Original research

Investigation of the effects of Islamic fasting on ocular parameters

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Abstract

Purpose: To investigate the effects of religious fasting during the month of Ramadan on intraocular pressure (IOP), refractive error, corneal tomography and biomechanics, ocular biometry, and tear film layer properties.
Methods: This prospective study was carried out one week before and in the last week of Ramadan. Ninety-four eyes of 94 healthy adult volunteers (54 males and 40 females) with a mean $\pm$ SD age of 35.12 ± 9.07 were enrolled in this study. Patients with any systemic disorder, ocular disease, or a history of previous surgery were excluded. Corneal tomography and biomechanics, ocular biometry, IOP, refractive error, and tear break up time (TBUT) were evaluated in non-fasting and fasting periods by the Pentacam (Oculus), Corvis ST (Oculus), IOL Master (Carl Zeiss), computerized tonometer (Topcon CT-1/CT-1P), auto kerato-refractometer (Topcon KR-1), and Keratograph 5M (Oculus), respectively.
Results: There was no significant difference in the central corneal thickness (CCT) between the study groups ($P = 0.123$) using the Pentacam while the Corvis ST showed a significant difference in all participants ($P < 0.0001$). Moreover, the peak distance (distance of the two surrounding peaks of the cornea at the highest concavity) of male and female participants showed a significant difference between the fasting and non-fasting groups ($P = 0.002$). The anterior chamber depth (ACD) using the Pentacam decreased in the male group ($P = 0.004$) in the fasting period. During the fasting period, computerized tonometer showed a decrease in IOP only in males in comparison to the non-fasting group ($P = 0.018$) while the Corvis ST showed decreased IOP in all participants ($P < 0.0001$). The steep keratometry (K2) in the corneal posterior surface appeared to be different in males between the study groups ($P = 0.034$). We were unable to show any significant difference in other ocular parameters between fasting and non-fasting periods.
Conclusion: This study showed that ACD, IOP, CCT, and peak distance were different between fasting and non-fasting groups while no difference was observed in other ocular parameters. Interpretations of these significant differences should be considered in the clinical setting.
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Keywords: Fasting; Intraocular pressure; Ocular parameters; Corneal tomography

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Introduction

The Muslim population of the world is expected to increase by about 35% in the next 20 years, rising from 1.6 billion in 2010 to 2.2 billion by 2030, according to new population projections by the Pew Research Center's Forum on Religion and Public Life.[1]

The month of Ramadan is the ninth month of the Islamic calendar, and fasting during this month is one of the five pillars of Islam, so it is strictly observed worldwide by millions of Muslims. Fasting is obligatory for healthy adult Muslims unless they have an acceptable excuse, such as menstruating women, sick and traveling people, or pregnant and lactating women who are exempt and permitted to postpone their fasting to a suitable time when it does not interfere with their maternal responsibilities.[2] Muslims fast during the daylight hours from dawn to dusk, when they abstain from foods, drinks, and smoke. They are permitted to eat and drink only after the sunset, the so-called breaking-of-fast meal, until the pre-dawn meal which defines the beginning of the new fasting period. However, they have two main meals as explained above, and they are allowed to eat and drink from the sunset to sunrise.[3] The amount of food and fluid intake shows a noticeable change as a result of fasting during the day and eating period.[4–6]

People who fast are subjected to significant changes in their normal feeding, sleeping, and behavioral patterns. There are only a few reports in the literature regarding the effects of Ramadan fasting on the ocular parameters, but most of them investigated intraocular pressure (IOP) and tear parameters.[3,4,7–12]

Kayikçioglu et al. found that religious fasting did not affect the tear break up time (TBUT) values in healthy individuals.[10] Moreover, some authors have concluded that the total daily intake of nutrients is not related to higher myopia.[9,11] Assadi et al. reported that Islamic Ramadan fasting did not markedly affect physiological IOP, refractive error, or visual acuity in healthy volunteers.[7]

Every year, many Muslims fast during Ramadan, and the majority of them are concerned about the impact of fasting on ocular health. Although various studies have been carried out so far,[3–12] most of these studies evaluated limited ocular parameters in a small number of patients. Therefore, we designed a comprehensive study to investigate the effects of fasting on different ocular parameters.

