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Original Research Article

A clinico-epidemiological study of periorbital melanosis

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ABSTRACT

Background: Besides the common alterations related to the intrinsic and extrinsic aging processes, there is one that affects individuals of any age, both sexes, and all races the so called dark circles, periorbital darkening or periorbital melanosis. There is scarcity of data regarding the incidence and prevalence of periorbital melanosis due to its transitory nature and lack of reasonable etiological explanation. Aim: To assess the prevalence of periorbital melanosis and to study the epidemiological factors responsible for the occurrence of periorbital melanosis.
Methods: A single centred, cross-sectional, descriptive study was conducted in patients attending the skin OPD of our teaching hospital from Jan 2016 – Dec 2016. A total of 250 patients were included in our study. Patients with hyperpigmentation around the orbital area of all ages and both genders were included in the study. A careful physical examination to detect involvement of upper or lower or both eyelids and extension beyond the periorbital region, colour of hyperpigmented areas (light brown/dark brown/red/blue), presence of any dermatological disease or scar in periorbital region were assessed. A detailed history was taken including duration of the condition, family history, history of atopy or drug intake, associated faulty habit or lifestyle.
Results: Based on the type of POM, vascular POM (44%) was found to be the most common type among our patients followed by constitutional (33.2%), post-inflammatory (13.6%) and shadow type (9.2%). Among the various factors for POM watching TV for more than 8 hours/day, usage of spectacles, sleeping habit of less than 6 hours/day, habit of regularly rubbing the eye, family history of POM, associated systemic disease like anaemia and irregular menstruation and associated skin lesion like atopic dermatitis had shown a strong association (odds ratio >0.8) in the development of POM.
Conclusions: It is very much essential to classify and grade the peri-orbital melanosis and to determine the causative factors which would help us to intervene earlier and that would result in a better prognosis.

Keywords: Periorbital melanosis, Type, Grading, Life style habits, Comorbid conditions

INTRODUCTION

Facial concerns have been the major reason for dermatological consultations in the last few years.[1] Besides the common alterations related to the intrinsic and extrinsic aging processes, there is one that affects individuals of any age, both sexes, and all races the so called dark circles, periorbital darkening or periorbital melanosis (POM).[2,3] Studies had shown that many factors had contributed to this condition like melanin deposition, increased vascularity, chronic inflammation, skin redundancy and genetic causes.[4-6]

Recently, Huang et al classified POM as pigmented, vascular, structural and mixed POM clinically.[7] Pigmented type (P) appears as infraorbital brown hue, vascular (V) type appears as infraorbital blue, pink, or

purple hue with or without periorbital puffiness. Structural type (S) appears as structural shadows formed by facial anatomic surface contours. Mixed type (M) combines two or three of the above appearances.

Most commonly POM develops with respect to two major components: hemodynamic congestion (possible postinflammatory) and dermal melanin deposition.[8] Dermal melanin deposition may be primary (congenital) or secondary to environmental factors such as excessive exposure to sun, exogenous or even unbalanced endogenous estrogen, pregnancy, and breast-feeding practices among the females.[9] Clinically, POM is characterized by light- to dark-colored, brownish-black pigmentation surrounding the eyelids giving a tired look to the patient. Diagnosis is mainly based on clinical examination. It is always important to differentiate the dark eyelid skin with shadowing effect due to tear trough. Manual stretching of the lower eyelid skin will help to differentiate between true pigmentation and shadowing effect, true pigmentation retains its appearance whereas if it was due to shadowing effect it resolves entirely while stretching.[10] Wood's lamp examination can be done to differentiate between the epidermal and dermal pigmentation.[11] The other non-invasive tool which was used to diagnose POM is dermoscopy (also known as epiluminescence microscopy, skin surface microscopy, incident-light microscopy, or dermatoscopy), it allows the in-vivo evaluation of colors and microstructures of the epidermis, the dermoepidermal junction and the papillary dermis which are not visible to the naked eye. These structures are specifically correlated to histologic features.[12]

There are a number of treatment options available for POM. The available treatment options for POM include topical depigmenting agents, such as hydroquinone, kojic acid, azelaic acid, topical retinoic acid and physical therapies, including chemical peels, surgical corrections, and laser therapy, most of which were already tried scientifically for melisma and found to be successful.[13,14]

There is scarcity of data regarding the incidence and prevalence of periorbital melanosis due to its transitory nature and lack of reasonable etiological explanation. In anrecent Indian study, it was found that POH was most prevalent in the age group of 16 to 25 years and it is more common among females.[15] So, the present study was done to assess the prevalence and the factors influencing periorbital melanosis.

