# Epidemiological patterns, aggravating factors and impact of disease on quality of life among individuals with melasma visiting the Dermatology Clinic in the Teaching Hospital Karapitiya

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## Abstract

***Introduction:*** Melasma is an acquired facial hypermelanosis which affects the quality of life, due to its occurrence in face. This study was aimed to assess its epidemiological patterns, predisposing factors and impact on quality of life in order to educate people to reduce its burden.

***Methods:*** A clinic based descriptive cross-sectional study was conducted recruiting all individuals with melasma, attended the dermatology clinic for seven months. Both self-reported questionnaire and interviewer-administered data record sheet were used for data collection.

***Results:*** 172 individuals with melasma were included. Females were dominated with 97.7% (n=168) and 52.3% (n=90) were with Fitzpatrick type V skin.

Mean age of onset of melasma was 47.2 years and the predominant pattern was malar pattern (58.1%).

Most common aggravating factor was sun exposure (44.7%, n=76), followed by, menstrual irregularities (20.5%), hormonal treatment (19.4%), family history (19.8%) and pregnancy (10.4%).

Mean MASI (Melasma Area and Severity Index) score was 12.7, with range of 1.5 to 30.9. It showed statistically significant correlation with family history, duration of sun exposure and the use of facial cosmetics ($p<0.05$).

Mean Melasma Quality of Life Score (MELASQoL) was 28.86 with most patients reported feeling depressed, but there was no significant correlation between severity (MASI) and quality of life (MELASQoL). (Pearson correlation = 0.548, $p>0.05$)

65.1% exposed into the sun more than two hours in the midday where sun intensity is in peak, but only 31.4% (n=54) used a sun protection method. Sunscreens were used by only 4.65%, although 50% declared regular application of cosmetics to face.

***Conclusion:*** Comparing with other studies, melasma starts at a higher age in our study population. It causes a significant negative effect on psychosocial aspects of quality of life, although it is not related to the clinical severity, suggesting treatment decision should not be made according to its severity.

Sun exposure was the major aggravating factor identified. Therefore, key element in prevention of melasma involves taking measures to minimize sun exposure in peak hours.

Although half of people use cosmetic products to face, sunscreens usage seems inadequate in Sri Lankan people, showing the lack of awareness about sunscreens as a prevention method of photo aggravating dermatoses. Therefore, the gravity for protection from sun, should be a key factor to address from young age in our population.


## Introduction

Since the beginning of human kind, the concept of beauty played a major role. Melasma is an acquired, facial hyper-melanosis most prevalent in darker skin phenotypes. For the reason of melasma occurrence on face, though it is asymptomatic, the disease has a significant emotional and psychological impact on quality of life[1,2].

It is frequently seen in women and mostly starts between the ages of 20 to 40 years, but several studies demonstrate a great variation of age distribution in different ethnicities. It is characterized by irregular, light to dark brown macules and patches in sun exposed areas, commonly the face.

The precise cause of melasma is unknown and several factors are linked to its exacerbation.

However, recent studies revealed that the melasma is not only a pigmentary disorder, but also a photo-ageing disorder by considering histo-pathologic findings[12].

Identification of commonly encountered exacerbating factors in a defined population, will aid to plan the treatment strategies.

Severity of melasma is assessed by the Melasma Area and Severity Index (MASI) which is based on area involved, darkness and homogenicity of pigmentation[4].

The quality of life of melasma is assessed by MELASQoL scale with standard structured questionnaire.

Treatment of melasma usually combines elimination of possible causative factors, use of sunscreens and hypo-pigmenting agents.

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The use of sunscreen is effective in the prevention of melasma and in the enhancement of the efficacy of other topical therapies[7].

There are wide differences in the results of the studies in different countries regarding melasma. It shows the need of a study to identify disease characteristics and its impact on life in Sri Lanka.

This type of study would give a foundation to educate people to reduce the possible exacerbating factors and this will enhance the treatment outcome and the compliance.

