

# Characteristics of facial melasma on Javanese women in Yogyakarta, Indonesia

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## Abstract

**Objective** To understand the clinical characteristics of melasma in Javanese women.

**Methods** We used a cross-sectional study design, conducting a clinical examination and collecting questionnaires from 93 Javanese women with melasma.

**Results** Among 93 patients, centrofacial melasma was more prevalent than maxillary melasma (55.9% vs. 44.1%). We found no mandibular melasma. Most cases were categorized as mild rather than moderate degree using the Melasma Area Severity Index (60.2%:39.8%), and most of these were found in women aged at least 40 years (55.9%). Family history (58.1%) and sun exposure exceeding 1 hour (61.3%) were among the factors contributing to melasma development.

**Conclusion** Characteristics of melasma in Javanese women are centrofacial type, mild severity and most common in those who are at least 40 year old with sun exposure and have a family history.

## Key words

Melasma, melasma type, MASI, sun exposure, family history.

## Introduction

Melasma is a hyperpigmentation disorder found symmetrically distributed primarily on the face and most commonly on women of reproductive age with skin types III-V.<sup>1,2</sup> The actual prevalence of melasma in many countries remains poorly understood. Prevalence reportedly varies between 1.5% and 33.3% depending on the location of the population. In pregnant women, its prevalence is 50% to 70%.<sup>3</sup> In Southeast Asia, its prevalence is approximately 0.25% to 4% among dermatology clinic patients.<sup>1</sup> Its distribution determines its type: the centrofacial type appears on the forehead, chin, above the lips, and on the cheeks

and nose (65%); the maxillary type appears on the nose and cheeks (20%); and the mandibular type appears on the ramus of the mandible (15%).<sup>3,4,5</sup>

Melasma is a heterogeneous multifactorial disorder involving interactions between genetics and environmental, hormonal, or inflammatory factors. Sun exposure and family history are the most dominant factors playing roles in the development of melasma (Guinot et al., 2010; Sonthalia and Sarkar, 2015; Trivedi et al., 2017).<sup>3,6,7</sup> Clinically, melasma and its severity differ depending on the geographic location of the person. In this study, we aimed to understand the characteristics of melasma on Javanese women in Yogyakarta.

## Methods

This cross-sectional study was conducted between May 2016 and March 2017, enrolling

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93 women with melasma. Subjects were recruited from the Dermato-Venereology Clinic of Dr. Sardjito General Hospital and the Be Queen Skin Care Clinic in Yogyakarta, Indonesia. This study was approved by the Medical and Health Research Ethic Committee of Faculty of Medicine Universitas Gadjah Mada and Sardjito Hospital with approval number (KE/FK/462/EC/2016). Subjects were interviewed using a standardized questionnaire that explored UV exposure and family history. Study participants were adult Javanese women aged 18 to 60 years (mean  $40.6 \pm 6.45$  years) in Yogyakarta who had melasma. Exclusion criteria were use of hormonal contraceptives, pregnancy, and use of a whitening cream during the prior two weeks. We examined the skin using a Bombtech Skin Diagnosis A-ONE® (Korea) to identify the skin's condition and the areas with melasma. Mexameter® MX18 Courage-Khazaka (Germany) was used to measure skin pigmentation and calculate the Melasma Area Severity Index (MASI) score. This instrument utilizes inspections of facial skin to assess three factors: the involved area, hyperpigmentation, and homogeneity. The face was divided into four areas: the forehead, right malar region, left malar region, and chin, representing 30%; 30%; 30%, and 10% of the face, respectively. Each involved area was rated from 0 to 6 (0, unaffected; 1, less than 10%; 2, 10%–29%; 3, 30%–49%; 4, 50%–69%; 5, 70%–89%; and 6, 90%–100%). Hyperpigmentation and homogeneity were each assessed from 0 to 4 (0, none; 1, thin; 2, medium; 3, clear; and 4, very clear). The final MASI result was the sum of hyperpigmentation and homogeneity multiplied by the involved facial area, rendering a value from 0 to 48.<sup>8,9,10</sup>