Methods

This case–control study was performed in Mashhad, Iran in Ramadan 2015 (7 June to 5 July). The study was performed in two phases: the first phase was carried out one week before Ramadan, and the second phase was conducted in the last week of Ramadan. One hundred subjects who intended to fast during Ramadan were recruited. All selected patients received information about the study and consented to undergoing additional examinations before and 3 weeks after fasting. The Institutional Review Board and the Ethics Committee of Mashhad University of Medical Sciences approved the study and ensured its protocol followed the tenets of the Declaration of Helsinki. Healthy adults aged 20–50 years old who intended to fast during Ramadan for at least 20 days were included in the study. Blood pressure was measured in the afternoon for all participants one week before the study using a digital sphygmomanometer. In addition, blood samples were taken in the morning for biochemistry tests using the Hitachi 717 analyzer (Japan) and lipid profile measurements. Then individuals with abnormal test results, underlying disease like diabetes, hypertension, etc., and people who took certain medications were excluded from the study. The patients with any systemic disorder, ocular pathology, and/or previous surgery were also excluded from the study. We also excluded subjects who did not participate in the second phase such as women who had their menstrual cycle in the second phase. All participants were evaluated carefully by an experienced ophthalmologist (MR.S.) and underwent complete ophthalmic examinations. All measurements were done by a single experienced optometrist in fasting and non-fasting periods.

In order to avoid the experimental error rate, only the data of one eye (right eye) was used in this study. All measurements were done in a consistent way based on the manufacturer's instructions. The manufacturers' representatives calibrated the devices every 6 months routinely.

Since Ramadan varies in duration from 12 to 17 h a day in different years, it should be mentioned that our study was conducted in the summer which is almost the longest span of fasting compared to any other season.[4–6] All measurements were performed between 03:00 and 06:00 p.m. in fasting and non-fasting periods; therefore, the measurement time was 2–3 h and at least 10 h after a meal in the non-fasting and fasting group, respectively.

Our study population was 94 subjects (54 males and 40 females).

The test sequence was as follows:

TBUT: Measurement of the TBUT was done by the Keratograph 5M (Oculus, type 77000, Germany). The Keratograph 5M evaluates the tear film using infrared light and non-invasive keratograph break-up time (NIKBUT) can be examined carefully and documented easily. The infrared light used in the Keratograph 5M is invisible to the human eye and produces no glare during the examination and no reflex tearing. The repeatability and methodology of the Keratograph 5M have been evaluated and approved in previous studies.[13]

Refractive error measurement: The participants underwent cyclorefraction using an auto kerato-refractometer (Topcon KR-1, Hasunma-cho, Itabashi-UK, Tokyo, Japan). Two doses of cyclopentolate 1% drops were administered 5 min apart, and refraction was checked 30 min after the second instillation. If the pupil responded to penlight stimulation after 30 min, the examiner waited for an additional 10 min before performing cycloplegic refraction. The auto kerato-refractometer measured the refractive error three times, and the average of these three measurements was used to calculate the refractive errors in spherical equivalent (SE).

IOP measurement: IOP measurements were performed by a computerized tonometer (Topcon, Computerized Tonometer CT-1/CT-1P, Hasunma-cho, Itabashi UK, Tokyo, Japan) and the Corvis ST (Oculus Optikgeräte GmbH, Germany). The CT-1/CT-1P measured IOP three times, and the average of the measurements was recorded. Both devices measure IOP non-invasively using the air puff mechanism. The methodology and repeatability of the Corvis ST in measuring IOP and corneal biomechanics have been evaluated in previous studies.[14,15]

Determination of corneal and anterior chamber parameters and biometric characteristics: Corneal and anterior chamber measurements were performed with the Pentacam (Oculus Optikgeräte GmbH, Wetzlar, Germany). In addition, the anterior chamber depth (ACD) and axial length (AL) were also measured with the IOL Master (Carl Zeiss Meditec, Jena, Germany). The Pentacam measures "internal" ACD (aqueous depth from the corneal posterior surface), whereas IOL Master evaluates ACD from the anterior surface of the cornea. The repeatability and reproducibility of the Pentacam and IOL master have been evaluated in different studies.[16−23] All corneal imaging and biometric measurements were done consistently based on manufacturer's instructions.[16−23]

Evaluation of corneal biomechanics: The device used for measuring corneal biomechanical parameters was the Corvis ST (Oculus Optikgeräte GmbH, Germany). The mechanism, methodology, and repeatability of the Corvis ST in measuring corneal biomechanics have been assessed in previous studies.[14,15]

Statistical analysis

Statistical analysis was performed using the SPSS program (SPSS version 22 for Windows; SPSS Inc., Chicago, IL, USA). The normal distribution of the parameters was assessed using the Kolmogorov−Smirnov test. Paired sample *t*-test was used to compare the parameters with a normal distribution measured one week before fasting and in the last week of Ramadan, and the Wilcoxon signed rank test was used to compare the non-parametric parameters. A *P* value less than 0.05 was considered significant.

