İRİS RENK SPEKTRUMUNA GÖRE ÖN VE ARKA SEGMENT PARAMETRELERİNİN KARŞILAŞTIRILMASI

Erdogan Yasar [1], Ugur Gurlevik[2] Mustafa Deger Bilgec[3]

[1]Clinic of Ophtalmology, Afyon ParkHayat Hospital
[2] Department of Ophthalmology, Faculty of Medicine, Aksaray University
[3] Department of Ophthalmology,Faculty of Medicine, Eskisehir Osmangazi University

Özet

Amaç: İris rengine göre göz anterior ve posterior segment parametrelerinin karşılaştırılması **Yöntem:** Aksaray Eğitim ve Araştırma Hastanesine 2019-2020 yılları arasında başvuran 150 hastasının 150 gözü çalışmaya dahil edildi.28 mavi, 30 yeşil, 29 hafif kahverengi(hafif pigmentasyon), 31 orta kahverengi(orta pigmentasyon) ve 30 koyu kahverengi(ağır pigmentasyon) göz olmak üzere 5 grup hasta çalışmaya alındı. Hastalara biyomikroskobik ve fundus muayenesi yapıldı. Hastaların refraksiyonları ölçüldükten sonra, korneal topografi ve optik biyometri ile Göz İçi Basıncı (GİB), Santral Korneal Kalınlık(SKK), Ön Kamara Derinliği(ÖKD), Ön Kamara açısı(ÖKA), Lens Kalınlığı(LK), Aksiyel Uzunluk(AU) ölçümleri ve OCT ile de retinal sinir lifi kalınlığı(RSLK), santral retinal kalınlık(SRK) ve subfoveal koroid kalınlık(SFKK) ölçümleri yapıldı. **Bulgular:** Hastaların yaş ortalamaları mavi, yeşil ve kahverengi gözlü hastalarda sırası ile 33.4 ±5.5, 35.7±4,7 ve 32,9 ± 6,7 idi. Mavi gözlü grupta 15 kadın 13 erkek, yeşil gözlü grupta 16 kadın 14 erkek ve kahverengi gözlü grupta 47 erkek 43 bayan yer aldı. Ön ve arka segment parametreleri açısından mavi göz ile kahverengi göz arasında SKK, ÖKD ve LK açısından fark saptandı (p=0.035, 0.004 ve 0.012). Mavi göz ile yeşil göz arasında ÖKD ve LK açısından fark saptandı (p=0.006 ve 0.041). Yeşil göz ve kahverengi gözlü hastaların ön ve arka segment parametreleri arasında da anlamlı bir farklılık saptanmadı. Ayrıca diğer faktörler açısından da gruplar arasında fark saptanmadı (p>0.05). İris pigmentasyon düzeyine göre parametreler açısından yapılan korelasyon analizi sonucu hiç bir parametre ile pozitif yada negatif korelasyon saptanmadı (p>0.05). **Tartışma:** Hastalar değerlendirilirken bazı göz parametrelerinin normal değerlerinin iris rengindeki farklılıklara göre değişiklik gösterebileceği akılda bulundurulmaldır.

AnahtarKelimeler:iris renk spektrumu, pigmentasyon, santral korneal kalınlık, subfoveal koroid kalınlığı

