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Original Research Article

Melasma and sun exposure: a clinicoepidemiological study

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ABSTRACT

Background: Melasma is a chronic hyper pigmentary disorder mainly affecting females. It presents over the sun exposed areas of face. Various factors implicated in the etiology are sun exposure, pregnancy, OCPs, hormonal therapy, thyroid disorders, cosmetic use etc. The major causative factors are genetic predisposition and sun exposure. This study was aimed at studying the relation between duration of sun exposure and melasma development.
Methods: 100 patients diagnosed with melasma were included. Detailed history was taken and clinical examination done. Modified MASI score was calculated. Patients were divided into four groups depending on hours of sun exposure. Data was collected in a proforma, tabulated and analyzed.
Results: F: M ratio was 3.54:1 with 78% females and 22% males. 46% of females were in 4th decade and 72% of males were in their third decade. 35% of females were in 21-30 years age. Third decade was the commonest age of onset seen in 49% of patients. 46% patients had <1 hour and 23% had >6 hours of sun exposure per day. A p value of 0.0006 was found between the mMASI scores of group A and group D which was highly significant.
Conclusions: More number of young males with melasma in their third decade are seeking treatment. Increase in the duration of exposure to solar radiation leads to more severe melasma. So, sun exposure is a major aggravating factor. There is a need to create awareness about sun protection.

Keywords: Melasma, Epidemiology, Sun exposure

INTRODUCTION

Melasma is a common acquired, chronic and relapsing pigmentary disorder, which presents clinically with bilaterally symmetrical brown-black circumscribed patches affecting mostly sun-exposed areas of skin, especially the face. It is most prevalent among young to middle aged women who are dark skinned and of Asian or African origin.[1] This condition accounts for 0.25 to 4% of the patients presenting to dermatology outpatient clinics in South East Asia and is the commonest hyper pigmentary disorder among Indians.[2,3] Multiple factors have been proposed in the etiology like genetic factors, pregnancy, exposure to ultraviolet light, combined oral contraceptive pills (OCPs), hormone replacement therapy, use of cosmetic preparations, thyroid gland dysfunction and anticonvulsive drugs.[4,5] Melasma is common in women, dark skinned individuals and high UV index countries.[6] Depending on the sites of involvement over face, melasma is classified into three types: centrofacial, malar and mandibular. The centrofacial pattern includes the lesions over the forehead, nose, cheeks, upper lip and chin. Malar pattern involves both cheeks and nose. In the mandibular pattern, lesions are present over the mandibular ramus.[7] The severity of melasma over the face is measured using modified melasma area severity index score (mMASI score), that ranges from 0-24. This scoring system takes into account the area involved and the severity of pigmentation.[8] The most striking concern with regards to melasma is the resultant cosmetic and social stigma, which makes the patient to search for a therapeutic solution. Melasma adversely affects the quality of life of the patients as the lesions are present on the face. The

purpose of this study was to investigate the relation between sun radiation exposure and development of melasma at the tertiary care hospital attached to Raichur institute of medical sciences, Raichur.

METHODS

This study was performed in the outpatient department of dermatology at Raichur institute of medical sciences, Raichur. Patients presenting with the chief complaints of facial pigmentation were evaluated. Melasma was diagnosed by clinical examination. One hundred patients with melasma who gave consent for the study were included. Detailed history was obtained with respect to age and sex of the patient, duration of pigmentation, occupation, duration of sun exposure per day, family history, history of cosmetics/ sunscreen application, drug history. Modified melasma area severity index score (mMASI score) was calculated in each patient using the formula given in Table 1. mMASI scores were divided on the basis of hours of sun exposure into four groups as group A, B, C, D (Table 2). Different groups of mMASI scores were compared to show the significance in association between hours of sun exposure and severity of melasma. All details obtained were noted in a proforma, tabulated in Microsoft excel worksheet. Statistical analysis was done using IBMSPSS software and unpaired students T test was used to calculate p value. A $p<0.05$ was considered statistically significant.

Table 1: Modified melasma area severity index score (mMASI).

Location of melasma	Scoring	Calculation for total score
Fore head	0.3 (A)(D)	Forehead mMASI score + left malar mMASI score + right Malar mMASI score + chin mMASI score = total score
Left malar	0.3 (A)(D)	
Right malar	0.3 (A)(D)	
Chin	0.1 (A)(D)	
Scoring system		
Area involved rated 0-6:		Darkness rated 0-4:
0 indicates absent		0 indicates absent
1-<10%		1-Slight
2-10 to 29%		2-Mild
3-30 to 49%		3-Marked
4-50 to 69%		4-Severe
5-70 to 89%		
6-90 to 100%		
Maximum mMASI score-24		

Table 2: Groups on basis of hours of sun exposure per day.

