A Study of Various Etiological Factors in the Causation of Melasma

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ABSTRACT

Background: *Melasma is an acquired pigmentary disorder characterized by symmetrical hyper pigmented macules on the face.*
Aim: *To study the role of various etiological factors in the causation of melasma in female patients.*
Objectives: *To find out the etiological factors of melasma in female patients attending Dermatology OPD of C.R.G.H. within 1 year by interviewing them.*
Patients & Methods: *Sixty -six female patients suffering from melasma, between the ages of 15-45 years, were enrolled in the study and detailed history of each patient was taken.*
Results: *Etiological factors like sun exposure, pregnancy, contraceptive use, familial tendency, cosmetic use, stress and emotional factors play an important role in the development of melasma.*
Key Words: *Melasma, chloasma, melanosomes, OCPs*

INTRODUCTION

Melasma, also called 'chloasma', is a common skin condition of adults in which light to dark brown or greyish pigmentation develops, mainly on the face affecting the cheeks, forehead, upper lip, nose and chin, usually in a symmetrical manner. It may be limited to the cheeks and nose or just overlying the jaw. Although it can affect both genders and any race, it is more common in women and people with darker skin- types. The exact cause is not known, but several factors contribute. These include sunexposure, pregnancy, cosmetics, family history, stress, emotional factors and OCPs. Melasma has an inherited tendency and is usually diagnosed clinically. Histologically, the melanocytes are hypertrophied and show a greater number of dendrites and cytoplasmic organelles, which indicates higher metabolic activity. There is an increased amount of melanin in all the layers of the epidermis, and an increased number of melanosome. Treatment includes topical depigmenting agents like hydroquinone (2-4%), retinoic acid (0.1%) and steroids.

MATERIALS AND METHODS

The present study was a prospective observational study in which sixty -six clinically diagnosed female melasma patients of reproductive age group i.e. 15-45 years attending Dermatology Out Patient Department in C.R.G.H, Ujjain, Madhya Pradesh constituted the subject material for present study. These patients belonged to Ujjain and its adjoining districts.

The patients with post inflammatory hyperpigmentation, other pigmentary disorders with epidermal dermal pigmentation e.g. Nevus of Ota, Nevus of Ito, Mongolian spots and previous cases of melasma were excluded. A detailed history and clinical examination of each patient was carried out. The personal data like family history of melasma, marital status, number of children, age of onset, stress and emotional factors, use of OCPs and cosmetics and exposure to sunlight was recorded. Area and extent of involvement of melasma were also noted. The results of routine investigations like complete blood count, urine examinations, random blood sugar were recorded. The data were collected and transferred to SPSS version 16 and analyzed accordingly.

RESULTS AND OBSERVATIONS

This study was carried out in Department of Dermatology, Venereology and Leprology, R.D. Gardi Medical College & C.R. Gardi Hospital, Ujjain. over a period of one and half years. Sixty six female patients of melasma of reproductive age who presented in our hospital as outdoor were included in our study.

Table 1: Distribution of Number of Cases according to sunexposure

S. No.	Sunexposure	No. of cases	Percent
1.	Present	47	71.2
2.	Absent	19	28.8
	Total	66	100.0

In our study, melasma was found to be aggravated on sun exposure in majority of patients i.e. 47 (71.2%) while no aggravation was seen in 19 (28.8%) of patients.

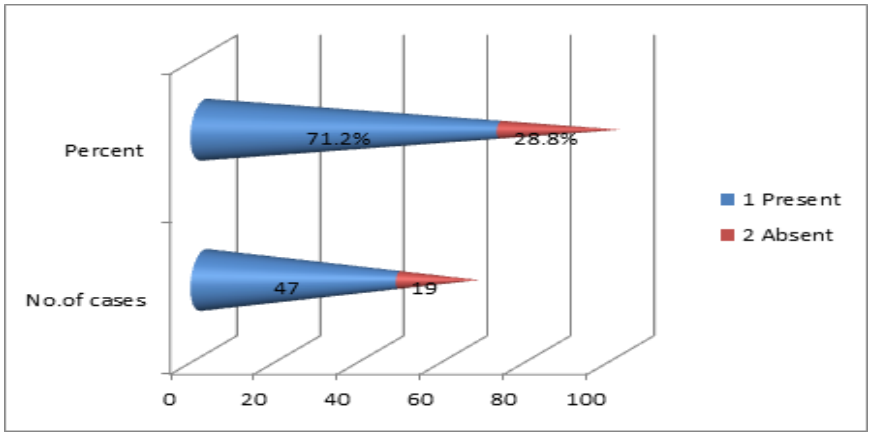


Table 2: Distribution of Number of Cases According to Pregnancy Aggravation

S. No.	Pregnancy Aggravation	No. of Cases	Percentage (%)
1.	Present	26	39.4
2.	Absent	40	60.6
	Total	66	100.0

In this study, it was found that melasma was aggravated during pregnancy in 26 (39.4%) patients while there was no aggravation seen during pregnancy in 40 (60.6%) of patients.