COMPARISON OF ANTERİOR AND POSTERIOR SEGMENT PARAMETERS ACCORDING TO IRIS COLOR SPECTRUM

Abstract

Aim: Comparison of eye anterior and posterior segment parameters according to iris color **Methods:** 150 eyes of 150 patients who applied to Aksaray Training and Research Hospital between 2019-2020 were included in the study. 28 blue, 30 green, 29 light brown (light pigmentation), 31 medium brown (medium pigmentation) and 30 dark brown (heavy pigmentation)eyes, 5 groups of patients were included in the study. Biomicroscopy and fundus examination were performed on the patients. After measuring the refraction of the patients, corneal topography and optical biometry, Intraocular Pressure (IOP), Central Corneal Thickness (CCT), Anterior Chamber Depth (ACD), Anterior Chamber Angle (ACA), Lens Thickness (LK), Axial Length (AU) Retinal nerve fiber thickness (RSLK), central retinal thickness (CRC) and subfoveal choroidal thickness (SFKK) measurements were made with OCT. **Results:** The mean age of the patients was 33.4 ±5.5, 35.7±4.7, and 32.9 ±6.7 in patients with blue, green and brown eyes, respectively. There were 15 women and 13 men in the blue-eyed group, 16 women and 14 men in the green-eyed group, and 47 men and 43 women in the brown-eyed group. In terms of anterior and posterior segment parameters, a difference was found between blue eyes and brown eyes in terms of CCT, ACD and LK (p=0.035, 0.004 and 0.012). A difference was found between blue eyes and green eyes in terms of ACD and LK (p=0.006 and 0.041). There was no significant difference between the anterior and posterior segment parameters of the green-eyed and brown-eyed patients. In addition, there was no difference between the groups in terms of other factors (p>0.05). As a result of the correlation analysis performed in terms of parameters according to iris pigmentation level, no positive or negative correlation was found with any parameter (p>0.05). **Conclusions:**When evaluating patients, it should be kept in mind that the normal values of some eye parameters may vary according to the differences in iris color.

KeyWords: iris color spectrum, pigmentation, central corneal thickness, subfoveal choroidal thickness

Corresponding Author: Erdogan Yasar[1], Afyon ParkHayat Hospital, dr.e.yasar@gmail.com

INTRODUCTION

It has been reported that iris color formation is predominantly hereditary and there are many genes associated with it ((Liu et al.,2010; Grimm et al., 2001)). Mainly, the color of the iris is determined by the melanocytes forming the posterior bilayer pigment epithelium behind it and the content of melanin in the anterior margin layer of the iris stroma. Another factor that determines iris color is the spectral characteristic of the extracellular matrix components. The iris color is fully developed during infancy and does not change significantly in later life. Although melanocytes isolated from the irises of adults show the ability to form melanin, pigment production is not normally observed in the later stages of organism development (Hu et al., 1995).

Also, iris color determines the amount of light transmitted through the iris. Lighter irises absorb and block less light than dark irises, and higher light intensity levels have been reported to transmit and enter the retina than dark irises (Meng et al., 2012). It has been reported that iris color is associated with very few ocular disorders such as age-related cataracts, choroidal melanoma, and age-related macular degeneration (Sun et al., 2014). It has been reported that some ocular conditions, such as oculocutaneous albinism with iris anomaly, are associated with high levels of astigmatism (Yhalom et al., 2012).

In our study, we aimed to investigate the effect of eye color on these parameters by comparing all parameters related to the anterior and posterior segments of the eye in patients with 5 different eye colors.

METHODS

150 eyes of 150 patients who applied to Aksaray Training and Research Hospital between 2019-2020 were included in the study. All study procedures were conducted in accordance with the Declaration of Helsinki. Ethics Committee approval was obtained from Aksaray University Ethics Committee and informed consent forms were obtained from all patients before their participation. Five groups of patients, 28 blue, 30 green, 29 light brown (light pigmentation), 31 medium brown (medium pigmentation) and 30 dark brown (heavy pigmentation) eyes, were included in the study and the differences between the parameters between the groups were compared. The presence of eye diseases (cornea, lens, macular, retinal disease) that may affect the measurements, the presence of ocular infection that may affect the measurements, the history of ocular surgery or refractive surgery that may affect the measurements, refractive error and the use of drugs that may affect other parameters were

