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Original Article

Periorbital hypermelanosis: A study on clinic-epidemiological profile, common associations and impact on quality of life

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Abstract

Introduction Periorbital hypermelanosis (POH) is a common dermatological condition which is characterized clinically by presence of increased pigmentation on the skin around the eyes. Despite its prevalence, there is a paucity of data regarding its clinicoepidemiological profile, risk factors and effects on quality of life.

Methods Epidemiological data was collected and detailed history was taken regarding duration of the complaints, family history, atopic diathesis or drug intake, medical history, sun exposure and lifestyle habits. Clinical assessment included evaluation of distribution, extent, severity of POH eyelid stretch test, Wood's lamp examination and relevant laboratory investigations. The impact of POH on quality of life was assessed using validated questionnaire (DLQI).

Results POH was most commonly seen in 16-25 age group (53%) with a female preponderance. Family history was present in 29.3% cases with lower lid involvement seen in 62% cases. 53% of the patients were having Grade 2 POM. Constitutional form of POH was most common (44%) and POH appeared to be dermal in 62% of cases. Refractive errors, eye strain, sleep deprivation and frequent eye rubbing, were the common risk factors. Strong association of POH with family history, atopic diathesis and stress was noted. DLQI revealed a significant psychological burden experienced by affected individuals, negatively affecting self-esteem, body image perception and social interactions, leading to increased emotional distress and diminished overall well-being.

Conclusion POH is a multi-factorial entity significantly impacting QOL of affected individuals. By identifying the factors associated with POH, tailored management approaches can be initiated including lifestyle modifications, topical/ systemic therapy and cosmetic interventions to address both physical and psychological aspects of the condition.

Key words
Periorbital hypermelanosis; Stress; Quality of life; Periorbital hyperpigmentation; Dark circles.

Introduction

Periorbital hypermelanosis (POH) or periorbital hyperpigmentation, commonly known as dark circles, is a routinely encountered dermatological condition characterized by the darkening of the skin around the eyes. Mostly, the patients seek medical advice because of the cosmetic concern. Despite its prevalence, there is a paucity of data regarding its pathogenesis, clinico-epidemiological profile, risk factors and effects on quality of life.

The objective of this research is to study is to study the clinical and the epidemiological characteristics of POH providing valuable insights into its associations, potential risk

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factors and its impact on quality of life of affected individuals.

Methods

This cross-sectional, prospective, observational and descriptive study was carried out in Northern Railway Divisional Hospital, Ambala over a period of one and a half years after ethical approval No. Med/P/2019/Pt.(01) dated 26/11/2019. One hundred and fifty consecutive patients, aged above 18 years with POH presenting to the OPD were enrolled in the study after taking written informed consent. Epidemiological data was collected in a predesigned proforma and detailed history was taken including duration of POH, family history of similar complaints, history of atopic diathesis or drug intake, history of alcohol intake and smoking, seasonal variations, history regarding sun-exposure, lifestyle habits like use of cosmetics, and medical history like history of any systemic disease. A detailed dermatological examination was carried out in each patient to evaluate the distribution (upper lid, lower lid or both lids), color of the pigment, extension of the pigmentation beyond the periorbital region, grading of POH and presence of any other dermatological disorder. Grading of POH was done as:[1]

Grade 0- color of skin is comparable to other facial skin areas.

Grade 1- presence of minimal pigmentation of infraorbital fold.

Grade 2- pigmentation is more pronounced.

Grade 3- deep dark pigmentation involving both lids.

Grade 4- grade 3 and pigmentation extending beyond infraorbital fold.

Classification of POH was done according to classification system proposed by Ranu *et al*.[2] as follows:

Constitutional There is presence of a curved band of brownish-black pigmentation on skin of lower eyelids with frequent involvement of upper lids.

Post inflammatory There is presence of patches of irregular brownish-grey pigmentation on skin of upper, lower or both lids with presence of features of lichenification in the surrounding areas. It may or may not be associated with personal or family history of atopy.

Vascular There is presence of erythema which predominantly involves inner aspect of lower lids, with presence of telangiectasias, prominent capillaries or presence of bluish discoloration. There may be visible bluish veins that become prominent on stretching the overlying skin.

Shadow effect There is presence of eye bags, or a shadow under overhanging tarsal muscle, or a deep tear trough. It disappears on direct lighting.

Others It includes POH resulting from other causes including nutritional deficiencies, anemia, hormonal disturbances, nutritional deficiencies, skin laxity, chronic illness, etc.