Aim

To assess the prevalence of periorbital melanosis and to study the epidemiological factors responsible for the occurrence of periorbital melanosis.

METHODS

A single centred, cross-sectional, descriptive study was conducted in patients attending the skin OPD of our teaching hospital from Jan 2016 – Dec 2016. A total of 250 patients were included in our study. Patients above 60 years of age and with severe dermatological manifestations were excluded from the study. The study was carried out after getting clearance from the institutional ethical committee and informed consent from the individual patients. Patients with hyperpigmentation around the orbital area of all ages and both genders were included in the study. A detailed history was taken including duration of the condition, family history, history of atopy or drug intake, associated faulty habit or lifestyle, use of cosmetics, precipitating factor such as photosensitivity, allergies, seasonal variations, presence of associated pigmentation in other areas of the face and the body and the patients were also screened for presence of any other concomitant illness such as anemia, gastrointestinal diseases, hepato-biliary diseases, renal diseases, thyroid diseases.

This was followed by careful physical examination to detect involvement of upper or lower or both eyelids and extension beyond the periorbital region, colour 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, face, nails and palms; any cosmetics applied over face, presence of pigmentation in other areas of face e.g. melasma, freckles, etc.

The diagnosis of periorbital melanosis was done clinically and the patients were classified according to the classification proposed by Ranuetal grading of POM was done in comparison to surrounding skin as follows: 0 - skin colour comparable to other facial skin areas, 1 - faint pigmentation of infraorbital fold, 2 - pigmentation more pronounced, 3 - deep dark colour, all four lids involved, 4 - grade 3+ pigmentation spreading beyond infraorbital fold.[14] All patients were examined with Wood's lamp to determine whether pigmentation is epidermal or dermal. Eyelid stretch test was done to rule out the shadow effect. Baseline investigations like complete blood count, serum TSH, SGPT, serum cholesterol, random blood sugar was done for all patients to identify the concomitant illnesses.

All data were entered and analysed by using SPSS version 20. Mean and standard deviation were derived for all parametric variables similarly frequencies and percentages were derived for all non-parametric variables. Association between POM and other variables were tested using multinomial logistic regression. $P<0.05$ was considered statistically significant.

RESULTS

Table 1 shows the distribution of the study subjects based on their socio-demographic characteristics. It is seen from the Table that the majority of the periorbital melanosis patients were in the age group of 15 – 35 years and most

of them were females. As the study being undertaken in a rural area majority of the subjects belong to the middle and lower middle socio-economic class according to modified Kupuswamy classification. Most of the patients with periorbital melanosis had it as a chronic problem, where they had the complaint for more than 1 – 3 years. Based on the type of POM, vascular POM (44%) (Figure 1) was found to be the most common type among our patients followed by constitutional (33.2%) (Figure 2), post-inflammatory (13.6%) (Figure 3) and shadow type (9.2%) (Figure 4). The grading of POM was done based on the grading system proposed by Ranu et al, majority of the patients had grade II (48.4%) POM (pigmentation found to be more pronounced) followed by grade I (25.2%) POM (pigmentation limited to the infra-orbital fold) and grade III (23.2%) POM (deep dark colour pigmentation) and only 3.2% of the subjects had grade IV POM pigmentation involving beyond the infraorbital folds in Table 2. The characteristics of POM were depicted in Table 3. Tear trough was present in 22% of patients with POM and the most common pigment colour was found to be brown (49.2%) followed by black (40.8%). 12% of patients with POM had a thick pigment demarcation lines and for majority (40.4%) of the patients lower eyelid was the commonest site of involvement and for 23.2% of the subjects both eyelids were involved. Among the other type of skin lesions which were present among the subjects with POM atopic dermatitis (17.2%) was found to be more commonest manifestation followed by dermatosis papulosa nigra (14.4%). Few female patients had acne and melasma and some of the male patients had seborrheic dermatitis and air-borne contact dermatitis as the associated skin lesions along with POM. Among the various factors for POM watching TV for more than 8 hours/day, usage of spectacles, sleeping habit of less than 6 hours/day, habit of regularly rubbing the eye, family history of POM, associated systemic disease like anemia and irregular menstruation and associated skin lesion like atopic dermatitis had shown a strong association (odds ratio >0.8) in the development of POM among our study subjects. Further analysis had shown that watching television for more than 8 hours /day had a significant association in developing post-inflamatory POM, whereas usage of spectacles, frequent rubbing the eyes, associated systemic diseases like anaemia and skin lesion like atopic dermatitis have a strong statistical significant association with vascular POM ($p < 0.05$) (Table 4).

