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ORIGINAL ARTICLE

Effect of Change in Iris Color on Myopia

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ABSTRACT

Purpose: The purpose of this study was to determine the distribution of iris colour and its relationship to myopia.
Methods: A multi-centered, multi-disciplined, cross-sessional study was conducted From March 2021 to December 2021. 300 individuals ranging in age from 11 to 25 years were selected through non-probability purposive sampling technique. All the patients had a maximum of 6 hours of screen time. Mild, moderate and severe degree of myopia was included. All subjects were examined for refraction, and slit lamp examination was performed to compare slit lamp photos to an iris colour grading scheme.
Results: Of the 300 subjects 188 (62.66 %) of the participants were female, with mild 70(23 %), moderate 51(17%), and severe 67 (22.33 %) myopia, while 112 (37.33 %) of the participants were male, with mild 45(15 %), moderate 40(13.33%), and severe 27(9 %) myopia. 90% of the participants in the study had Grade 3, 4 and 5 iris color.Subjects with darker iris colors had more myopic refractive error. Study results indicate patients with Grade 5 iris color had a higher likelihood of becoming myopic (p 0.001).
Conclusion: Darker iris color was linked to higher myopia-related refractive errors, even when other known myopia-related risk variables were taken into account.
Keywords: Refractive Errors, Myopia, Iris , Risk factor

INTRODUCTION

The most prevalent eyesight impairment among children and adolescents is myopia[1] and its incidence is increasing steadily around the world[2-3]. Both inherited and environmental factors are thought to play a role in the development of nearsightedness[4]. Environmental influences on myopia development are more important than genetic ones, according to a number of studies[5]. This is the focus of recent research on environmental risk factors for myopia, as time spent outside has been demonstrated to be an essential protective factor that can help young people avoid acquiring myopia[7]. The association between time spent outdoor and the development of myopia has been suggested to be influenced by light intensity.

Chicks exposed to high brightness adjusted for negative lenses at a slower rate than those exposed to low luminance, according to an animal experiment[8]. Other researchers, on the other extreme, dispute with the light intensity hypothesis, suggesting that the spectrum makeup of lights, not the intensity, is the primary cause of myopia in people who spend less time outside[9]. They argued that the wavelength of light entering the eyeball is the most critical consideration in determining nearsightedness.

Iris color is one of the most fundamental physical traits of humans, and it is assumed to be inherited dominantly[10]. The color of one's iris has been associated with numerous genes[10,11]. Additionally, the amount of light that passes through the iris is determined by its color. Dark-colored irides absorb and block more light than lighter-colored irides, allowing higher levels of light intensity to pass through the iris and into the retina[15]. As a result, the quantity, packaging, and quality of melanin pigment varies, resulting in a range of eye color[16].

Based on established research, the iris color might change by the age of 6. Non-pigmented iris has been documented in infants, but pigmentation can take a while to develop. Not only can the iris colour change over time, but physiological changes have also been documented to have an influence on the index. Pregnancy, puberty, as well as certain traumas are all contributing factors[17,18,19].

The purpose of this study was to see whether there is a link between iris colour and myopia inindividuals. The findings shed more light on the role of light wavelength in the pathophysiology of myopia.

METHODS

Amulti centered, multi-disciplined, cross-sessional study was conducted From March 2021 to December 2021. Data was gathered using a non-probability purposive sampling technique. There were 300 individuals in all, both male and female, ranging in age from 11 to 25 years old and with a best corrected visual acuity (BCVA) of 6/6. All the patients had a maximum of 6 hours of screen time. Mild, moderate and severe degree of myopia was included. Mild myopia ranges from -0.25 to -3.00 D. -3.25 to -5.00 D is considered moderate myopia. Myopia that is greater than -6.00 D is considered severe myopia. In this study, there are two types of myopia: simple myopia and curvatural myopia, which includes both with the rule and against the rule.