excluded from the study. Biomicroscopic and fundus examinations were performed on the patients. Patients' Intraocular Pressure (IOP), Central Corneal Thickness (CCT), Anterior Chamber Depth (ACD), Anterior Chamber Angle (ACA), Lens Thickness (LT), Axial Length (AL) measurements and retinal nerve fiber thickness (with OCT) RSLK), central retinal thickness (CRC) and subfoveal choroidal thickness (SFCT) measurements were made. AL and LT were measured by optical biometry (Lenstar APS, Haag-Streit Koeniz, Switzerland). CCT and ACD measurements were taken using a corneal topography device (Cirrus, Costruzione Strumenti Ophthalmic, Florence, Italy). Optical coherence tomography (OCT) (Optovue Inc., Fremont, CA, USA) and SRK and SFKK measurements were then performed. SFKK was defined as the distance from the outer border of the retinal pigment epithelial line to the hyperreflective line behind the great vessel layers of the choroid, presumed to be the choroid-sclera interface. SFKK was performed by 2 experienced doctors who were unaware of the groups. In addition, subfoveal choroidal thickness measurements were made in the morning the next day. Refraction was measured with an autorefractometer (TONOREF™ III, Nidek Co. Ltd. Japan). Statistical analysis was performed using the Statistical Package for Social Sciences (SPSS) version 23.0 for Windows (SPSS Inc., Chicago, IL). The normality of the data distribution was evaluated with the Shapiro-Wilk test. The independent-t test was used to determine whether there was a difference between the means of the numerical data of the groups. Linear regression analysis was used to estimate the linear relationship between continuous variables, and a p-value of 0.05 or less was accepted as statistically significant.

RESULTS

The mean age of the patients was 33.4 ±5.5, 35.7±4.7 and 32.9 ±6.7 in patients with blue, green and brown eyes, respectively. Again, 15 women and 13 men in the blue-eyed group, 16 women and 14 men in the green-eyed group, and 47 men and 43 women in the brown-eyed group were included in the study. In terms of anterior and posterior segment parameters, CCT, ACD and LT were different between blue eyes and brown eyes (p=0.035, 0.004 and 0.012, respectively) and no difference was found in other anterior ve posterior parameters (Table 1).

Table 1. Comparison of blue and brown eyes

	Group	Mean	Std. Deviation	p
Spherical	blue	,25	,28	0.089
	brown	-,20	,75	
Cylindrical	blue	-,12	,25	0.125
	brown	-,38	,45	
Eye Pressure	blue	17,5	1,7	0.067
(mm hg)	brown	15,2	3,2	
Central Corneal Thickness	**blue**	**569,3**	**53,2**	**0.035**
(μm)	**brown**	**541,1**	**25,8**	
Anterior Chamber Thickness	**blue**	**2,44**	**,02**	**0.004**
(mm)	**brown**	**3,04**	**,39**	
Axıal Lenght	blue	23,2	,35	0.531
(mm)	brown	23,3	,91	
Lens Thickness	**blue**	**4,02**	**,10**	**0.012**
(mm)	brown	3,64	,28	
Central Choroidal Thickness	blue	288,2	14,7	0.816
(μm)	brown	290,2	25,1	
Central Retinal Thickness	blue	247,5	6,4	0.858
(μm)	brown	248,3	19,1	
Retinal Nerve Fiber Thickness	blue	102,5	13,3	0.662
(μm)	brown	100,5	7,9	

A difference was found between blue eyes and green eyes in terms of ACD and LT (p=0.006 and 0.041, respectively) and no significant difference was found in any of the other anterior ve posterior parameters (Table 2).

Table 2. Comparison of blue and green eyes

	Grup	Mean	Std. Deviation	p
Spherical	blue	,25	,28	0,059
	green	-,50	1,46	
Cylindrical	blue	-,12	,25	0,085
	green	-,55	,84	
Eye Pressure	blue	17,5	1,7	0,057
(mm hg)	green	14,8	3,5	
Central Corneal Thickness	**blue**	**569,3**	**53,1**	**0,044**
(μm)	**green**	**531,4**	**41,9**	
Anterior Chamber Thickness	**blue**	**2,44**	**,02**	**0,006**
(mm)	**green**	**3,02**	**,37**	