Table 1: Distribution of the study subjects based on their socio-demographic characteristics.

Socio-Demographic characteristics		Frequency (n=250)	Percentage	Mean ± SD
Age	<16	6	2.4%	30.3 ± 9.2
	16 – 25	79	31.6%	
	26 – 35	98	39.2%	
	36 – 50	64	25.6%	
	>50	3	1.2%	
Gender	Male	59	23.6%	
	Female	191	76.4%	
Socioeconomic class	Upper	12	4.8%	
	Upper middle	31	12.4%	
	Middle	83	33.2%	
	Lower middle	75	30%	
	Lower	49	19.6%	
Duration of illness	1 – 6 months	59	23.6%	1.3 years ± 0.8 years
	7 months – 1 year	36	14.4%	
	1 – 3 years	96	38.4%	
	3.1 – 6 years	48	19.2%	
	>6 years	11	4.4%	

Table 2: Distribution of the study subjects based on the type and grading of periorbitalmelanosis.

POM		Frequency (n=250)	Percentage
Type of POM	Constitutional	83	33.2%
	Post-inflammatory	34	13.6%
	Vascular	110	44%
	Shadow type	23	9.2%
Grading of POM	Grade 1	63	25.2%
	Grade 2	121	48.4%
	Grade 3	58	23.2%
	Grade 4	8	3.2%

Table 3: Characteristics of POM among the study population.

Characteristics		Frequency	Percentage (%)
Tear trough	Present	55	22
	Absent	205	82
Colour	Brown	123	49.2
	Brownish black	102	40.8
	Black	25	10
Texture/pigment demarcation lines	Normal	220	88
	Thick	30	12
Site of involvement	Upper eyelid	91	36.4
	Lower eyelid	101	40.4
	Both eyelids	58	23.2
Other types of skin lesions	Dermatosispapulosanigra	36	14.4
	Seborrhic dermatitis	5	2
	Air borne contact dermatitis	4	1.6
	Acne	15	6
	Melasma	6	2.4
	Atopy	43	17.2
	Nil	141	56.4

Table 4: Association of various risk factors for POM among the study subjects.