All other kinds of refractive errors were excluded.All patients with parental myopia were excluded from this study. Those who had previously undergone ocular surgery (including cataract and filtering surgeries), iris laser therapy, or IOP-lowering medication were excluded from the study, as these factors may have affected the iris colour or morphology in some eyes. Furthermore, eyes with corneal opacity were excluded since these anomalies could influence iris grading. Exclusion criteria included patients having systemic comorbidities.

All patients had a thorough clinical record and ophthalmic examination, which included best corrected visual acuity (BCVA), slit lamp biomicroscopy, and objective and subjective refraction. A projection-type Snellen chart was used to evaluate BCVA. To rule out ocular diseases, slit lamp biomicroscopy was used to examine the fundus in detail. All the patients were subjected to the objective and subjective refraction. Objective refraction was done using the RM-8000 Autorefractor. A Trial box and a trail frame were then used to perform subjective refraction (Essilor instruments).

In a dark environment, color images of both eyes' irides were shot with an Android phone camera. JPEG files were used to save the photos. Only students who collaborate adequately with the examination were photographed with colorful iris pictures. The iris color grading protocol used for this investigation was the same as that included in a previous Asian study[20,21].

Previous research on the link between iris colour and myopia has described the method used to grade the iris colour using standardised slit-lamp pictures of the anterior part of the eye[19]. Standardized slit lamp images of the eye's anterior segment were used to grade the iris' colour. The iris images' colour was judged independently of the reference photographs by comparing a

specific snapshot to the reference photographs[19]. (described in a prior study). Photographs taken with a slit lamp and those graded using an iris colour system (higher grade denoting a darker iris). There were five grades, with 'grade 1' indicating the lightest colour and 'grade 5' representing the darkest. To differentiate between photographs that fell into one of two categories, the greater rating was given.

Research conducted in accordance with the Declaration of Helsinki was conducted in accordance with defined standards and the Declaration of Helsinki principles. Each participant's verbal informed permission was also obtained. The chi-square test was performed to examine the relationship between iris colour and myopia. The Statistical Package for Social Sciences (SPSS) programme was used to analyse the data (SPSS version 22.0). A P value of less than 0.05 was considered statistically significant.

RESULTS

Out of 300 Subjects, 188 (62.66 %) of the participants were female, with mild 70(23 %), moderate 51(17 %), and severe 67 (22.33 %) myopia, while 112 (37.33 %) of the participants were male, with mild 45(15 %), moderate 40(13.33 %), and severe 27(9 %) myopia (Figure 1). Females seemed to have a substantially higher prevalence of myopia than males. Age of the patient were between 11 to 25 years (Table 1) Table 3 determined that screen time on smartphones and in combination with Computer screen time, significantly associated with myopia. To reduce the risk of myopia in children, adjust the distance from close work and take intervals after continuous reading. Table 5 demonstrate that more than 90% of the participants in the study had Grade 3,4 and 5 iris colour. The vast majority of the people had dark brown or medium brown eyes, with only around a tenth having light eyes. Children with darker iris colors had more myopic refractive error. According to the present study, patients with Grade 5 iris color have a higher likelihood of becoming myopic (p 0.001). In curvatural myopia, dark brown was the most common iris colour, while medium brown was the most common colour in simple myopia. (Table 6) In this study, after controlling for known myopia-related factors such as gender, parental history of myopia, screen time, occupation and socioeconomic status, the trend remained consistent and did not alter significantly. The association between iris colour and myopia was statistically significant.

Figure 1: Gender and Degree of Myopia

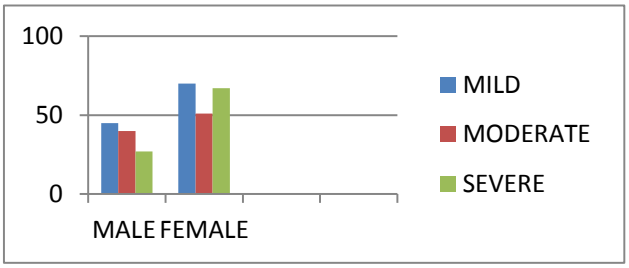

Table 1: Age distribution and degree of myopia

		MYOPIA			Total
		MILD	MODERATE	SEVERE	
AGE	11-15 YEARS	42	31	40	113
	16-20 YERAS	34	34	39	107
	21 -25 YEARS	39	26	15	80
Total		115	91	94	300

Table 1 showed age wise distribution and severity of Myopia.

