

# Association of periorbital melanosis with pigmentary demarcation line-F

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## Abstract

**Objective** To determine the association of periorbital melanosis with pigmentary demarcation line-F.

**Methods** This observational study was carried out at the Department of Dermatology, Services Institute of Medical Sciences/ Services Hospital Lahore, from January 2017 to June 2017. A total of 50 patients of periorbital melanosis of any age and either sex were included. The association between periorbital melanosis (POM) and pigmentary demarcation line-F (PDL-F), if present, was determined by close inspection of the patients, histopathological and Wood's lamp examination.

**Results** In 44 (88%) patients, PDL-F was observed along with POM. Histopathological examination carried out on 5 patients showed melanin pigment within dermal macrophages in both POM and PDL-F. In 9 (18%) patients, both POM and PDL-F became indiscernible on Wood's lamp examination.

**Conclusion** POM and PDL-F are common chronic and same pigmentary conditions and should be considered as a single entity.

## Key words

Periorbital melanosis, pigmentary demarcation lines, Wood's lamp examination.

## Introduction

Periorbital melanosis (POM, also known as periorbital hyperpigmentation, is a common condition observed in dermatological practice. It is also known as dark circles. POM is a poorly defined entity that presents as bilateral round or semicircular homogenous brown or dark brown pigmented macules in the periocular region.<sup>1</sup> There is limited data about the incidence and prevalence of POM due to its transient nature and deficient reasonable etiological explanation.<sup>2</sup> POM can be classified on the basis of clinical pattern of pigmentation and vasculature as

pigmented (brown color), vascular (blue/pink/purple color), structural (skin color), and mixed type.<sup>3</sup>

Various factors involved in the etiology of POM include genetic, postinflammatory pigmentation from atopic or contact allergic dermatitis, excessive dermal melanin deposition, periorbital edema and shadowing due to skin laxity.<sup>4</sup> POM can be aggravated due to ultraviolet radiation, lack of sleep, stress, alcohol overuse, and smoking. Clinically, POM presents as light- to dark-colored, brownish-black pigmentation surrounding the eyelids. Diagnosis is mainly based on clinical examination. There are few investigations to find the cause of this common disorder.<sup>2</sup> Different treatment modalities for POM include topical depigmenting agents, such as hydroquinone, kojic acid, azelaic acid, topical

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retinoic acid, and physical therapies, including chemical peels, surgical corrections, and laser therapy.<sup>2,5,6,7</sup>

Pigmentary demarcation lines (PDL), also known as Fitcher's or Voight's lines are areas of abrupt transition from hyperpigmented to hypopigmented or normal skin color. These lines are present on limbs, face and trunk. PDL are mostly seen in black races. Eight groups of PDL, A-H are described.<sup>8</sup> The etiopathogenesis of PDL is not known. According to some theories PDL are due to pigmentary mosaicism while others believe that these lines coincide with the distribution of cutaneous nerve innervations.<sup>9,10</sup>

Facial PDL are divided into three types F, G and H. Line F denotes an inverted cone-shaped patch that extends from the lateral orbital rim and points inferiorly or inferolaterally. Line G is analogous to line F, but having two inverted cones with a rim of normal pigmentation in between that forms a W-shaped patch. Line H is a linear hyperpigmented patch which extends from the lateral corners of the mouth.<sup>11</sup>

Facial PDL may present around puberty and may persist unchanged throughout life. It should be differentiated from melasma and postinflammatory hyperpigmentation. Various initiating factors include hormonal changes at puberty, pregnancy and acute illnesses like chickenpox, typhoid fever and viral hepatitis. Facial PDL is an evolving term so it is usually underdiagnosed.<sup>8,11</sup> Periorbital melanosis and facial pigmentary demarcation line-F may represent same spectrum of the disease.<sup>12</sup>

## Methods

It was an observational study, carried out at the Department of Dermatology, Services Institute of Medical Sciences/ Services Hospital Lahore, during the period from January 2017 to June

2017. 50 patients of POM, diagnosed clinically, of any age and either sex were enrolled in the study after taking an informed consent. Patients with drug-induced pigmentation and with other dermatoses like melasma, lichen planus pigmentosus and postinflammatory hyperpigmentation were excluded from the study. Patients were asked about the history of onset, affected family members and triggering factors like stress, sun exposure, insomnia, pregnancy, hepatitis and typhoid.