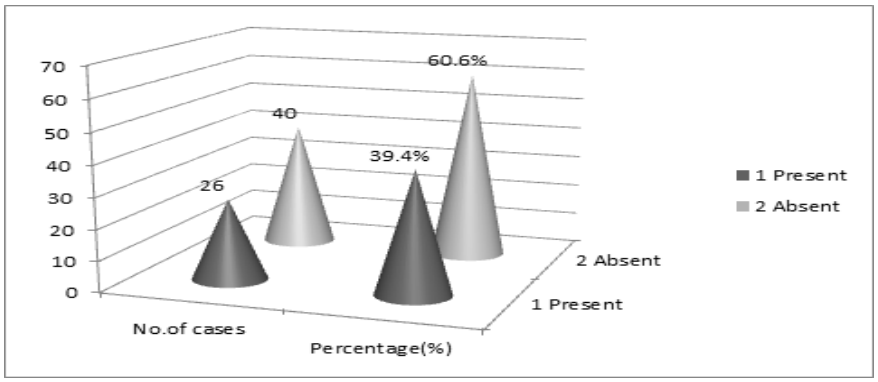


Table 3: Distribution of Number of Cases according to Contraceptives use

S. No.	Contraceptive use	No. of cases	Percentage (%)
1.	Present	27	40.9
2.	Absent	39	59.1
	Total	66	100.0

In this study, history of contraceptive use was present in 27 (40.9%) patients while it was absent in 39 (59.1%).

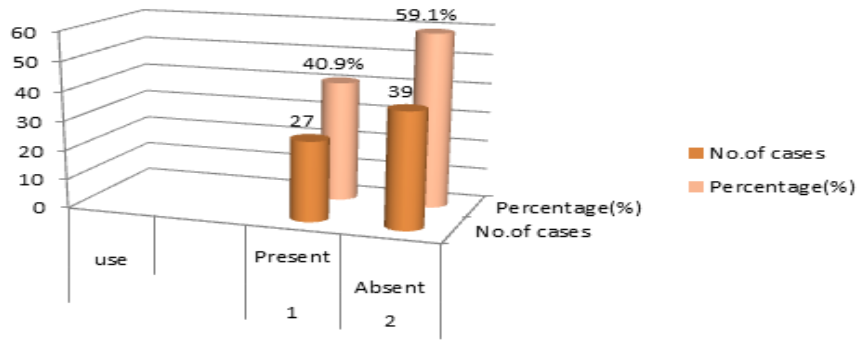


Table 4: Distribution of Number of Cases according to Cosmetic use

S. No.	Cosmetic use	No. of cases	Percentage (%)
1.	Present	20	30.3
2.	Absent	46	69.7
	Total	66	100.0

It was found in this study that there was history of some cosmetic application prior to appearance of melasma in 20 (30.3%) patients while in 46 (69.7%) no such history was found.

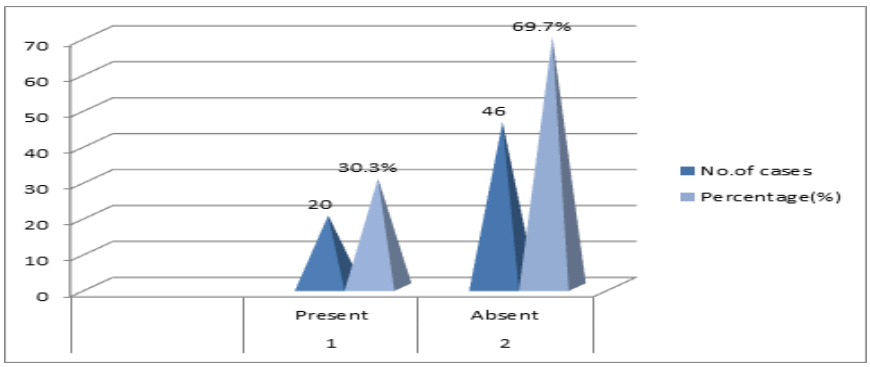


Table 5: Distribution of Number of Cases according to Presence of similar Family History

S. No.	Similar family history	No. of cases	Percent
1.	Present	34	51.5
2.	Absent	32	48.5
	Total	66	100.0

In our study, there were 34(51.5%) patients in which family history for melasma was present while in 32 (48.5%) such history was absent.

