8	3%
Total	**251**	**100**

In our study there were 215 (85.7%) females and 36 (14.3%) males. 159 patients (63.3%) were married, while 92 patients (36.7%) were unmarried.

Table 3: Description of gender of the patients

Gender	Frequency	Percentage (%)
Female	215	85.7
Male	36	14.3
Total	**251**	**100**

Table 4: Description of marital status of the patients

Marital Status	Frequency	Percentage (%)
Married	159	63.3
Unmarried	92	36.7
Total	**251**	**100**

In the study, maximum patients (48.6%) worked outdoors. Most of the patients (62.5%) belonged to the lower middle socioeconomic class.

Table 5: Description of occupation (outdoor/indoor) of the patients

Occupation (outdoor/indoor)	Frequency	Percentage (%)
Indoor	74	29.5
Outdoor	122	48.6
Unemployed	55	21.9
Total	**251**	**100**

Table 6: Description of socio-economic class of the patients

Socio economic class	Frequency	Percentage (%)
Lower	31	12.4
Lower Middle	157	62.5
Upper Lower	23	9.2
Upper Middle	40	15.9
Total	**251**	**100**

The duration of the condition varied: 20 patients (8.0%) had experienced symptoms for less than 6 months, 37 patients (14.7%) for 6 months to 1 year, 58 patients (23.1%) for 1 to 2 years, 20 patients (8.0%) for 2 to 3 years, 44 patients (17.5%) for 3 to 5 years, and 72 patients (28.7%) for more than 5 years. 210 patients (83.7%) experienced a gradual progression, while 41 patients (16.3%) experienced a rapid progression.

Table 7: Description of duration

Duration	Frequency	Percentage (%)
Less than 6 months	20	8.0
6 months-1year	37	14.7
1-2 Years	58	23.1
2-3 Years	20	8.0
3-5 Years	44	17.5
More than 5 Years	72	28.7
Total	**251**	**100**

Seasonal variation was noted as 54 patients (21.5%) reported no seasonal variation, 181 patients (72.1%) experienced exacerbation of symptoms during summer, and 16 patients (6.4%) experienced exacerbation during winter.

Patients reported various comorbidities: 5 patients (2.0%) had asthma, 1 patient (0.4%) had atopic diathesis, 18 patients (7.2%) had diabetes, 2 patients (0.8%) had dyslipidemia, 16 patients (6.4%) had hypertension, 9 patients (3.58%) had both diabetes and hypertension, 12 patients (4.78%) had hypertension with dyslipidemia and 188 patients (74.9%) reported no comorbidities.

Table 8: Description of comorbidities in the patients

Comorbidities	Frequency	Percentage (%)
Asthma	5	2.0
Atopic diathesis	1	0.4
Diabetes	18	7.2
Dyslipidaemia	2	0.8
Hypertension	16	6.4
DM + HTN (hypertension)	9	3.58
HTN + dyslipidaemia	12	4.78
None	188	74.90
Total	**251**	**100**

In the study, 34 patients (13.6%) had received Ayurvedic/Homeopathic treatments, 12 patients (4.8%) had undergone injectable treatments, 35 patients (13.9%) had taken oral medications, 53 patients (21.1%) had used topical treatments, 39 patients (15.5%) had received both topical and oral treatment, 16 patients (6.4%) had received both oral and injectable treatment and 62 patients (24.7%) had not received any previous treatment.

Table 9: History of previous treatment of the patients

History of Previous treatment	Frequency	Percentage (%)
Ayurvedic/ Homeopathic	34	13.6
Injectable	12	4.8
Oral	35	13.9
Topical	53	21.1
Oral and Topical	39	15.5
Oral and injectable	16	6.4
No	62	24.7
Total	**251**	**100**

In the study, only 1 patient (0.4%) had a history of hyperthyroidism and 18 patients (7.2%) had a history of hypothyroidism. 82 melasma patients (32.7%) had a negative family history, while 169 patients (67.3%) had a positive family history. Maximum patients (28.7%) reported more than 4 hours of sun exposure. Out of these, 46.6% reported history of sun exposure in the afternoon time and only 24.3 % patients reported using sunscreen. In the study, patients reported their use of electronic devices as follows: 71 patients (28.3%) used them for less than 2 hours, 116 patients (46.2%) used them for 2 to 5 hours, 59 patients (23.5%) used them for more than 5 hours, and 5 patients (2.0%) reported not using electronic devices. Amongst the female patients, 112 patients (77%) reported onset during pregnancy.

Table 10: Role of various etiological factors

		Present	Absent
Seasonal variation	**Winter exacerbation**	16 (6.4%)	
Thyroid disease	**Hypothyroidism**	18 (7.2%)	232 (92.4%)
	Hyperthyroidism	1 (0.4%)	
Family history		169 (67.3%)	82 (32.7%)
Menstrual irregularity		41 (19%)	174 (81%)
OCP use		26 (12%)	189 (88%)
Onset during Pregnancy		112 (77%)	34 (23%)

In the study, patients reported various associated dermatological conditions. Maximum patients reported acne vulgaris (24.3%) while a few reported both acne vulgaris and acne scars (1.2%). Freckles & lentigens were common, reported by 16.7% of patients, some of whom also reported concurrent hirsutism (0.4%). However, a significant proportion (41.0%) reported no associated dermatological conditions. This diversity underscores the multifaceted nature of dermatological manifestations in the study population.