## Results

All patients had skin type IV, and they were aged with the youngest age 29-year and the

oldest 58-year; then the age categorization was divided into below 40-year-old and above 40-year-old (**Table 1**). Of 93 participants, 54 subjects had family history of melasma and 39 subjects did not (58.1% vs 41.9%). Melasma was found most frequently in subjects with accumulated sun exposure for more than 1 hour are 57 subject (61.3%) and for less than 1 hour are 36 (38.7%). Using the MASI score, severity of melasma was classified as mild in 56 (60.2%) patients and moderate in 37 (39.8%). Centrofacial type of melasma was the most common type seen in this study compared to maxillaris (55.9%: 44.1%) patients (**Figure 1** and **2**). No mandibular melisma was found. Patients' characteristics are presented in **Table 1**.

## Discussion

In this study, all patients had skin type IV. Therefore, all had similar responses to sun exposure. People with skin types IV and V have acidic melanocyte dendrites because melanosomes are present in greater quantities compared to those with skin types I and II. This causes the corneal layer of skin to be acidic (pH 4.6). An acidic corneal layer increases the skin's integrity and its healing process after

**Table 1** Patients' characteristics (n=93).

|                 | N (%)     |
|-----------------|-----------|
| Family history  |           |
| Yes             | 54 (58.1) |
| No              | 39 (41.9) |
| Sun exposure    |           |
| ≥ 1 hour        | 57 (61.3) |
| < 1 hour        | 36 (38.7) |
| Severity (MASI) |           |
| Mild            | 56 (60.2) |
| Moderate        | 37 (39.8) |
| Melasma type    |           |
| Centrofacial    | 52 (55.9) |
| Maxillary       | 41 (44.1) |
| Age             |           |
| ≥ 40 years      | 52 (55.9) |
| < 40 years      | 41 (44.1) |



**Figure 1** Centropfacial type of melasma (printed after permission of subject).



**Figure 2** Maxillary type of melasma (printed after permission of subject).

photodamage. However, in those with melasma, a disorder in the integrity of the corneal layer creates a slower healing process.<sup>11,12,13</sup> A study by Ortonne *et al.* (2009)<sup>14</sup> using 324 women with melasma showed that 83% had skin types III-VI; 33% had skin type IV. A study in Tunisia showed that 45% of melisma patients had skin type IV.<sup>11</sup> In addition, a Brazilian study found that 302 (38.4%) melasma patients had skin type IV.<sup>5</sup> We found a similar result. These might be

reasons for the high of melasma in people with skin type IV, because the healing process is slow after UV exposure. However, these conditions depended on the duration and intensity of sun exposure and geographic location.

We found that most patients (54, 58.1%) had family histories of melasma. Several studies show that genetic factors have important roles in melasma development. A study of 324 women with melasma showed that 48% had family histories, and 90% had dark skin.<sup>14</sup> A Brazilian study showed that 56.3% of 302 participants with melasma had family histories.<sup>5</sup> A study in the sub-Himalayan showed that 75% of 100 melasma patients had family history of disease.<sup>15</sup> We found that a family history or genetic factors seem to be related to the development of melasma.

Several epidemiological studies evaluating sun exposure have been performed across several countries such as Singapore, India, Iran, Brazil, and France. It appears that UV exposure has a bad effect on the skin. It could both trigger and worsen melasma. These effects varied depending on the duration of UV exposure.<sup>5,14,16,17</sup> A study in Basrah evaluating the relationship between sun exposure and melasma showed that of 196 patients, 117 receiving 2 to 4 hours of sun had melasma.<sup>18</sup> In addition, a study in the sub-Himalayan showed that 68% of patients receiving 2 to 4 hours of sun had melasma.<sup>15</sup> Those with melasma received longer UV exposures and had family histories of melasma. The hypothesized mechanism was that those with skin type IV produce abundant pigment as a result of lengthy UV exposure, a primary triggering factor of melasma. Long-term sun exposure also causes photoaging. We found melasma more frequently among those receiving more than 1 hour of sun exposure and among those aged more than 40 years. We conclude that

sun exposure is a risk factor for melasma in addition to a family history of melasma.

