



Infra-orbital Hyper-pigmentation (Dark Circles): A Study of its Prevalence, Etiology and its Association with Other Dermatological Symptoms among Young Adults

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Name of Author:

Abdul Qayum Khan¹, Somaiya Rehman², Farooq Azam Khan³, Najeeb Ullah Khan⁴, Kalsoom Aslam⁵

Affiliation: ¹Assistant Professor, Department of dermatology Lady Reading Hospital, Peshawar

²MBBS, FCPS Dermatology, Senior Woman Medical Officer, Naseer Ullah Khan Baber Memorial Hospital Peshawar

³FCPS Dermatology, HOD Dermatology, Mian Rashid Hussain shaheed memorial Hospital PABBI

⁴MBBS, FCPS (Dermatology), Registrar, Department of Dermatology Khyber Teaching Hospital, Peshawar

⁵Assistant Professor Dermatology Khyber Medical University Hospital and Research Centre.

Corresponding Author:

Najeeb Ullah Khan

Email: najeebullah@gmail.com

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Abstract: Background: Dark circles are a dermatological disorder that can impact self-esteem and attractiveness. It often has consistent pigmentation on both sides. **Objective:** The aim of this study was to determine the prevalence, etiology and association of Infra-orbital Hyper-pigmentation with other dermatological symptoms among young adults. **Material and method:** The current cross-sectional study was carried out at the Department of dermatology Lady Reading Hospital, Peshawar from January 2025 to June 2025 after taking approval from the ethical committee of the hospital. The college voluntary students of different age groups (ranged 18-26 years) without active any dermatological diseases were included in this study. Questionnaire was distributed among the participants. To evaluate the level of stress in an individual life during the last month a 10-item questionnaire was used. The questionnaire included questions on infraorbital hyperpigmentation (dark circles). To address prevalent societal concerns, we updated the SSCQ to include two more conditions: oily hair and skin greying. The SSCQ was used to assess dark circles on a Likert scale. SPSS version 22 was used for data analysis. **Results:** A total of 300 individuals were enrolled in this study out of which 200(66%) were females and 100 (44%) were males. The mean age of the study population was 22.78 $\pm$ 2.52 years and mean weight was 55.4 $\pm$ 9.9 Kg. The frequency of Infra-orbital Hyper-pigmentation was observed in 250(83.3%) of the study participants. The usage of face wash, sunscreen, cosmetics, and high levels of psychological stress were found to be substantially associated with IOHP. To explore the relationship between IOHP levels and various dermatological skin problems. SSCQ (self-reported skin complaint questionnaire) was used. The most common skin problems seen in individuals were oily skin (70%) and pimples/acne (67%). A substantial correlation was identified among pimples / acne ($p = 0.005$) & oily skin (p equal 0.02). **Conclusion:** The present study concluded that Infra-orbital Hyper-pigmentation was very common (80%) among young adults and its prevalence was strongly associated with daily life style factors, and dermatological variables including oily skin and acne.

Keywords: IOHP, Dark circles, Etiology, Symptoms.

INTRODUCTION

Skin care is crucial because it protects the body from pathogens, UV radiation, and harmful substances while keeping its health and efficiency.¹ Taking care of skin may improve its appearance and make it look more youthful and fresh. Skin problems affect people of all ages, however certain age groups are more vulnerable to particular skin conditions than others.² A study shows that the most recent dermatological cases are seen in South Asia. Lack of socioeconomic status is one of the factors that significantly influences the prevalence of dermatological disorders. As a result of its low resources, Pakistani healthcare is especially susceptible to the burden of dermatological disorders.³ In the modern society dark circles (infra-orbital hyperpigmentation) are among the most common skincare problems and often have consistent pigmentation on both sides. Concerns about infra-orbital hyperpigmentation are common, especially among women aged 16-25 (up to 47.5%). Treatment for this disorder varies based on individual factors, including environmental and internal influences.⁴ It can be caused by thinned peri-orbital skin, larger capillaries, hyperpigmentation, and enlarged orbital

veins. These three aspects provide strong evidence for the formation of infra-orbital dark rings. The thinner skin around the eyes gives a greater perspective of the underlying blood vessels. Increased melanin production, inflammation, or fluid accumulation may worsen this condition.⁵ Dark circles are a common ageing sign caused by thinning and brittle skin around the eyes owing to collagen and elastin fiber loss. Melanin concentrations and oxygen hemoglobin ratios are the key chromophores in human skin that regulate pigmentation.⁶ The study showed that the black circle region had a low hemoglobin oxygen ratio with elevated melanin accumulation. Dark circles might be classified as vascular, high pigmented, or intentional.¹ Dark circles are one of the most common cosmetic concerns identified. Dark circles are quite common in Pakistan, effecting up to 79-80% of young people, according to research. Common in the 16-25 age range, with a greater prevalence in females, they are substantially connected with psychological stress, inadequate sleep (less than 6 hrs.), excessive use of screens time, and hereditary issues.⁷ The present study was carried out to determine the prevalence, etiology and association of dark circles with other dermatological symptoms among young adults.

