Original Article

Clinical and Dermoscopic Evaluation of Periorbital Hyperpigmentation

Mithali Jage, Sunanda Mahajan
Department of Dermatology, Seth G.S. Medical College and KEM Hospital, Mumbai, Maharashtra, India

Abstract

Introduction: Periorbital hyperpigmentation (POH) is a routinely encountered condition in dermatology practice. Studying the clinical features and its correlation with dermoscopy will help in better understanding of patterns of periorbital pigmentation and its evolution.

Methodology: Fifty patients attending dermatology outpatient department with POH as presenting complaint were included in the study. A detailed history and proper clinical examination were done. Laboratory tests were advised whenever necessary. Dermoscopy of pigmentation over both lower eyelids was done with ×200 magnification of Oitez e-scope (DP-M17 filter e-scope pro [optical ×200]). Clinical photographs of all patients were taken.

Results: POH was multifactorial. The most common clinical type is postinflammatory type. Other associated clinical findings included pigmentation at other anatomical sites (20%), visible bulging (10%), tear trough (8%), and visible superficial vessels in the periorbital region (6%). On dermoscopy, majority of the patients had multicomponent pattern (64%) which included more than one pattern of pigmentation, vasculature, and skin changes. The different patterns of pigmentation were blotches (30%), exaggerated pigment network (28%), coarse speckled (24%), fine speckled (20%), and globules (16%). Pattern of vasculature included telangiectases (18%) and superficial dilated vessels (20%). Patterns of skin changes included atrophy (18%) and exaggerated skin markings (22%). Dermoscopic features can correlate with its etiology.

Conclusion: POH is a multifactorial entity. Dermoscopic features can correlate with its etiology.

Keywords: Clinical features, dermoscopy, etiology, periorbital hyperpigmentation

Introduction

Periorbital hyperpigmentation (POH) commonly referred to as dark circles, seen predominantly on the lower eyelids. In cosmetic dermatology practice, POH is one of the common complaints by the patients. It is also known by the following names: periorbital melanosis, periorbital circles, dark-eye circle, under-eye circles, periocular pigmentation, periorbital melanosis, infraorbital melanosis, and idiopathic cutaneous hyperchromia of the orbital region. It is a common cosmetic condition that occurs in both sexes and may be considered to be normal variants of pigmentation. There is most likely a familial component as it may be seen in family members over generations. POH is a complex entity with a multifactorial etiology and an expanding knowledge base. The multiple factors involved are the amount of melanin deposited in the epidermis and dermis, the presence of periorbital blood vessels, reduced thickness of the epidermis (creating a translucent appearance that leaves deep structures visible – the thinnest epidermis of the human body is located in this region), and genetic factors. The skin of the palpebral region is physiologically thin and is, therefore, more sensitive to exposure to irritative, recurrent, and chronic factors (contact dermatitis and blepharitis) that may contribute to the worsening of the picture through postinflammatory hyperpigmentation. POH usually presents as bilaterally symmetric hyperpigmented patches around the eyes of varying degree and severity. It can affect either upper or lower eyelids or both. It may extend to involve the glabella and upper nose.

Esthetic facial concerns have been the major reason for dermatological consultation in the last few years. Among it, POH is of increasing incidence. It is a significant cosmetic concern because it may make patients seem sad, tired, stressed, and aging faster. The etiology of POH may be multifactorial, with no one etiologic agent predominating. It is important to

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know the etiology – it may be a sign of an underlying systemic disease, skin disorder, allergic reaction, nutritional deficiency, or sleep disturbance. The aims of our study were to study the etiology, clinical features, and the dermoscopic features of POH.

**Methodology**

It was a cross-sectional study conducted in a single center over a period of 6 months. Using convenience sampling method, a sample size of 50 patients was selected; all patients attending dermatology outpatient department of tertiary care institute who were clinically diagnosed as POH and willing to give consent for participation in the study were included in the study.