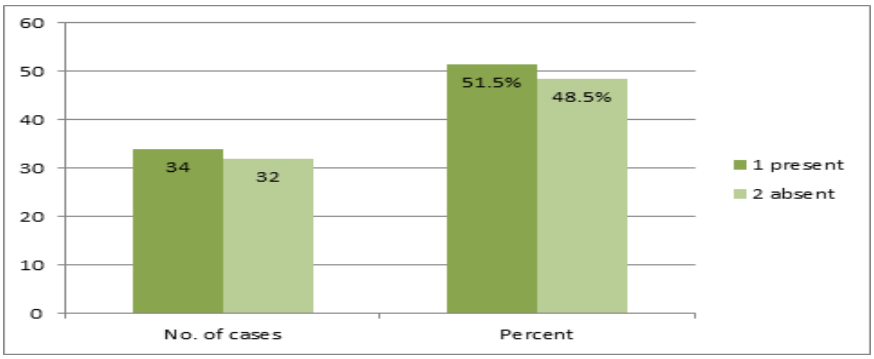
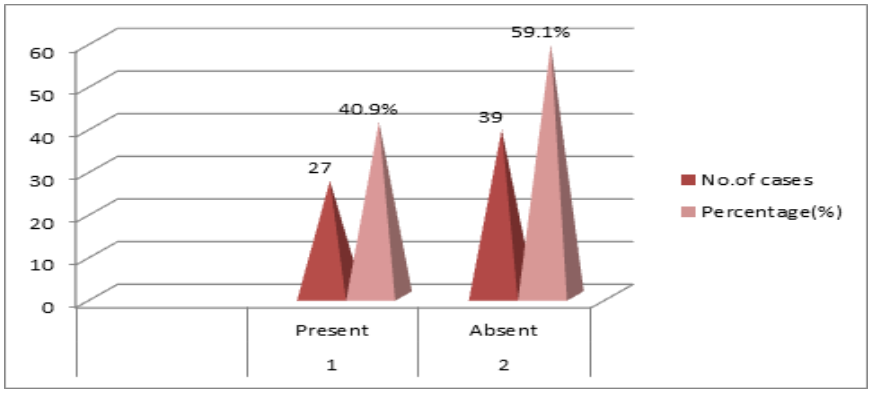


Table 6: Distribution of Number of Cases according to Stress & Emotional Factors

S. No.	Stress & Emotional Factors	No. of Cases	Percentage (%)
1.	Present	27	40.9
2.	Absent	39	59.1
	Total	66	100.0

In this study, stress and emotional factors were found to be present in 27 (40.9%) patients while these factors were absent in 39 (59.1%).



DISCUSSION

Melasma is an acquired hyper-pigmentary disorder of the skin. It is the most common pigmentary disorder in Indian population[1]. UVR on human skin induces the production of alpha-melanocyte stimulating hormone (α-MSH) and adrenocorticotropic hormone (ACTH) in melanocytes and keratinocytes. α-MSH stimulates the activity of tyrosinase and *in vivo* melanin synthesis and the synthesis of melanocytes through melanocortin 1 receptor (MC1-R). Other reports indicate that the irradiation of melanocytes with UVR increases MC1-R mRNA levels. Moreover, the synthesis of many epidermal factors, including α-MSH, ACTH and endothelin-1, is increased by the exposure to UVR, suggesting an important influence of these mediators on the response of melanocytes to sunlight[2]. In our study, melasma aggravation on sun exposure was seen in majority of patients i.e. 47 (71.2%) while aggravation was absent in 19 (28.8%) of patients. This is greater in comparison to the study of:

Ravali Yalamanchili, et al: 44%[3], **Arun Achar et al:** 55.12%[4], **S Kumar, BB Mahajan, Nidhi Kamra et al:** 48.84%[5], **Iffat Hassan et al:** 65.75%.