MATERIALS AND METHODS

The current cross-sectional study was carried out at the Department of dermatology Lady Reading Hospital, Peshawar from January 2025 to June 2025 after taking approval from the ethical committee of the hospital. The sample size was determined through open EPI software. The college voluntary students of different age groups(ranged 18-26 years) without active any dermatological diseases were included in this study while individuals who refused to enroll, taking medication for any disease and diagnosed with any metabolic, psychiatric, or dermatological active disease were excluded. Written informed consent was taken from each individual. Questionnaires was distributed among the participants written in English with 52 questions and had sub sections including demographic features, perceived psychological stress, and dermatological questions. Perceived stress scale questionnaire (PSSQ). To evaluate the level of stress in an individual life during the last month a 10-item questionnaire consists of 5 points was used. 0 = never, 1 = almost

never 2 = sometimes, 3 = fairly often, and 4 = very often. The PSSC cutoffs were based on percentile, with persons scoring below the 75th percentile indicating light psychological stress and those scoring beyond the 75th percentile indicating significant psychological stress. The validated self-reported skin complaints questionnaire (SSCQ) with 10 items assesses dermatological morbidity using a 4-point Likert scale. The questionnaire included questions on infra-orbital hyperpigmentation (dark circles), with responses ranging from 1 (no) to 4 (yes, very much). To address prevalent societal concerns, we updated the SSCQ to include two more conditions: oily hair and skin greying. The SSCQ was used to assess dark circles on a Likert scale. Individuals scoring 4 were classified as having a high rate of dark circles, while those reporting 1-3 were classified as having no dark circles and were considered a control group. SPSS version 22 was used for data analysis. All statistical data was presented in tabular format with the standard deviation and mean. A P-value less than 0.05 was considered statistically significant. ($P < 0.05$). A chi-square test was used to analyze the relationship between IOHP rates, related variables, and dermatological symptoms

RESULTS

A total of 300 individuals were enrolled in this study out of which 200(66%) were females and 100 (44%) were males. The mean age of the study population was 22.78 ± 2.52 years and mean weight was 55.4 ± 9.9 Kg. The frequency of Infra-orbital Hyper-pigmentation was observed in 250(83.3%) of the study participants. Our study results evaluated that daily life style factors are highly associated with Infra-orbital Hyper-pigmentation. Factors such as daily sun exposure, sleep, eye cream use, smoking, fluid intake, and face treatment had no association with dark circle severity. The usage of face wash, sunscreen, cosmetics, and high levels of psychological stress were found to be substantially

associated with IOHP as presented in table 1. To explore the relationship between IOHP levels and various dermatological skin problems. SSCQ (self-reported skin complaint questionnaire) was used. The most common skin problems seen in individuals were oily skin (70%) and pimples/acne (67%). A substantial correlation was identified among pimples / acne ($p = 0.005$) & oily skin (p equal 0.02) as presented in table 2.

Table1.The relationship between daily lifestyle variables and the degree of dark circles

Factors		Individuals %	IOHP rate (%)			Value of p
			High	low		
	High stress					
Yes		16	14	2		0.005
No		84	65	19		
	Therapy of face					
Yes		23	17	6		0.56
No		77	62	15		
	Fluid consumption					
More than 8 glasses		83	60	23		0.193
Less than 8 glasses		17	13	4		
Habit of smoking						
Yes		8	5	3		0.058
No		94	74	18		
	Cosmetics usage					
Yes		26	24	2		0.003
No		74	58	16		
	Eye cream use					
Yes		6	5	1		0.107
No		94	72	22		
	Use of sun screen					
Yes		58	30	28		0.001
No		42	30	12		
	Use of face wash					
Yes		76	63	13		0.001
No		24	14	10		
	Sleep duration daily					
More than 7 hours		51	42	9		0.304
Less than 7 hours		49				
	Sun exposure					
More than 20 minutes		46				0.679