Therefore, this study was designed to gain the knowledge into common factors aggravating melasma, clinical presentation and its effect to quality of life, facial skin care habits and the awareness of sun protection in line of prevention.

## Method

A clinic based descriptive cross-sectional study was conducted in all people with melasma attended to the Dermatology Clinic in the Teaching Hospital Karapitiya from October 2017 to May 2018. Only the patients who can read and understand the questionnaire were included.

A pretested self-reported questionnaire with closed ended questions and an interviewer administered data record sheet were used to collect data.

The questionnaire included questions about demographic data, age of onset of the disease, known exacerbating factors and skin care habits.

Patients were examined to assess skin phenotype and distribution of melasma and recorded in data record sheet. MASI score was calculated using these data.

Sinhala validated MELASQoL was used to assess the quality of life. It has been prior validated with a standard procedure after taking permission from the original author and copyright holder of English version Professor Rajesh Balkrishnan.

The study protocol was approved by the Ethical Review Committee of the Faculty of Medicine, University of Ruhuna and conducted with prior permission of the relevant administrative authorities.

The participation was entirely on a voluntary basis and informed consent was obtained. Participants were ensured of the freedom to withdraw from the study at any stage.

Confidentiality was met throughout the study and individual identity of participants has not been disclosed.

All data were analyzed using a data base created with SPSS and $p<0.05$ was considered as statistically significant.

## Results

### General demographic characteristics

A total of 172 individuals with melasma were included.

Mean age of the participants was 54.97, with age range between 28-76 years (Table 1).

Females were dominated with 97.7% (n=168) (Table 1).

**Table 1. Demographic details and disease characteristics**

| *Characteristics* | *Frequency (Percentage)* |
|---|---|
| **Age in years** | |
| 20-29 | 01 (0.6%) |
| 30-39 | 06 (3.5%) |
| 40-49 | 39 (22.7%) |
| 50-59 | 75 (43.6%) |
| >60 | 51 (29.7%) |
| **Sex** | |
| Female | 168 (97.7%) |
| Male | 04 (2.3%) |
| **Educational level** | |
| No | 08 (4.7%) |
| Gr 1-5 | 46 (26.7%) |
| Gr 6-11 | 63 (36.6%) |
| A/L | 39 (22.7%) |
| Higher education | 14 (8.1%) |
| **Fitzpatrick skin type** | |
| Type IV | 82 (47.7%) |
| Type V | 90 (52.3%) |
| **Age of onset** | |
| <30 | 04 (2.4%) |
| 30-39 | 34 (20.2%) |
| 40-49 | 61 (36.3%) |
| 50-59 | 47 (28.0%) |
| >60 | 22 (13.1%) |
| **Pattern** | |
| Centro-facial | 72 (41.9%) |
| Malar | 100 (58.1%) |

All the people are of Fitzpatrick skin type IV and V with 82 (47.7%) recorded as type IV photo-type and 90 (52.3%) with type V photo-type (Table 1).

The majority of people have studied up to secondary education level (36.6%, n=63) (Table 1).

**Characteristics of melasma**

Most people declared the age of onset of melasma between 40-49 years with the mean age of onset of 47.2 (Table 1).

The predominant pattern observed was malar pattern (58.1%) followed by centro-facial pattern (41.9%). Mandibular only pattern was not observed in the study sample (Table 1).

**Aggravating factors of melasma**

Overall, 34 (19.8%) individuals reported a family history of melasma (Table 2).

Among 138 women who reported past or present pregnancy, this was declared as an aggravating factor by only 10.4% (Table 2).

**Table 2. Aggravating factors**

| *Factor* | *Frequency (Percentage)* |
|---|---|
| **Family history** | |
| Yes | 34 (19.8%) |
| No | 138 (80.2%) |
| Not responded | 00 |
| **Pregnancy** | |
| Yes | 10 (10.4%) |
| No | 96 (89.6%) |
| Not responded | 32 |
| **Hormone treatment** | |
| Yes | 32 (19.4%) |
| No | 133 (80.6%) |
| Not responded | 07 |
| **Menstrual irregularities** | |
| Yes | 34 (20.5%) |
| No | 132 (79.5%) |
| Not responded | 06 |
| **Sun exposure** | |
| Yes | 76 (44.7%) |
| No | 94 (55.3%) |
| Not responded | 02 |

20.5% described menstrual irregularities while 19.4% had a history of hormonal treatment (Table 2).