Risk factor		Odds ratio	Consti-tutional (n=83)	Post-inflammatory (n=34)	Vascular (n=110)	Shadow type (n=23)	P value
Watching computer for > 8 hours/day (n=21)		0.418	6 (7.2%)	7 (20.5%)	6 (5.4%)	2 (8.6%)	0.0318
Watching TV for >8 hours/day (n=48)		0.894	20 (24%)	6 (17.6%)	22 (20%)	0	0.761
Work stress(n=38)		0.739	12 (14.4%)	5 (14.7%)	20 (18.1%)	1(4.3%)	0.834
Usage of spectacles (N=44)		0.815	12 (14.4%)	3 (8.8%)	28 (25.4%)	1 (4.3%)	0.0371
Sleeping < 6hours/day (N=51)		0.905	19 (22.8%)	7 (20.5%)	25 (22.7%)	0	0.719
Habit of rubbing the eyes regularly (N=142)		1.452	37 (44.5%)	11 (32.3%)	90 (81.8%)	4(17.3%)	0.0261
Family history of POM (n=108)		1.348	44 (53%)	6 (17.6%)	54 (49%)	4(17.3%)	0.0581
Systemic diseases	**Hypertension(N=6)**	0.187	1 (1.2%)	1 (2.9%)	3 (2.7%)	1 (4.3%)	0.681
	Diabetes (n=7)	0.172	2 (2.4%)	1 (2.9%)	4 (3.6%)	0	0.594
	Hypothyroidism (n=5)	0.163	1 (1.2%)	1 (2.9%)	3 (2.7%)	0	0.614
	Anemia (n=52)	0.938	18 (21.6%)	3 (8.8%)	30 (27.2%)	1 (4.3%)	0.0482
	Irregular menstruation (n=26)	0.847	20 (25%)	1 (2.9%)	5 (4.5%)	0	0.0324
Association of other skin lesions	**Atopy (n=43)**	0.834	11 (13.2%)	2 (5.8%)	29 (26.3%)	1 (4.3%)	0.0318
	dermatosispapulosanigra (n=36)	0.779	11 (13.2%)	5 (14.7%)	18 (16.3%)	2(8.6%)	0.871
	Seborrhic dermatitis (n=5)	0.167	2 (2.4%)	0	3 (2.7%)	0	0.395
	air borne contact dermatitis (n=4)	0.164	2 (2.4%)	1 (2.9%)	1 (0.9%)	0	0.582
	Acne (n=15)	0.298	8 (9.6%)	2 (5.8%)	4(3.6%)	1 (4.3%)	0.639
	Melasma (n=6)	0.168	1 (1.2%)	1 (2.9%)	4 (3.6%)	0	0.628

P value derived by applying Chi-square test

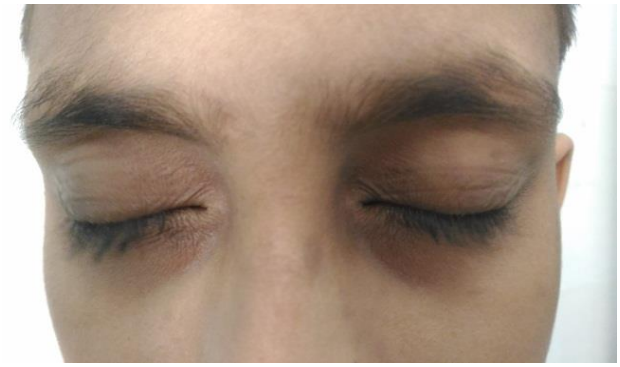

Figure 1: Vascular type.

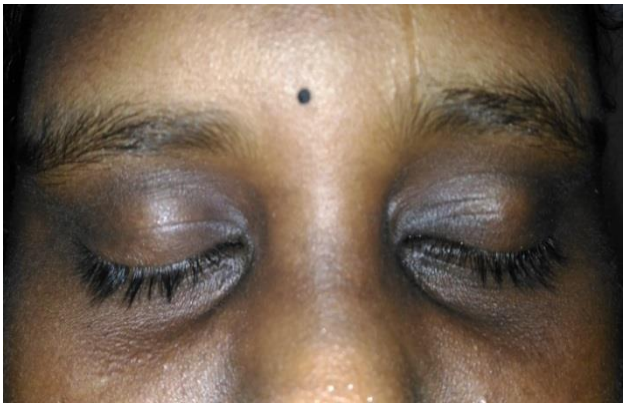

Figure 2: Constitutional type.

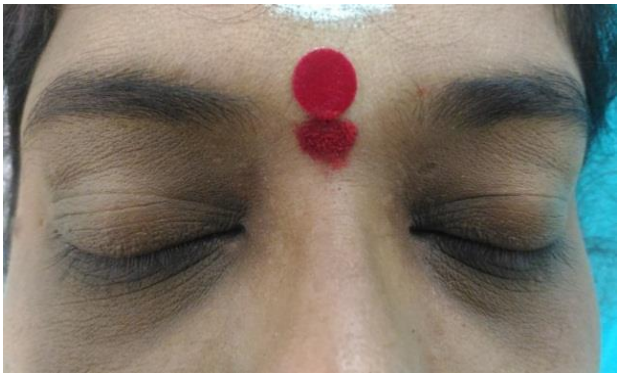

Figure 3: Post inflammatory type.