People with skin type IV are primarily brown-skinned.<sup>19</sup> Skin type IV has more eumelanin and has greater photoprotectant abilities.<sup>20</sup> Three factors play role during sun exposure: melanin, amino acid, and light reflection by melanin and amino acid. Increased melanin and a thicker epidermis protects the DNA and reduces inflammation caused by photons.<sup>21-22</sup> The amount and type of melanin determine skin color and its protectiveness against sun exposure. Differences in the amount of melanin can have a 100-fold difference in the response to UV exposure. Melanin is a polymer, and its content remains poorly understood. The ratio between melanin eumelanin and pheomelanin differs depending on the population and the geographic location where the individual originated.<sup>22</sup> Eumelanin can act as a photoprotector by absorbing visible and nonvisible UV rays, especially between the wavelengths of 720 nm and 620 nm. It has an exponential effect between 300 nm and 600 nm. An ultrastructure study showed that the epidermal eumelanosome was intact on dark skin after sun exposure. On the other hand, the eumelanosome was not intact on white skin after sun exposure.<sup>20,22</sup> A study in Tunisia enrolling participants with skin type III, brown hair, and sun-exposed skin showed moderate melasma based on MASI score (16-32.9). Mild melasma was commonly found in people with skin type IV. Severe melasma was commonly found in patients with skin type V who followed a regimen of oral contraceptives.<sup>6</sup> We found mild melasma in 56 patients (95% CI, 13.34-16.53). This could be because all our patients had skin type IV and a high eumelanin-to-pheomelanin ratio. Therefore, the skin was more photoprotective. Our results are comparable to those of the study in Tunisia enrolling participants with mild or moderate melasma. Differences lie in our lack of patients with

severe melasma, a result of excluding those experiencing hormonal factors (contraception use and pregnancy) from our study.

The centrofacial type of melasma is most common (65%), followed by maxillary melasma (20%) and then mandibular melasma (15%).<sup>4,5</sup> We classified melasma according to its distribution on the face and found results similar to those found by Tamega *et al.* (2012).<sup>5</sup> Studies in India and Brazil showed that centrofacial melasma was the most common type (69.2%) followed by malar melasma (43.4%). Mandibular melasma was not found in the Brazilian study because most mandibular melasma (68.8%) spread to the parotid area; melasma purely on the ramus of mandible was found in only 2 patients (3.7%).<sup>5,23</sup> On the other hand, in Singapore, malar melasma was most common (89%) followed by centrofacial melasma (8%) and mandibular melasma (3%).<sup>16</sup> Similar results were found in Tunisia, where centrofacial melasma was the most common (76.1%) among 197 patients, and malar melasma and mandibular melasma were found in 22.9% and 1%, respectively.<sup>6</sup>

We found that the centrofacial type was most prevalent (52 [55.9%] patients). Maxillary melasma was the only other type found (41 patients [44.1%]). This is likely because a larger centrofacial area (forehead, chin, cheeks, nose, and above the lips) is exposed to the sun compared to those with maxillary melasma. We did not find mandibular melasma. Our results are comparable to those found in India and Brazil, but they differ from those found in Singapore, where maxillary melasma was the most common type. Differences between that study and ours lie primarily in the ethnical and geographical differences.

## Conclusion

The characteristic features of melasma in Javanese women are centrofacial type, and for severity of most sufferers is mild. It is seen most frequently in women aged above 40 year old, in those who received at least 1 hour of sun exposure, and in those with family histories of melasma. Sun exposure and family history are the most influencing factors in the characteristics of melasma.

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