76 (44.7%) individuals reported exacerbation due to sun exposure (Table 2).

**Average sun exposure, sun protection behavior and facial skin care habits**

Average duration of sun exposure per day was noted and 65.1% exposed into the sun > 2 hours in the midday where sun intensity is in peak (Table 3).

The usage of sun protection methods was also recorded. Overall, only 54 (31.4%) use a sun protection method, namely, sunscreens, shades and clothes. Among them, sunscreens were used by only 14.8% which is 4.65% from total (Table 3).

Concerning skin care habits, 50% declared regular application of cosmetics to face, with western and ayurvedic products in almost equal amounts (48.6% and 45.7% respectively) (Table 3).

**Table 3. Sun exposure, protection behavior and facial skin care habits**

| | *Frequency (Percentage)* |
|---|---|
| **Sun exposure in peak hours** | |
| < 2 hours | 60 (34.9%) |
| > 2 hours | 112 (65.1%) |
| **Use of sun protection method** | |
| Yes | 54 (31.4%) |
| No | 26 (15.1%) |
| Not answered | 92 (53.5%) |
| **Type of method** | |
| Sunscreens | 04 (7.4%) |
| Dresses | 08 (14.8%) |
| Sunshades | 29 (53.7%) |
| Dresses and shades | 09 (16.7%) |
| Sunscreens and shades | 04 (7.4%) |
| **Use of facial cosmetics** | |
| Yes | 86 (50.0%) |
| No | 86 (50.0%) |
| **Type of cosmetics** | |
| Western creams | 34 (48.6%) |
| Ayurvedic creams | 32 (45.7%) |
| Other | 04 (5.7%) |
| Not responded | 16 |

**Disease severity of melasma**

Melasma Area and Severity Score (MASI) was calculated in every patient considering affected area, intensity and homogenecity of the pigmentation.

Mean MASI score in the study population was 12.7+/- 7.07 which ranged from 1.5 to 30.9

The distribution of MASI score was categorized using the quartile method, with MASI score of <7.2 defining as mild disease, between 7.2 and 11.95 as moderate disease, between 11.96 and 18.07 as severe disease, and >18.07 as very severe disease for the purpose of analyzing the significance of aggravating factors and MASI score.

**Aggravating factors and melasma severity**

According to the level of melasma severity, 85.3% of person with positive family history had higher MASI score of more than 25$^{th}$ centile, with statistically significant association. (chi square=4.538, p=0.033) (Table 4).

Considering sun exposure, people who exposed to more than 2 hours of mid-day sunlight, 75.9% had higher severity score of more than 25$^{th}$ centile, while only 60.0% of people who had less than 2 hours exposed to mid-day showed higher MASI scores, with statistically significant correlation between duration of sun exposure and the severity of melasma. ($x^2$=4.731, p=0.03) (Table 4).