Table 12: Description of associated dermatological conditions

Associated Dermatological Conditions	Frequency	Percentage (%)
Acanthosis Nigricans (AN)	3	1.2
Acanthosis Nigricans + Hirsutism	1	0.4
Acne Vulgaris (AV)	61	24.3
Acne Vulgaris + Acne Scars	3	1.2
Dermatosis papulosis nigra (DPN)	2	0.8
Freckles & Lentigens	42	16.7
Freckles, Lentigens & Hirsutism	1	0.4
Hirsutism	21	8.4
None	103	41.0
Peri-orbital Hyper melanosis (POH)	8	3.2
Seborrheic Keratosis	6	2.4
Total	**251**	**100**

The majority patients reported involvement of both cheeks (95.20%), followed by the nose (55.40%). A substantial proportion reported involvement of the forehead (39.00%), chin (34.30%), and upper lip (30.70%). Additionally, a small percentage reported involvement of extra facial sites (5.60%).

Table 13: Description of site involvement

Site involvement	Frequency	Percentage (%)
Facial Site		
Forehead	98	39.00%
Bilateral cheeks	239	95.20%
Nose	139	55.40%
Upper lip	77	30.70%
Chin	86	34.30%
Extra Facial Sites (Forearm)	14	5.60%

Most prevalent melasma pattern was malar, reported by 137 patients (54.6%), followed by centrofacial involvement in 106 patients (42.2%). Mandibular involvement was less frequent, reported by 8 patients (3.2%).

Discussion

The mean age of 29.78 years in our study is younger compared to the mean age reported by Krupashankar D.S et al. in their study as 37.2 years (SD = 9.3) among their 331 patients. [11] Similarly, Pangti R et al. reported in their study a mean age of 35.25 years, [12]

The female predominance in our study aligns with findings from other studies. Kumar A et al. reported that out of 60 patients, 50 were females. [13] Krupashankar D.S et al. found a male-to-female ratio of 1:4 (65 males and 266 females). [11]

The average age of onset of melasma in the current study was 25.9 years. Krupashankar D.S et al. reported a mean age of onset of 34.1 years, [11] while according to Wanniarachchi C.G et al., the majority of patients had an age of onset between 40 and 49 years old, with a mean age of 47.2 years (SD = 9.78). [14] The earlier onset in the current

study may be due to potential genetic or environmental differences influencing the onset of melasma.

In this study, 74 patients (29.5%) worked indoors, 122 patients (48.6%) worked outdoors, and 55 patients (21.9%) were unemployed. Results of our study coincided with Handel A.C who reported 58.1% are outdoor workers. [15] This highlights the significance of constant exposure to the sun and the development of melasma. In contrast to findings of our study Winaya K et al. stated in their research that 20 (87%) patients worked indoors and only 3 (13%) patients worked outdoors. [16]

Similar to our study, Sarangi S et al. found that according to the modified Kuppuswamy socioeconomic scale, the majority of the patients in their study - 76 patients (31%) belonged to the lower medium socioeconomic group, while 66 patients (26.9%) belonged to the lower socioeconomic class. [17]

In the study, the duration of melasma varied among patients. Kumar A et al. reported that out of 60 patients, 14 (23.33%) had melasma for less than 1 year, while 16 (26.66%) had lesions for more than 5 years. [13]

Higher percentage of cases with positive family history were present in our study compared to other studies. Kumar A et al. reported that 18 out of 60 patients had a positive family history. [13] Krupashankar D.S et al. observed positive melasma family history in 31.1% of their patients. [11]

Almost similar to our study, Wanniarachchi C.G et al. noted that the majority of their patients (65.1%) were exposed to the sun for more than 2 hours at midday, with only 31.4% using sun protection methods. [14]

Similar to our study, Liu W et al. also stated in their study that melasma pigmentation typically increases in the summer or after prolonged exposure to sunlight, and it decreases in the winter. [18] 11% of patients in a multicentric study conducted in India by Sundara D et al. had hypothyroidism in consistent to findings of our study. [19]

Kumar A et al. stated that the area most frequently impacted was the malar region (52 patients), followed by the centrofacial region (31 patients), with the least involvement in the forehead region (24 patients). [13] Krupashankar D.S et al. observed that the predominant patterns were centrofacial melasma (42%) and malar melasma (39%). [11] These findings in our study and others illustrate the varying distribution patterns of melasma lesions across different studies.

Conclusion

The present study provides valuable insights into the clinical characteristics and demography of melasma, emphasizing the significant impact of sun exposure and genetic predisposition on the condition. Additionally, the diverse pigmentation types observed underscores the necessity for tailored treatment approaches according to the specific clinical type of melasma.

Limitations

Because this study was conducted at a single hospital, its findings cannot be extrapolated to the general population. There is a potential for memory and recall bias.

Conflict of interest - Nil

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