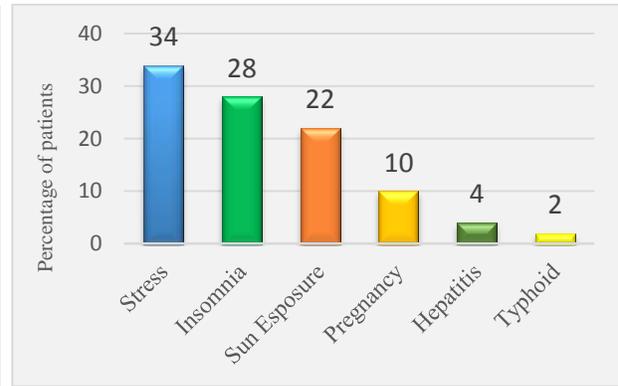
We examined the patients for the extent of POM. Depth of pigmentation was determined by Wood's lamp examination. Association of POM and PDL-F, if present, was determined by closely inspecting the patients from front and side views with their eyes open and closed. Biopsy with histopathological examination was possible in 5 patients. 2 mm punch biopsies were taken from POM and PDL-F of the same side of the patient. Photographs of patients were taken from front and oblique views.

## Results

A total of 50 patients, clinically diagnosed as POM were studied. Among these 50 patients there were 39 (78%) female and 11 (22%) male with age ranging from 9-58 years (mean age 26.6 years). POM started during adulthood in 41 (82%) patients, at puberty in 7 (14%) patients while it started in only 2 (4%) patients during childhood. Familial predisposition was seen in 20 (40%) patients. The aggravating factor was stress in 17 (34%) patients, insomnia in 14 (28%), sun exposure in 11 (22%), pregnancy in 5 (10%), hepatitis in 2 (4%) and typhoid in 1 (2%) patient (**Figure 1**). On close inspection of the patients with their eyes closed from the front, POM was seen around the eyes in all 50 patients. When viewed from the side, PDL-F was noticed along with POM in 44 (88%) patients (**Figure 2-4**).



**Figure 1** Frequency of periorbital melanosis (POM) and pigmentary demarcation line-F (PDL-F).



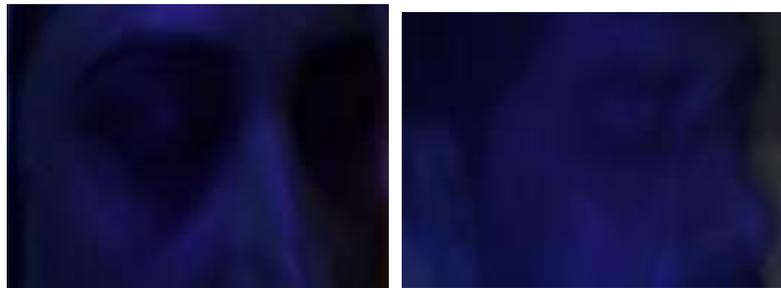
**Figure 2** Frequency of aggravating factors.



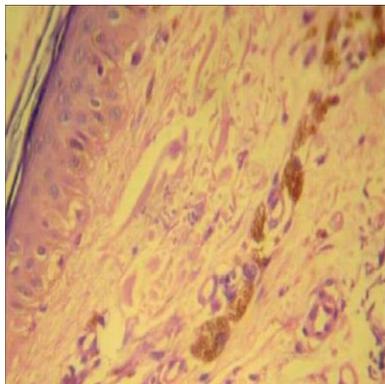
**3 (a)** **3 (b)** **3 (c)**  
**Figure 3** Periorbital melanosis and pigmentary demarcation line-F in the patients



**Figure 4** Periorbital melanosis with pigmentary demarcation line-F in the patient



**Figure 5** Wood's lamp examination



**Figure 6** Histological examination showed melanophages in the dermis.

26 (52%) patients with POM also complained of PDL-F, while 18 (36%) patients were not aware of the presence of PDL-F.

Wood's lamp examination in 35 (70%) patients showed decreased intensity of the hyperpigmentation of both POM and PDL-F on the same side of the patients (**Figure 5**). While in 9 (18%) patients, both POM and PDL-F became indiscernible on Wood's lamp examination. Histological examination from

POM and PDL-F in the same patient revealed variable degree of melanin pigment within dermal macrophages (**Figure 6**).