**Table 4. The association between aggravating factors and melasma severity**

| *Characteristic* | *MASI* | | | | | | *Significance* |
|---|---|---|---|---|---|---|---|
| | *Mild* | | *Mod/Sev/ V. Sev* | | *Total* | | |
| | *n* | *%* | *n* | *%* | *n* | *%* | |
| **Family history** | | | | | | | |
| Yes | 5 | 14.7 | 29 | 85.3 | 34 | 100 | $X^2$ = 4.538 |
| No | 46 | 33.3 | 92 | 66.7 | 138 | 100 | p = 0.033 |
| **Pregnancy** | | | | | | | |
| Yes | 5 | 50.0 | 5 | 50.0 | 10 | 100 | $X^2$ = 2.234 |
| No | 44 | 27.8 | 114 | 72.2 | 158 | 100 | p = 0.135 |
| **Hormonal treatment** | | | | | | | |
| Yes | 11 | 34.4 | 21 | 65.6 | 32 | 100 | $X^2$ = 0.416 |
| No | 38 | 28.6 | 95 | 71.4 | 133 | 100 | p = 0.519 |
| **Menstrual irregularity** | | | | | | | |
| Yes | 15 | 44.1 | 19 | 55.9 | 34 | 100 | $X^2$ = 4.381 |
| No | 34 | 25.8 | 98 | 74.2 | 132 | 100 | p = 0.036 |
| **Sun exposure** | | | | | | | |
| <2 hours | 24 | 40.0 | 36 | 60.0 | 60 | 100 | $X^2$ = 4.731 |
| >2 hours | 27 | 24.1 | 85 | 75.9 | 112 | 100 | p = 0.030 |
| **Use of sun protection methods** | | | | | | | |
| Yes | 14 | 25.9 | 40 | 74.1 | 54 | 100 | $X^2$ = 2.192 |
| No | 11 | 42.3 | 15 | 57.7 | 26 | 100 | p = 0.139 |
| **Use of facial cosmetics** | | | | | | | |
| Yes | 16 | 18.6 | 70 | 81.4 | 86 | 100 | $X^2$ = 10.062 |
| No | 35 | 40.7 | 51 | 59.3 | 86 | 100 | p = 0.002 |

Use of facial cosmetics also showed a significant correlation with higher melasma severity scores with 81.4% of people who use cosmetics having MASI score of higher than 25$^{th}$ centile, while only 59.3% of those who does not use facial cosmetics show higher scores. ($x^2$=10.062, p=0.002) (Table 4).

Other factors, namely, pregnancy, hormonal treatment and menstrual irregularity did not show significant correlation with melasma severity.

**Quality of life assessment due to melasma**

Mean Melasma Quality of Life Score (MELASQoL) was 28.86 with most patients reported feeling depressed.

There was no significant correlation between melasma severity (MASI) and quality of life (MELASQoL). (Pearson correlation = 0.548, p>0.05).

**Quality of life and other associations**

Both age and educational level correlated with quality of life.

58.8% people who are less than 55 years had more than 50th centile of quality of life score, whereas 61.6% of people more than 55 years had less than 50th centile of quality of life score, which shows significant correlation of higher impairment of quality of life with lower age group. ($x^2$=6.353, p=0.012) (Table 5).

57.6% of people with higher educational level shows higher impairment of quality of life score of more than 50$^{th}$ centile, while only 33.3% of those who had primary education only showed higher impairment of quality of life, which is statistically significant. ($x^2$=8.217, p=0.004) (Table 5).

## Discussion

**Characteristics of melasma**

Melasma shows a great variation of age distribution in different ethnicities, described in several studies done globally in India, Tunisia, Malaysia, United Kingdom, Brazil, Singapore etc. Compared to those, the age of onset in our study population lies between 40 and 49 years, which is higher than other countries[1,2,3,8,10].

A clear female predominance was identified in all published studies, generally estimated around 90%. In our study, cases of melasma reported in men were amounting 2.3% with F:M ratio of 42:1. The Indian studies only showed less significant prevalence in females than males, whereas others show more or less similar results as our population[2,7,8].

Malar pattern was the predominantly involved pattern reported in our study similar to South Asian studies[1,2,7].

**Aggravating factors of melasma**

Our study shows positive family history in 19.8%. However, a positive family history was reported with a very wide range in past studies published in other countries being 10% in Singapore, 18% to 33% in India, 48% worldwide and 61% in UK[1,3,8]. In this study, positive family history is associated with severity of melasma.