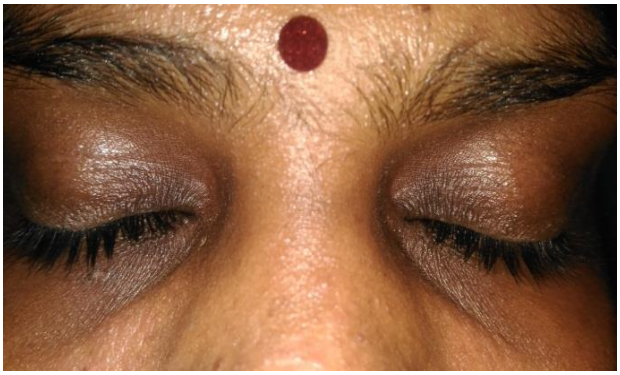

Figure 4: Shadow type.

DISCUSSION

Today periorbitalmelanosis is one of the most common cosmetological concerns particularly among females which urge the patients to visit a dermatologist, is an ill-defined entity to date. The pigmentary demarcation line-F (PDL-F) is a physiological line which most of the time would go unnoticed from childhood and that would be revealed after some triggering conditions like puberty, pregnancy and some unknown causes.

Strachan et al in his study had quoted that genetic conditions are not necessarily present at birth.[16] The genotype is fixed at conception, but the phenotype may not manifest until adult life. In such cases the penetrance is age-related which had supported the results of our study showing the commonest age group affected with POM was 16-35 years.

According to the study done by Ranu, et al regarding the commonest type of POM in Indian patients was found to be vascular followed by constitutional type and it was almost in par with our study where 44% of the study subjects had vascular and 33.2% had constitutional POM. He also reported that in their study on Chinese, Malay and Indian patients, the commonest form of POH observed was vascular (41.8%), followed by constitutional (38.6%), post inflammatory type (12%), and shadow effect (11.4%).[14]

Malakaretal had defined periorbitalmelanosis as an extension of pigmentary demarcation line F of the face and in his study he reported it was present in 11% of his patirents, whereas in our study only three (1.2%) patients had PDL – F.[3]

Goodman et al has reported POH to be an autosomal dominant trait which usually runs in the families, which is reflected in our study, in our study 108 out of 250 patients had positive family history with a odds of 1.348.[6] In the present study, 25% patients reported lack of adequate sleep (sleep of <6 hours duration) with a odds of 0.905 and almost similar type of results was also quoted by Ranu et al.[14] Rubbing the eyes regularly had shown a strong significant association of POM in our study but the study done by Seth did not show association between rubbing of eyes and POM, so further scientific studies had to be conducted to substantiate this finding.[15] In our study usage of spectacles by patients mainly due to myopia had shown a strong significant association with POM and this is well supported by the theory quoted by Gathers in his study mentioning that exhaustion of periorbital muscles may play a significant role in causation of POH.[17] According to Gathers fatigue, stress, emotional liability and aging all may play a significant role in development of POH, whereas in our study work stress did not show a significant association (OR=0.78) with POM as most of our study subjects were from rural area and their major occupation was agriculturist.[17] In our study 52 females out of 191 (27.2%) had iron deficiency

anemia and it showed a strong association with POM and this is because enough oxygen is not reaching the periorbital tissues or due to facial pallor which makes the periorbital region look comparatively darker. In the present study we did not found any significant association of POM with some of the systemic diseases like hypertension, diabetes and hypothyroidism whereas Gendler et al in his study had quoted that some medical problems had shown association of POM with heart diseases, liver disease, thyroid disease and vitamin K deficiency but the literature did not support statistically significant association.[18]

CONCLUSION

Peri-orbital melanosis is a common dermatological disorder particularly among the females and more of cosmetic concern. It is a multifactorial disorder which involves genetic, lifestyle behaviours and certain comorbid medical disorders. It is very much essential to classify and grade the peri-orbital melanosis and to determine the causative factors which would help us to intervene earlier and that would result in a better prognosis.

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