Epidemiological factors of patients recorded are age, sex, and occupation. Detailed history to assess the following etiological factors was taken which included duration of the condition, duration of sun exposure, hours of sleep, hours of exposure to computer screen, family history, history of atopy or drug intake, associated faulty habit or lifestyle, use of cosmetics, frequent eye rubbing, prior use of any medications topical (eye drops and ointment) or systemic medication, blurring of vision, headache, mental stress, precipitating factor such as photosensitivity, allergies, seasonal variations, presence of associated pigmentation in other areas of the face and the body, and presence of any concomitant illness such as anemia, gastrointestinal diseases, hepato-biliary diseases, renal diseases, and thyroid diseases. In females, menstrual history, history of consumption of oral contraceptive pill, or any other hormonal preparation was also elicited. This was followed by careful physical examination to detect involvement of the upper or lower or both eyelids and extension beyond the periorbital region, color of hyperpigmented areas (light brown/dark brown/red/blue), presence of any dermatological disease or scar in periorbital region, presence of any visible bulging, shadow effect, superficial visible vasculature (i.e., capillaries or veins) in the infraorbital region, pallor in palpebral conjunctiva, nails, and palms, and presence of pigmentation in other areas of the face, for example, melasma or freckles. Eyelid stretch test was done as shown in Figure 1. A manual stretch was given to lower eyelid, and visible change in intensity of pigment was noted. Diagnosis of POH was done clinically, and the patients were classified according to the classification proposed by Ranu et al., as shown in Table 1.

Clinical photographs of the patients were taken under standard conditions. Dermoscopy was done for every patient. It included examination of the structures under a magnification with self-illumination using video dermoscope and OITEZ e-scope (DP-M17 filter e-scope pro [optical ×200]). The lesion was examined in white light both polarized and nonpolarized. No contact fluid was used. There was no risk of discomfort involved. Dermoscopic images captured were correlated with clinical findings and etiology in every patient.

**Results**

There were 39 females and 11 males present in our study. POH was found to be more common in females as compared to males. This is in concordance with study by Mostafa et al. The most common age group affected is 21–40 years in both males and females which is similar to Indian study by Sheth et al. The mean age affected was 28.18 years (range = 8–50 years). Among females, the mean age affected was 28.61 years, and in males, it was 26.63 years. The most common etiology

| Type             | Description                                                                 | Eyelid stretch test                      |
|------------------|-----------------------------------------------------------------------------|------------------------------------------|
| Constitutional   | Curved band of brownish-to-black pigmentation on the skin of the lower eyelids approximating the shape of the orbital rim with frequent involvement of the upper eyelids | Pigment intensity decreased with the stretch |
| Postinflammatory | Presence of irregular patches of brownish or gray pigmentation on the skin on the upper, lower, or both eyelids with features of lichenification, accentuation of skin creases, and eczematous papules or patches in the surrounding areas | Pigment intensity remains same with the stretch |
| Vascular         | Presence of erythema predominantly involving the inner aspect of the lower eyelids, with prominent capillaries or telangiectases (capillaries) or the presence of bluish discoloration of the lower eyelid and visible bluish veins | Pigment intensity increases with the stretch |
| Shadow effect    | Presence of a dark shadow under an overhanging tarsal muscle, eye bags, or the presence of a deep tear trough over the medial aspect of inferior orbital rim that disappears with direct lighting | Pigment intensity decreased with the stretch |
found on history and examination was multifactorial (30%). Multifactorial included the presence of more than one etiology such as stress, lack of adequate sleep, and/or excessive exposure to sun. Other etiologies studied are shown in Figure 2.

Atopic dermatitis, diagnosed on the basis of Hanifin’s and Rajka’s criteria,[8] was seen in 22% of cases. Anemia (Hb <12 g/dl in males and Hb <11 g/dl in females) was present in 16% of cases. Premenstrual exaggeration of periorbital pigmentation was seen in 6% of females. Refractive error, i.e., myopia, was diagnosed in 8% of patients with POH. Anxiety was diagnosed by psychiatrists in 4% of patients with POH. The other associated clinical features examined were pigmentation at other sites (perioral) (20%), visible bulging (10%), shadow effect (8%), and visible vessels (6%). On clinical classification, postinflammatory (36%) was the most common clinical type.