**Table 5. The association between quality of life and age, and educational level**

| | *MELASQoL* | | | | | | |
|---|---|---|---|---|---|---|---|
| | *<50$^{th}$ centile* | | *>50$^{th}$ centile* | | *Total* | | *Significance* |
| | *n* | *%* | *n* | *%* | *n* | *%* | |
| Age | | | | | | | |
| <55 years | 33 | 41.3 | 47 | 58.8 | 80 | 100 | $X^2$ = 6.353 |
| >55 years | 45 | 61.6 | 28 | 38.4 | 73 | 100 | p = 0.012 |
| Educational level | | | | | | | |
| Non/Primary | 36 | 66.7 | 18 | 33.3 | 54 | 100 | $X^2$ = 8.217 |
| Secondary/Higher | 42 | 42.4 | 57 | 57.6 | 99 | 100 | p = 0.004 |

Pregnancy is a well-known factor associated with melasma. Though in our study only 10.4% were declared it as an aggravating factor, prevalence of melasma during pregnancy shows strong variation according to population and ethnicities[2,8].

Melasma has been reported to represent around two thirds of cutaneous side effects of oral contraceptives and the incidence varies according to ethnic groups[2,8,10]. 19.4% of participants declared to have taken OCP at one stage of their life.

Even though multiple causative factors have been implicated in the aetiology, UV radiation is the single most important factor mentioned in the literature[7,8,10]. In our study population, 44.7% individuals reported to have an exacerbation following sun exposure and the hours of sun exposure amounted a significant correlation with Melasma Area and Severity Index (MASI) score.

**Sun exposure, protection behavior and facial skin care habits**

A review of recent literature shows that sun exposure was reported as triggering factor by 51% and aggravating factor by 84%[2].

Similarly, it was the frequently reported aggravating factor in our study population (44.7%). Almost all declared having exposed their skin to the sun in the day time and majority of them (65.1%) declared that their average sun exposure per day is more than 2 hours.

Only 31.4% actively use a sun protection method and among them, 85.18% used sunshades and clothes, however, only 14.8% declared that they use sunscreens during the sunny period, which is well below than other studies[2]. This shows that the awareness towards sun protection methods and sunscreen use really inadequate in our population.

Concerning skin care habits, 50% declared regular application of cosmetics to face, with western and ayurvedic products in almost equal amounts (48.6% and 45.7% respectively).

This alarms that, despite higher prevalence of use of regular application of cosmetic products among our people, many were not aware about the importance of sunscreens in line of treatment and prevention of melasma which has pigmentary and photo ageing pathogenesis.

**Disease severity of melasma**

Concerning melasma severity scores (MASI score), Mean MASI score in our study was 12.7+/- 7.07.

In our population, the family history, use of cosmetics and the duration of sun exposure was significantly associated with severity scores of melasma.

**Quality of life assessment due to melasma**

Comparing the quality of life with other studies, we noted a similar response in Mean Melasma Quality of Life Scale (MELASQoL) which was 28.86 with most patients reported feeling depressed causing psychosocial and emotional distress. Several other studies report embarrassment, frustration, low esteem and withdrawal from social life which ultimately causes low productivity[1,8].

Also, we noted, the lower the age and the higher the educational level are correlated with higher impairment of quality of life, implicating more educated people and more younger people have more concerns with regard to their appearance.

Although melasma affects for the quality of life, according to the data from our population, the severity score of melasma does not correlate to the score of quality of life, suggesting that the subjective perception affects to the quality of life than the clinical impression of the disease. This poor correlation was documented in the previous studies as well[8].

## Conclusion and recommendations

Comparing with other global studies, melasma starts at a higher age in our study population and it causes a significant negative effect on psychosocial aspects of quality of life although it is not related to the clinical severity. This warrants that the treatment decision should not be made by the severity scores of the disease.

Sun exposure was the major aggravating factor identified in this study population. Therefore, key element in prevention of melasma involves taking measures to minimize sun exposure, which need to be addressed in our population.

Although half of them use cosmetic products to face, sunscreens usage seems inadequate in Sri Lankan people, showing the lack of awareness about sunscreens as a prevention method of photo aggravating dermatoses. Therefore, the gravity for protection from sun, should be a key factor to address from young age.

## Limitations

The study was carried out in the Teaching Hospital Karapitiya, therefore the findings may not be generalized to the whole population of the country.

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