Table 2: Socioeconomics status and myopia prevalence

		Socioecnomicstatus				Total
		Good	Mild income	Average	Poor	
Myopia	Mild	25	50	20	20	115
	Moderate	20	35	15	21	91
	Severe	17	40	23	14	94
Total		62	125	58	55	300

Table 2 showing the prevalence of myopia is considerable among mild income socioeconomic status.

Table 3: Screen time and myopia

		Myopia			Total
		Mild	Moderate	Severe	
Screentime	1-2 hours	20	21	15	56
	2-4 hours	50	20	25	95
	4-6 hours	45	50	54	149
Total		115	91	94	300

Table 4: Occupation and myopia

		Occupation		Total
		Student	Job Holder	
Myopia	Mild	79	36	115
	Moderate	57	34	91
	Severe	60	34	94
Total		196	104	300

Table 5: Degree of myopia and iris grading

Degree of myopia	IRIS Grading				
Myopia	Garde 1 (Lightest)	Grade 2	Grade 3	Grade 4	Grade 5 (Darkest)
Mild	9	8	15	38	45
Moderate	4	6	11	29	41
Severe	2	4	17	30	41

Table 6: Type of myopia and iris grading

Types of myopia	IRIS Grading				
	Garde 1 (Lightest)	Grade 2	Grade 3	Grade 4	Grade 5 (Darkest)
Simple myopia	6	9	43	19	56
Curvatural myopia	9	9	24	54	71

DISCUSSION

Most of the individuals had dark brown or medium brown eyes, with only a few having light eyes. Other Iranian research, including Hashemi et al.[22], revealed that medium brown was the most common colour of eye in a 2010 study done in Tehran.

Individuals who have darker eyes are more likely to suffer myopia, according to a study by Meng et al.[17]. Many factors have been postulated as possible reasons for the association between iris colour and myopia, however it appears that certain genes and polymorphisms are to blame.

Ocular risk factors for astigmatism in children and teenagers, in particular, are poorly studied in the general population. Astigmatism was found to be associated to a darker iris colour in current studies. A possible connection between astigmatism and myopia and iris colour could be the cause of this phenomenon. First and foremost, astigmatism is intimately linked to the

prevalence and severity of myopia. Astigmatism and myopia, according to some authors, may be connected in some way. According to Fan et al.[23], a cohort research on a subset of youngsters found that the insertion of astigmatism at the initial examination predisposed the eyes to greater myopia after five years of follow-up in the study. Children with higher astigmatism, on the other hand, developed myopia more quickly. This led them to believe that astigmatism, particularly increasing astigmatism, may be a risk factor for developing myopia over time. Myopia is more common in animals with black or grey eyes, according to research done on animals[17].

A high participation rate and a large sample size are all assets of this investigation. Because a non-probability purposive sample was created. Despite the fact that our study was cross-sectional, we cannot draw any conclusions about the significance of the connections we found. Future research is needed to prove the link between myopia and the colour of one's iris.

CONCLUSION

Darker iris color was linked to higher myopia-related refractive errors, even when other known myopia-related risk variables were taken into account. Nearly 90% of the participants in this study had dark brown or medium brown eyes, according to the results. People with black eyes are more likely to develop myopia than those with light brown eyes, according to the results of this study. Myopia is more common in people with dark brown eyes than light brown eyes. Myopia is more common in those with dark brown eyes than those with light brown eyes, and early detection of ocular problems is aided by this information.

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