Hours of sun exposure per day	Group name
<1	Group A
1-3	Group B
3-6	Group C
>6	Group D

RESULTS

Age at the time of presentation and sex distribution

Among the 100 patients included in the study, we had 78 female patients and 22 male patients diagnosed with melasma. Female patients were 3.5 times more than males. The age of the youngest patient was 19 years and age of the eldest patient being 56 years. Most number of females (46%) were in the age group of 31-40 years with mean age 33.38±7.41. More number of males (72%) presented were in their third decade with mean age 28.82±6.48. Among 100 patients' maximum numbers of patients (44%) were in the age group of 21-30 years (Table 3 and graph 1).

Table 3: Age at the time of presentation and sex distribution.

Age (year)	Number of patients				Total	%
	F	%	M	%		
≤20	03	3.85	2	9.09	5	5
21-30	28	35.90	16	72.73	44	44
31-40	36	46.15	3	13.64	39	39
41-50	8	10.26	1	4.55	9	9
>50	3	3.85	0	0.00	3	3
Total	78	100	22	100	100	100

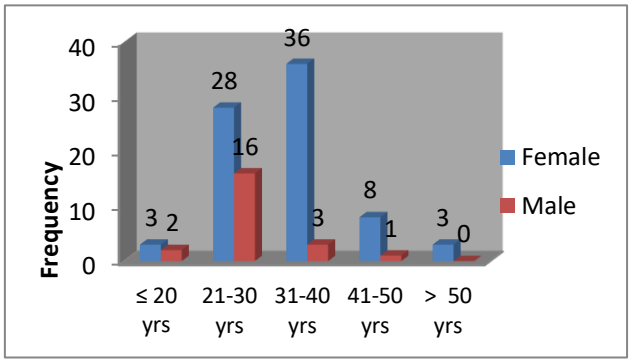

Figure 1: Age and sex distribution.

Duration of melasma

In our study, maximum number of patients presented for treatment 1-3 years after developing melasma (43%). 24 patients presented within 1 year of developing melasma (Table 4).

Table 4: Duration of melasma

Duration of melasma (years)	No of patients				Total	%
	M	%	F	%		
<1	7	31.8	17	21.79	24	24
1-3	11	50	32	41.03	43	43
3-5	3	13.6	15	19.23	18	18
>5	1	4.55	14	17.95	15	15
Total	22	100	78	100	100	100

Occupation

49% of the individuals were housewives. 21 patients (11 females and 10 males) were laborers working in agricultural fields. 7 were doing business as their occupation. 8 patients were doing office work as clerks, bank employees. 5 each patient was working as group D and nursing officers. Only two individuals were students (Table 5).

Table 5: Occupation.

Occupation	Females	Males
House wife	49	0
Field work	11	10
Business	2	5
Nurse	4	1
Group D	4	1
Student	0	2
Office	5	3

Duration of sun exposure

Depending upon the hours of sun exposure per day, 47 patients (45 females and 2 males) revealed that they were being exposed to solar radiation for about less than 1 hour per day, most of them were housewives. 23% of total patients were exposed to sunlight for more than 6 hours per day, all working in agricultural fields (Table 6).

Only 16% of patients gave a history of aggravation of melasma on exposure to solar radiation. 15 were females and one male. None of the patients pointed to sun exposure as the precipitating factor.

Family history

34% of patients gave a history of melasma in their first-degree relatives. Among them 26 were females and 8 were males.

Pattern of melasma

72% of patients had malar type of melasma. 27% had centrofacial and one patient had mandibular pattern.

Modified MASI score and hours of sun exposure

The lowest mMASI score recorded was 2.4 and the highest was 16.8. Mean mMASI score in patients belonging to group A was 7.91±3.42. The mean mMASI score in female patients of group B was 9.59±3.93 and among males 10.63±4.1. The score in group C was 5.4±4.24. Among patients of group D, females had mMASI score of 11.77±4.55 and males had 8.57±3.83 (Table 7).

Table 6: Duration of sun exposure per day.

Duration of sun exposure (hours)	F	%	M	%	Total	%
≤1	45	56.41	2	9.09	47	47
1-3	17	21.79	11	50	28	28
3-6	0	1.28	2	9.09	2	2
>6	16	20.51	7	31.82	23	23
Total	78	100	22	100	100	100

Table 7: Hours of sun exposure and mMASI scores.