Table2. The level of dark circles and its relation with other dermatological symptoms

Dermatological symptoms	Individuals %	IOHP rate (%)		Value of p
		High	low	
Oily skin				
Yes	70	58	12	0.02
No	30	22	8	
Hair fall				
Yes	80	64	16	0.07
No	20	16	4	
Hair graying				
Yes	36	31	5	0.12
No	64	50	14	
Dry/sore rash				
Yes	25	22	5	0.113
No	75	50	25	
Itchy Skin				
Yes	35	30	5	0.061
No	65	50	15	
Scaly skin				

Yes	20	17	3	0.121
No	80	59	21	
Warts				
Yes	7	6	1	0.287
No	93	71	22	
Troublesome of sweating				
Yes	40	33	7	0.763
No	60	48	12	
Pimples/acne				
Yes	67	54	13	0.005
No	33	24	9	
Other rashes on face				
Yes	20	16	4	0.079
No	80	60	20	

DISCUSSION

Dermatological diseases account for the fourth most significant cause of nonfatal illness worldwide. Low socioeconomic countries have a greater prevalence of skin problems. Infra-orbital hyperpigmentation (IOHP), sometimes referred to as dark circles, is a dermatological disorder that can impact self-esteem and attractiveness.⁸ Dark circles, is a prevalent problem of skin, particularly in Asians. Overall, 50% of Indian women have moderate to severe black circles on their upper eyelids, which rises with age. In a research, the most prevalent kind of IOHP was constitutional/genetic (51.5%), followed by post-inflammatory type (22.5%), with limited information of the pathogenesis.⁹ Recent studies on pigmentation around the orbit mostly ignore lifestyle influences.¹⁰ The present study was carried out to determine the prevalence, etiology and association of dark circles with other dermatological symptoms among young adults. A total of 300 individuals were enrolled in this study out of which 66% were females and 44% were males. Similar pattern of gender distribution was seen in the study of Imam et al.¹¹ In the present study the frequency of Infra-orbital Hyper-pigmentation was observed in 250(83.3%) of the study participants. our study findings are similar to the study conducted by Bilal and Jabeen¹² in which the prevalence of dark circles among the young adults were 80%. Similarly our results are also comparable to the study conducted by Imam et al.¹¹ In their study the frequency was 79.1%.however the our study results are not similar to the study conducted by Awal et al ,in which the frequency was quit lower.¹³ Our study results evaluated that daily life style factors are highly associated with Infra-orbital Hyper-pigmentation. Factors such as daily sun exposure, sleep, eye cream use, smoking, fluid intake, and face treatment had no association with dark circle severity. The usage of face wash, sunscreen, cosmetics, and high levels of psychological stress were found to be substantially associated with IOHP. To explore the relationship between IOHP levels and various dermatological skin

problems. SSCQ (self-reported skin complaint questionnaire) was used. The most common skin problems seen in individuals were oily skin (70%) and pimples/acne (67%). A substantial correlation was identified among pimples / acne ($p = 0.005$) & oily skin (p equal 0.02). Similar results were documented from the previous studies which support our research 11-12. Research shows that dark circles may be caused by deoxygenated blood and increased capillaries in the skin surrounding the eyes.¹³⁻¹⁴ The study we conducted did not assess patients' quality of life, despite previous research indicating a worse quality of life for those with dark rings, particularly women.¹⁵⁻¹⁶ Our study found no significant correlation between sleep duration & rate of infraorbital hyperpigmentation, despite previous research indicating a substantial link between the two variables.¹⁴ Studies underscore the need for a holistic approach to treat IOHP, encompassing both dermatological & psychological views. Resolving the root causes of IOHP can improve patients' prognosis, quality of life, and emotional well-being.¹⁷ Our study focuses on a prevalent dermatological condition among young adults, which is generally disregarded in studies. This research identifies lifestyle variables that may cause IOHP. We found a link between various dermatological symptoms and the incidence of IOHP, a unique finding. Our study primarily focused on modifiable lifestyle variables. Our study examined the impact of dermatological products and therapies on the incidence of IOHP].

CONCLUSION

The present study concluded that Infra-orbital Hyper-pigmentation was very common (80%) among young adults and its prevalence was strongly associated with daily life style factors such as usage of face wash, sunscreen, cosmetics, high psychological stress, and dermatological variables including oily skin and acne.

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