## Discussion

Aesthetic facial concerns constitute a large part of dermatological consultation. Periorbital melanosis is one of them. It usually appears after puberty and is more common in certain ethnic groups. POM is frequently observed in multiple members of the same family. POM can affect an individual's self-esteem and influence quality of life.<sup>13</sup> Pigmented demarcation lines are symmetrical lines separating normal zones of light and darker skin colors. Facial PDL may have a genetic predisposition and become visible around puberty. It may appear from childhood but remain unnoticed and become prominent after exposure to triggering factors e.g. pregnancy or hormonal changes at puberty. Facial PDL-F has a prolonged course causing cosmetic concerns for the patients and a challenge for dermatologists. It is a developing entity so it requires awareness among dermatologists for proper diagnosis.<sup>8,11,12</sup>

In the present study, we enrolled 50 patients of periorbital melanosis and observed its association with PDL-F. Mean age of the patients in our study was 26.6 years, which is a younger age group. This may be due to the fact that youth is more concerned about their cosmetic problems. This is also comparable to study performed by Sheth *et al.*<sup>13</sup> where it was seen that POM is mostly seen in younger age group. POM started during adulthood in 82% of the patients, during puberty in 14% and in childhood in 4% in our study. This age of onset correlates with the study results of Malakar *et al.*<sup>4</sup> where also the number of patients reported in adulthood was greater followed by puberty and childhood.

The number of female patients (78%) in our study was greater as compared to male (22%), which is similar to that of Malakar *et al.*<sup>4</sup> and Sheth *et al.*<sup>13</sup> where female patients were 88% and 81%, respectively. This female preponderance is due to more image conscious nature of the females in our society. POM was reported to be an autosomal dominant trait by Goodman *et al.*<sup>14</sup> which usually runs in the families and is reflected in our study as familial predisposition seen in our patients was 40%. These results are in accordance to the results of studies done by Malakar *et al.*<sup>4</sup> and Ranu *et al.*<sup>15</sup> where family history was positive in 36% and 42.2% of the patients respectively. While in another study performed by Sheth *et al.*<sup>13</sup> family history was positive in 63% of the patients. This high percentage may be due to difference in study population.

Stress (34%) and insomnia (28%) were the major aggravating factors appeared in our study. These are also the major factors in the studies conducted by Sheth *et al.*<sup>13</sup> and Ranu *et al.*<sup>15</sup> The recent socioeconomic trends in our society such as ever increasing cost of living and the peak of mass media and cellular technology are inducing stress and insomnia, respectively in the youth. This stress and insomnia exacerbate periorbital melanosis due to the effect of increased MSH secretion via hypothalamic-pituitary-adrenal axis.<sup>13</sup> Pregnancy (10%), hepatitis (4%) and typhoid (2%) were also the worsening factors found in our study which is comparable to the study conducted by Malakar *et al.*<sup>4</sup> where pregnancy appeared as triggering factor in 12% of the patients and acute illnesses such as hepatitis and typhoid were the triggering factors in 3% and 2% of the patients, respectively. Hormonal changes during pregnancy exacerbate periorbital melanosis. Sun exposure was also observed as a significant aggravating factor of POM in our study reported in 22% of the patients.

Both POM and PDL-F were present in 88% of the patients in our study that shows strong association of the two conditions. This is also comparable to the studies of Malakar *et al.*<sup>4</sup> where POM and PDL-F was present in 92% of the patients. This substantiates the association of PDL-F with POM. 52% of the POM patients also complained of the PDL-F while 36% of the patients were unaware of the presence of PDL-F and it was observed after close inspection of the patients. These results are similar to those of Malakar *et al.*<sup>4</sup> and Somani *et al.*<sup>8</sup> PDL-F was absent in 12% of the POM patients and these patients should be followed up for the appearance of pigmentary demarcation lines.

Histological examination of POM and PDL-F in our 5 patients showed melanin pigment within the upper dermal macrophages while Wood's lamp examination revealed diminished intensity of hyperpigmentation of both POM and PDL-F. These results of our study are comparable to those of Malakar *et al.*<sup>4</sup> and Watanabe *et al.*<sup>16</sup> The dermal nature of pigment in both POM and PDL-F, and no difference under Wood's lamp examination of both the conditions rather inability to differentiate these two conditions under Wood's lamp in 18% of the patients suggest that POM and PDL-F are not separate entities, but should be considered same. Periorbital melanosis is considered as an extension of pigmentary demarcation line-F of the face in some studies.<sup>4,8,12</sup>

## Conclusion

POM and PDL-F are common chronic and same pigmentary conditions and should be considered as a single entity. PDL-F is a newly described and evolving concept and it should be recognized and differentiated from other similar conditions like melasma, lichen planus pigmentosus, postinflammatory

hyperpigmentation and drug-induced pigmentation.

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