The various dermoscopic patterns observed are shown in Figure 3. Majority of the patients had multicomponent pattern (64%), which included more than one pattern of pigmentation, vasculature, and skin changes. The different patterns of pigmentation were blotches (30%) [Figure 4], exaggerated pigment network (28%) [Figure 5], coarse speckled (24%) [Figure 6], fine speckled (20%) [Figure 7], and globules (16%) [Figure 8]. Pattern of vasculature included telangiectases (18%) and superficial dilated veins (20%) [Figure 9]. Patterns of skin changes included atrophy (18%) and exaggerated skin markings (22%). In the constitutional type of periorbital pigmentation, the most common dermoscopic pattern observed is exaggerated pigment network. Globules, coarse speckled and fine speckled, are found more commonly in postinflammatory type. The color of pigment observed on dermoscopy was dark brown in 48 cases and slate blue in 2 cases. On further examination, it was found that patients with slate blue pigmentation had etiologies of lichen planus pigmentosus which implies dermal origin of pigment [Figure 10]. Patients with postinflammatory type showed commonly blotches (20%), coarse speckled (20%), fine speckled (14%), and globule (10%) pigment pattern.
In the present work, we performed a descriptive study to assess the etiology of POH, clinical type, other associated clinical features, and dermoscopic findings. According to Gathers,[9] fatigue, stress, emotional liability, and aging all may play a significant role in the development of POH. POH in atopics can be explained by excessive rubbing and scratching of the periorbital region.[2] Anemia can cause selective vasoconstriction in the skin, leading to impaired oxygen to periorbital tissues which makes the periorbital region look darker.[6,7] A previous study[7] (n = 200) revealed that 30% of patients with menstrual irregularities and 18% of patients taking oral contraceptive pills had POH, reflecting the role of hormones in POH.[3] Errors of refraction cause increased strain on periocular muscles, resulting in muscle fatigue.[9] Patients with anxiety had aggravation of dark circles during periods of stress which causes increased melanocyte-stimulating hormone secretion through hypothalamic–pituitary–adrenal axis leading to hyperpigmentation. One patient had extension of pigmentary demarcation line (PDL)-F to POH [Figure 11]. A study by Malakar et al.[10] in Indian population of 100 patients showed that in 92% of population, the periorbital pigmentation is to be due to extension of PDL-F. After ruling out other etiologies on history and examination, autosomal dominant inheritance of this condition was postulated in an 8-year-old child with similar complaints in mother. A similar familial inheritance of periorbital pigmentation has been reported by Goodman and Belcher.[11] Other etiologies were lichen planus pigmentosus, acanthosis nigricans, and regular application of cosmetics. Long-term use can lead to deposition of lead sulfide, leading to pigmentation as reported by Sheth et al.[7] The most common clinical type was postinflammatory type (36%) as these patients have relatively acute onset and is noticed early.

Dermoscope helps in finding origin of pigment whether it is due to melanin or due to underlying vasculature. Polarized dermoscopy helped in evaluating pigment network and vascular structures, whereas non polarized dermoscopy was utilized in evaluating superficial skin changes such as scaling and fissuring. This can also help in modifying the treatment according to its etiology as pigment due to melanin can respond to pigment reducing agents; laxity can be managed by lasers and radiofrequency.

**Figure 6:** Dermoscopy showing coarse speckled pattern of pigmentation

**Figure 7:** Dermoscopy showing fine speckled pattern of pigmentation

**Figure 8:** Dermoscopy showing globular pattern of pigmentation

**Figure 9:** Dermoscopy showing superficial dilated veins
Dermoscopic finding was classified as patterns of pigmentation, patterns of vasculature, and pattern of skin changes. Patterns of pigmentation observed were blotches, coarse speckled, fine speckled, globular, and exaggerated pattern. Exaggerated pigment network was identified on dermoscopy in comparison with normal pigment network seen on malar region of the face on the same side. There was accentuation reticular pigment network pattern in terms of pigment deposition. The pattern of vasculature consisted of telangiectasia and superficial veins. Telangiectasia appears as finer branching erythematous vessels. Superficial veins appear as bluish, linear veins of larger caliber as compared to telangiectasia. Telangiectasia is associated generally with poststeroid abuse, whereas the vascular type presents with superficial veins. Vascular type of POH occurs due to a combination of transparency of the overlying skin and dermal vascularity.

Skin changes observed generally on dermoscopy are atrophy and exaggerated skin markings. Atrophy appeared as hypopigmentation and lack of normal skin markings. Exaggerated skin markings appear as increase in crisscross lines of skin markings as compared with malar site of the same site in atopic dermatitis. The color of pigment observed implies the epidermal or dermal origin of pigment which can help in avoiding biopsy and management of the patient. An approach to diagnosis of clinical type using dermoscopy is represented in Figure 12. Polarized dermoscopy helped in better visualization of pigment network and vascular structures as compared to polarized dermoscopy.

**Limitations**

Larger sample size is needed to validate the result and to find out the specific finding of dermoscopy for POH. The diameter of scope used was comparatively larger than area of involvement, so there was difficulty in maneuvering in affected area. Clinicopathologic correlation and test of statistical significance need to be done to prove correlation of POH with etiology and dermoscopic findings.

**Conclusion**

POH is a multifactorial entity, with the most common clinical type being postinflammatory type. Dermoscopic findings can
correlate with its etiology of POH. This study is conducted as a step forward in better understanding of patterns of POH and its evolution, thus aiding in its treatment.

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Conflicts of interest
There are no conflicts of interest.

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