Axıal Lenght	blue	23,24	,35	0,222
(mm)	green	23,48	,49	
Lens Thickness	**blue**	**4,02**	**,10**	**0,041**
(mm)	**green**	**3,64**	**,33**	
Central Choroidal Thickness	blue	288,2	14,7	0,933
(µm)	green	287,5	14,2	
Central Retinal Thickness	blue	247,5	6,4	0,823
(µm)	green	248,5	12,9	
Retinal Nerve Fiber Thickness	blue	102,5	13,3	0,789
(µm)	green	104,1	10,6	

There was no significant difference between the anterior and posterior segment parameters of the green-eyed and brown-eyed patients (Table 3).

Table 3. Comparison of brown and green eyes

	Group	Mean	Std. Deviation	p
Spherical	brown	-,22	,75	0,344
	green	-,50	1,46	
Cylindrical	brown	-,37	,45	0,290
	green	-,55	,84	
Eye Pressure	brown	15,2	3,2	0,721
(mm hg)	green	14,8	3,5	
Central Corneal Thickness	brown	541,1	25,9	0,259
(µm)	green	531,4	41,9	
Anterior Chamber Thickness	brown	3,06	,41	0,708
(mm)	green	3,02	,37	
Axıal Lenght	brown	23,41	,94	0,761
(mm)	green	23,48	,49	
Lens Thickness	brown	3,64	,27	0,961
(mm)	green	3,64	,33	
Central Choroidal Thickness	brown	290,9	25,08	0,601
(µm)	green	287,5	14,24	
Central Retinal Thickness	brown	248,4	18,8	0,989
(µm)	green	248,5	12,9	
Retinal Nerve Fiber Thickness	brown	100,3	7,9	0,137
(µm)	green	104,1	10,6	

As a result of the correlation analysis performed in terms of parameters according to iris pigmentation level, a positive correlation was found with CCT as pigmentation increased (p=0.029, r=0.314), and a negative correlation was found with SFCT (p=0.034, r=-0.267).

DISCUSSION

Iris color is considered one of the most distinctive phenotypic characteristics of humans. In recent years, genetic and epidemiological studies on eye color have enabled us to learn more about iris pigmentation and have revealed the association of iris color with different diseases of the eye and other organs (White et al., 2011, Yonunan et al., 2002, Di Stasio et al., 2011).

In some studies, it has been revealed that the risk of cataract is increased in people with dark iris color and the risk of ocular uveal melanoma is also found to be reduced (Cumming et al., 2000, Leske et al. 2002, Schmidt-Pokrzywniak et al., 2009). The relationship between iris color and age-related macular degeneration could not be confirmed because different results were obtained in various studies (Klein et al., 1998, Khan et al., 2006, McCarty et al., 2001). There is a limited study investigating the relationship between iris color and glaucoma, and no significant relationship was found between the risk of progression of glaucomatous visual field defects and iris color (Jonas et al., 2006). In a study, myopia was found to be associated with a decrease in the use of sunglasses, and sunglasses were likened to an artificial dark iris, and it was suggested that myopia may decrease similarly in dark-colored eyes (Saw, 2003, Young et al., 2007, Vannas et al. 2003) Again, in a recent study, it was reported that darker iris color may be a risk factor for astigmatism (Pan et al., 2009).

In our study, a statistically significant difference was found between central corneal thickness measurements between blue and brown eyes. In blue eyes, increased CCT and LC, and accordingly decreased ACD were detected. We think that this may be related to the joint development of the iris, cornea and choroid in the embryological development stage.

Among the limitations of our study, it can be said that the relatively low number of patients was included in the study and the measurements were made with a single brand device that made that measurement. In addition, the possibility of comparison with the literature was limited in terms of the limitation of the study, which looked at detailed parameters in this way.

As far as we know, there has not been a study comparing the anterior and posterior segment parameters of the eye at the same time according to different iris colors. This study will

contribute to the literature in terms of suggesting that physicians may show a difference according to eye color when evaluating anterior and posterior segment parameters.

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