Pregnancy: Many patients note the onset or worsening of melasma during pregnancy; often christened as "chloasma gravidarum" and "the mask of pregnancy;" with typical onset during the second half of the gestational period. However, melasma may appear before pregnancy or many years after delivery. The reported incidence of melasma appearing during pregnancy has ranged from 2.5% to 75%. In pregnancy, especially in the third trimester, there is stimulus for melanogenesis, and the increased levels of placental, ovarian and pituitary hormones may justify melasma associated with pregnancy. Elevations of melanocyte-stimulating hormone (MSH), estrogen and progesterone also lead to increased transcription of tyrosinase and dopachrome tautomerase, which may be involved in the development of pigmentation in this phase. In our study, it was found that melasma was aggravated during pregnancy in 26 (39.4%) patients while there was no aggravation seen during pregnancy in 40 (60.6%) of patients. It is similar to study of:

S Kumar, BB Mahajan, Nidhi Kamra et al: 36.4% which is higher than reported in previous studies[5] like that of **Vidyadhar R Sardesai et al:** 32%[6] and **Arun Achar et al:** 22.4%[4].

Contraceptive Use: The accrued evidence from different studies studying the epidemiology of OCP-induced melasma suggests it to be more common in patients lacking family history of melasma and a higher risk of recurrence or worsening of melasma during pregnancy in such patients. Thus, while patients who develop melasma while taking OCPs may benefit by stopping them and avoiding them in future, a systematic change in hormonal contraception in melasma patients seems unwarranted. In our study, history of contraceptive use was present in 27 (40.9%) of the patients. Its number is greater than the study of:

Arun Achar et al:18.4% [4], **Ortonne et al:** 25% [7] and **Sorrel Resnik, MC et al:** 29% .

Cosmetic Use: The use of cosmetics and other photosensitizing substances have also been implicated as risk factors for melasma. The epidermal-melanin unit usually responds to certain inflammatory stimuli through melanogenesis[8]. Melasma can be triggered or aggravated by cosmetics use and cosmetic procedures that induce skin inflammation, such as peelings and therapies with light/laser.

It was found in our study that there was history of some cosmetic application prior to appearance of melasma in 20 (30.3%) while in 46 (69.7%) any such history was absent. It is similar to:

Arun Achar et al: 23.39 % [4], **S Kumar, BB Mahajan, Nidhi Kamra et al:**15%. History of use of mustard oil in cooking/body massage was present in 54.07%[5], and in **Katsambas et al: 14%**.

Stress & emotional factors: Some patients report the onset of melasma after stressful episodes and affective disorders (e.g.: depression)[9]. Propiomelanocortins (ACTH and MSH) are hormones related to stress, which can activate melanocortin receptors in melanocytes, inducing melanogenesis. There is also evidence that the melanocyte presents individualized

response to stress hormones, with the same hierarchy of the hypothalamic-pituitary axis. The possibility of the existence of a neural element associated with melasma has been suggested. The study in South Korea in 2009 proved an increase in the number of keratinocytes expressing NGFR (*nerve growth factor receptor*), neural endopeptidase and nerve fibers in the superficial dermis of the diseased skin was evidenced. These findings support the hypothesis that neuropeptides may play a role in the development or maintenance of the disease.

In our study, stress and emotional factors were found to be present in 27 (40.9%) of the patients while these factors were absent in 39 (59.1%). Studies related are:

Juliana Kida Ikino et al revealed significant emotional impact on patients, such as feeling bothered (94.11%), frustrated and embarrassed (64.71%), and depressed (52.94%) about their skin appearance, as well as unattractive (78.43%).

Ravali Yalamanchili et al: Patients were depressed, frustrated and embarrassed about their skin condition. Higher MELSQOL scores (28.28) were observed irrespective of MASI score indicating that severe facial blemishes of any cause affect the self-perception of individual.

Family History: Melasma is the most common melanoderma in individuals with brown to light brown skin. Familial predisposition (genetic component) is the most important risk factor for its development. The occurrence of melasma was described in two identical twins, in England, in 1987. It was triggered by hormonal stimulation and worsened after sun exposure. However, it did not occur in the other sister (not twin), which strengthens the hypothesis of genetic susceptibility to disease development. Lower frequencies were identified in India (33%), and Singapore (10%), suggesting that the development of the disease may suffer epigenetic hormonal control, as well as the influence of environmental stimuli, such as UV radiation.

In our study, there were 34(51.5%) patients in which family history for melasma was present while in 32 (48.5%) similar family history was absent. Its number is greater than in the study of:

Arun Achar et al 2011: 33.33% [4], **Vidyadhar R Sardesai et al:** 35%[6], **S Kumar, BB Mahajan, Nidhi Kamra et al:** 29.07%[5] and **Devasthanam Sundara Rao KrupaShankar et al:** 31.1% patients[10]

CONCLUSION

The exact cause of melasma is unknown. However, many factors have been implicated in the etiopathogenesis of this disorder. In our study, we found that sun exposure, pregnancy, oral contraceptives, cosmetics, stress and emotional factors and family history play an important role in causation of melasma.

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