Eyelid stretch test and examination under Wood's lamp was carried out in all patients. In eyelid stretch test, on manual stretching of lower lid, true pigmentation retains its appearance while shadow type of POH, improves or resolves completely. However, in vascular type of POH, there may be increase in the violaceous discoloration. Wood's lamp examination helps to differentiate between epidermal and dermal pigmentation as former becomes more pronounced on Wood's lamp while in latter, the contrast is less pronounced. Relevant laboratory investigations including hemogram and thyroid profile were done.

Patients were evaluated for stress by perceived stress scale (PSS) questionnaire.[3] Validity of this scale (PSS-10) has already been established.[4] It consists of 10 items which are rated on a five-point scale. Item number 4, 5, 7 and 8 are reverse scored, and the ratings are summed, with higher scores indicating more perceived stress. Total score is interpreted as follows:

0-7: stress is much lower than average.

8-11: stress is slightly lower than average.

12-15: average perceived stress.

16-20: stress is slightly higher than average.

21 and over: stress is much higher than average.

The impact of POH on quality of life was assessed using validated questionnaire (DLQI). The Dermatology Life Quality Index (DLQI), is a commonly used instrument for assessment of dermatology specific QoL. It is a 10-point validated questionnaire with each question carrying 3 marks. The final score is calculated by summing the score of each question. The maximum value is 30 and minimum value is 0. The higher the DLQI score, the more the impairment in QoL.

All the data was properly coded and entered in Microsoft Excel and analyzed using SPSS software. Appropriate tests of significance were applied wherever required.

Results

The demographic profile of the study patients is listed in **Table 1**. POH was most commonly seen in 18-25 year age group (53%) and females were more commonly involved (71.3%). Family history was present in 29.3% cases. Characteristics of POH in the study population are depicted in **Table 2**. Lower lid involvement was present in 62% cases. A majority of patients had Grade 2 POM (53.3%). Constitutional form of POH was most common (44%) followed by vascular (35.3%), post inflammatory (14%) and shadow (8%) type. On Wood's lamp examination, the pigmentation was dermal in 62% of cases. Associated risk factors are tabulated in **Table 3**. Refractive errors,

Table 1 Distribution of study subjects based on their demographic characteristics.

	Frequency (n=150)	*(%)*
Age		
18-25	80	53.3%
26-35	32	21.3%
36-45	26	17.3%
46-55	8	5.3%
>55	4	2.7%
Gender		
Male	43	28.6%
Female	107	71.3%
Occupation		
Students	103	68.7%
Housewives	28	18.7%
Serving employees	13	8.7%
Retired employees	6	4.0%
Duration of POH		
< 1 year	17	11.3%
1 to < 2 years	15	10.0%
2 to < 5 years	98	65.3%
≥ 5 years	20	13.3%
Family history		
Present	44	29.3%
Absent	106	70.7%

Table 2 Characteristics of POH among the study population.

	Frequency (n=150)	*(%)*
Site		
Lower eyelid	93	62.0%
Upper eyelid	21	14.0%
Both	36	24.0%
Grade		
Grade 1	38	25.3%
Grade 2	80	53.3%
Grade 3	29	19.3%
Grade 4	3	2.0%
Type		
Constitutional	66	44.0%
Post-inflammatory	21	14.0%
Vascular	53	35.3%
Shadow	12	8.0%
Color of pigment		
Brown	89	59.3%
Brownish black	53	35.3%
Black	8	5.3%

prolonged eye strain (involving cell phone use >4 hours per day or watching TV >6 hours per day), lack of adequate sleep and frequent eye rubbing, were the common risk factors observed. Strong association of POH was seen with atopic diathesis, (35.3%), family history (29.3%) and perceived stress (P-value <0.005). Laboratory investigations revealed presence of anemia in 18.7% patients and thyroid dysfunction in 2.7% patients. History of chronic sun exposure was elicited in 37.3% patients.

PSS was significantly higher than average (>16) in 71.3% cases of POH and mean PSS score was 19.2.

DLQI study (**Figure 1**) revealed a significant psychological burden experienced by affected individuals, negatively affecting self-esteem, body image perception and social interactions, leading to increased emotional distress and diminished overall well-being.

Discussion

A total of 150 patients with POH were enrolled in the study. Majority of the patients were in 18-25 year age group (53%) and the mean age of participants was 22.31 years. Females outnumbered males in our study (71.3%). Female preponderance in study subjects was also seen in studies conducted by Mahesh *et al*.[5] and Neerja *et al*.[6] However, in a study conducted by Yaar *et al;*[7] both the sexes were in same proportions. Majority of the study subjects were students (68.7%) in our study. However, in a study conducted by Neerja *et al*.[5] and Sheth *et al;*[1] majority of the patients were housewives. A positive family history was seen in 29.3% of patients. This is in contrast to study by Sheth *et al*.[1] who reported a family history in 63% of their patients. Lower lid (62%) was the most common site involved in our patients. Similar findings were seen in studies conducted by Brinda *et al*.[8] and Sheth *et al;*[1] however Mahesh *et al*.[5] and Neerja *et al*.[6] reported both lids to be involved in majority of their patients. Grade 2 POH was commonly seen in this study (53.3%). This is consistent with studies conducted by Sheth *et al;*[1] Mahesh *et al*.[5] and Brinda *et al*.[8] Neerja *et al*.[6] however, reported grade 3 POH to be most common in their study subjects.