Hours of sun exposure per day								
Mean mMASI score	**Group A ≤1 hour**		**Group B 1-3 hours**		**Group C 3-6 hours**		**Group D > 6 hours**	
	F	M	F	M	F	M	F	M
	7.91±3.42	6.3	9.59±3.93	10.63±4.1	0	5.4±4.24	11.77±4.55	8.57±3.83

Table 8: Comparison of mMASI scores.

mMASI scores and sun exposure per day			P value	T value
Both females and males	<1 hour of sun exposure	> 6 hours of sun exposure	0.0045 (significant)	2.907
Only females	<1 hour of sun exposure	> 6 hours of sun exposure	0.0006 (highly significant)	3.627
Only females	<1 hour of exposure	1-3 hours of sun exposure	0.016 (significant)	2.453
Males vs. females	>6 hours of exposure	> 6 hours of sun exposure	0.1168 (not significant)	1.632

The comparison between the mMASI scores of different groups is shown in Table 8. We found a highly significant (p value 0.0006) difference between the scores of group A and group D. There was also significant difference (p value 0.016) between scores of group A and group B. when males and females in the group D were compared, the p value calculated was 0.1168 (>0.05) which was not significant.

DISCUSSION

Melasma is one of the commonest facial pigmentary disorders observed in dermatology clinics nowadays. Its prevalence varies according to ethnic group, skin type and intensity of sun exposure. In a study conducted in Nepal during 2008 showed melasma to be the fourth frequent diagnosis.[9]

In our study, female outranged males in the ratio of 3.54:1, a finding similar to a study conducted by Pawar et al, [10] who reported a female to male ratio of 3.28:1. A multicentric study conducted in India showed a ratio of 4:1.[11] We found 22% of male patients with melasma in our study, which shows an increasing trend in male melasma cases.

The average age of females included in our study was 33.38 whereas the average of males was found to be 28.82. In a study conducted by Achar et al average age of melasma patients was 33.45 years.[12] In this study, majority of the females were in the age group of fourth decade and males in the third decade. Nowadays, a greater number of males in younger age group are seeking treatment for melasma because of increase awareness and cosmetic concern.

The mean age of onset was 30.42 in females and 28.59 in males. Maximum number of patients developed melasma during the age group of 21-30 years (49%). Pawar et al reported the mean age of onset as 29.4, with more than 50% female patients developing melasma during their third decade.

Most of the patients presented to the outpatient department after having melasma for around 1-3 years. The chronicity of the condition was similar in a study by Krupashankar et al.[11]

India is a tropical country with high UV index. Sun exposure is widely accepted to be the most important environmental factor in melasma development.[13] Also melasma lesions were more evident during or after periods of sun exposure.[12] In our study 47% of the patients reported <1 hour of sun exposure per day (group A). Most of these patients were housewives who were exposed to sun on and off during the daily chore activities. 28% of patients gave a history of 1-3 hours of sun exposure, due to their occupation or while travelling between home and workplace. 23% of individuals were exposed to solar radiation for >6 hours per day. Majority of them were working as laborers in fields while doing agricultural work. In a study by Guinot et al.[6] 46.8% of female patients gave a history of ≤1 hour of sun exposure. 89.6% of patients reported sun exposure during the hottest hours of the day.

In our study 16% of the patients told sun exposure as an aggravating factor for melasma. This finding is in great contrast to Guinot et al who reported 84%, Achar et al showing 55.12% sun exposure as an aggravating factor.[6,12] As majority patients in our study were housewives, they were not aware that even < 1 hour of exposure is causing melasma. None of the patients pointed solar radiation as triggering factor.

The average mMASI score in group A patients (n=46) was 7.91±3.42. In group A, 45 patients were females. Group B had 28 patients. The average score in female patients of group B was 9.59±3.93 and among males 10.63±4.1. The score in group C was 5.4±4.24, which had only male patients. Among patients of group D, females had mMASI score of 11.77±4.55 and males had 8.57±3.83. The mMASI scores of group D was more as compared to the scores of group A and group B. This difference was highly significant with a p value 0.0006 between the groups A and D. There was also significant difference (p value 0.016) between scores of group A and group B. This shows that when the duration of sun exposure increases, the melasma also becomes more severe. Ortonne et al performed a multicentric study and reported that an extra 10 hours per week of sun exposure increases the odds of onset of melasma by approximately 27%.[13]

In group D, the scores of males and females were compared, the p value calculated was 0.1168 (>0.05) showing no significant difference. This shows that there are various triggering factors for the development of melasma like genetic, hormonal, skin type and sun exposure to be most important. But sun exposure seems to be a major environmental factor to increase the severity of melasma. Not many people in our country are aware about the sun exposure as a causative factor for melasma.

CONCLUSION

The prevalence of melasma is increasing in males. More number of young males in their late twenties are having concern about their melasma and presenting to dermatology OPDs for treatment. After 30 years not many males are bothered regarding melasma. Females are more worried both in the third and fourth decades. Many factors are contributing to the initiation of melasma, but sun exposure is emerging as a major external aggravating factor. The increase in the severity of melasma is proportional to the duration of exposure to solar radiation. Many patients are not aware that sun exposure is causing or aggravating melasma. So, there is a need to create more awareness about sun protection habits.

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