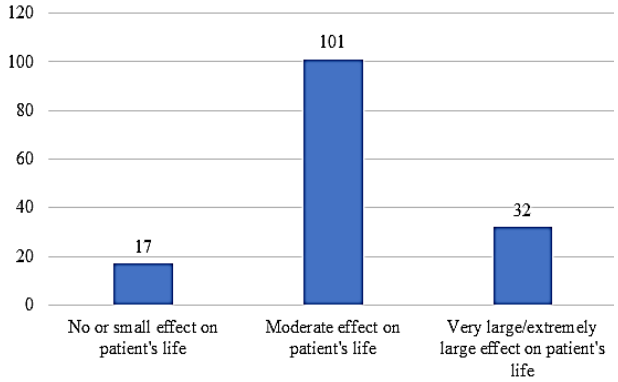

Figure 1 Impact of POH on DLQI of study subjects.

Table 3 Risk factors associated with POH.

	Frequency (n=150)	*(%)*
Refractive errors		
Present	35	23.3%
Absent	115	76.7%
Prolonged eye strain		
Cell phone usage >4 hour/day	24	16.0%
Watching TV >6 hours/day	17	11.3%
Sleep less than 8 hours a day	32	21.3%
Frequent eye rubbing	14	9.30%
History of atopy		
Present	53	35.3%
Absent	97	64.7%

The most common type of POH seen in the patients of the current study was constitutional (44%), followed by vascular (35%), post inflammatory (14%) and shadow (8%). Similar results were also reported by Sheth *et al*.[1] and Mahesh *et al;*[5] who also reported constitutional type of POH to be the most common. This is in contrast to study by Neerja *et al*.[6] where post inflammatory type of POH was the most common. Vascular type of POH was most common in a study conducted by Ranu *et al*.[2] and Brinda *et al*.[8] The color of pigment was brown in 59.3% of patients, which is similar to results observed by Brinda *et al*.[8] On Wood's

lamp examination, pigment was dermal in 62% of patients, similar to those observed by Sheth *et al*.[1] History of atopic diathesis was elicited in 35.3% of patients, similar to those observed by Brinda *et al*.[8] and Mahesh *et al*.[5] Neerja *et al*.[6] however reported history of atopy in 72% of their study subjects. Anemia was seen in 18.7% of our patients. Mahesh *et al*.[5] however reported a higher prevalence of anemia in their patients. Thyroid disorders were seen in 2.7% of our patients, Neerja *et al*.[6] however reported higher prevalence of thyroid disorders in their study (14.6%).

Perceived stress was significantly higher than average (>16) in 71% of the study subjects with mean PSS score of 19.2. Mahesh *et al*.[5] reported emotional stress to be present in 14% of their patients. In a study conducted by Neerja *et al*.[6] stress was seen in 55.4% of the patients. The postulated mechanism behind stress and POH could be due to increased melanocyte stimulating hormone (MSH) secretion in response to stress via HPA axis.

Quality of life (QoL) study using DLQI revealed, no or small effect in 17 patients, moderate effect in 101 patients and very large or extremely large effect in 32 of the patients. There was no correlation between grading of POH and impairment in QOL. It is imperative to note that the impact of POH on QoL can vary among different individuals. Some may find effective coping strategies with little effect on QOL, while others may experience substantial distress and impairment in QoL. However, addressing both the physical and emotional aspects of the condition can lead to better overall well-being and improved quality of life in patients.

Conclusion

POH is a common yet poorly understood dermatological condition with a multi-factorial causation, significantly impacting QOL of affected individuals. By identifying the factors associated with POH, targeted management approaches can be initiated including lifestyle modifications, topical/ systemic therapy and cosmetic interventions. Apart from addressing the physical and cosmetic aspects of the condition, psychological aspects of the condition also need to be taken care of to improve the overall well-being of the affected individuals.

Declaration of patient consent The authors certify that they have obtained all appropriate patient consent.

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Conflict of interest Authors declared no conflict of interest.

Authors' contribution

NS: Substantial contribution to study design and data collection, manuscript writing, critical review.

GR: Analysis and data interpretation, manuscript writing, critical review, given final approval of version to be published.

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