Results

Our study was conducted on 94 volunteers [54 males (57.45%) and 40 (42.50%) females] to investigate the effect of Islamic fasting in Ramadan on TBUT, SE, IOP, AL, and ACD in addition to the results of the Corvis ST and Pentacam. The mean age of the participants was 35.12 ± 9.07 years (35.93 ± 8.91 years in males and 34.03 ± 9.28 years in females). The mean and *P*-value of SE, TBUT (first and average measurements), AL, ACD, and IOP for both genders a week before and in last week of Ramadan are shown in Table 1. Computerized tonometry revealed a 0.56 mmHg decrease in IOP in all participants. As shown in Table 1, IOP changes were significant in males and non-significant in females

(0.71 mmHg in males and 0.36 mmHg in females). SE, TBUT (first and average values), AL, and ACD (measured by the IOL Master) remained unchanged.

A summary of the effects of Ramadan fasting on the Pentacam results is shown in Table 2. The results of the Pentacam revealed that ACD were different between fasting and non-fasting periods in all participants ($P = 0.032$) and males ($P = 0.004$), but this change was not significant in females ($P = 0.797$).

Regarding corneal biomechanics, there was a significant increase in the peak distance (distance of the two surrounding peaks of the cornea at the highest concavity) ($P = 0.002$), and females experienced more increase than males (0.071 mm vs. 0.043 mm). As shown in Table 3, the Corvis ST showed significant differences in deformation amplitude (DA) ($P = 0.016$) and IOP ($P < 0.0001$) in all participants between fasting and non-fasting periods. As for the Corvis ST results, the central corneal thickness (CCT) increased in all participants before and after fasting ($P < 0.0001$) with the males experiencing more increase than females (9.30 μm vs. 4.08 μm).

Discussion

In Ramadan, Muslims' eating and drinking habits and sleep and behavior change when they fast. That these changes are important for their clinical consequences. Several studies have shown the effects of fasting on patient health. Some of these studies have evaluated the changes of ocular parameters during fasting.

We designed this study to evaluate the effect of fasting on different ocular parameters in a large sample size. Our results showed no changes in the results of Scheimpflug-based corneal tomography except for ACD between fasting and non-fasting subjects. Notably, the IOL Master showed no significant difference in ACD between fasting and non-fasting periods. Inconsistent results for ACD can be related to the different reference points (internal or external) between two instruments for measuring the ACD. Moreover, there were no significant differences in SE and AL, but IOP decreased during the fasting period compared with the non-fasting period. In addition, evaluation of corneal biomechanics using the Corvis ST showed significant differences in DA, peak distance, IOP, and CCT before and after fasting. Furthermore, there were no differences in DA between males and females separately but there was a significant difference in DA in all participants. This may be the result of the larger sample size that has a higher statistical power to detect the differences accurately. In this study, the TBUT (first and mean) was also evaluated with a non-invasive method which showed no difference between fasting and non-fasting periods.

The effect of fasting on IOP has been evaluated in a few studies. Kayikçioglu and Güler reported that fasting did not alter diurnal IOP values in healthy people.[24] They did not find any association between fasting and IOP (measured with the Goldmann tonometer) which is not consistent with our findings. This difference is not surprising because it may be related to the methods of IOP measurements and the sample size.

Table 1
The effects of fasting in Ramadan on spherical equivalent (SE), tear break up time (TBUT), anterior chamber depth (ACD), axial length (AL), and intraocular pressure (IOP).

	One week before Ramadan (mean ± SD)	Last week of Ramadan (mean ± SD)	Difference[e] (mean ± SD)	*P*-value
SE (diopter)				
All participants	−0.67 ± 1.44	−0.61 ± 1.44	−0.06 ± 0.35	0.096[a]
Male	−0.77 ± 1.64	−0.71 ± 1.65	−0.07 ± 0.28	0.095
Female	−0.53 ± 1.12	−0.48 ± 1.11	−0.06 ± 0.43	0.503
First TBUT (s)				
All participants	10.84 ± 6.42	11.65 ± 6.72	−0.81 ± 7.41	0.635[a]
Male	11.18 ± 6.64	11.79 ± 6.68	−0.61 ± 7.50	0.806
Female	8.19 ± 3.67	10.56 ± 7.52	−2.37 ± 6.94	0.310
Average TBUT (s)				
All participants	14.10 ± 6.00	15.56 ± 6.11	−1.46 ± 7.17	0.116[b]
Male	14.17 ± 6.23	15.48 ± 6.18	−1.31 ± 6.99	0.176
Female	13.53 ± 4.15	16.20 ± 5.95	−2.68 ± 8.92	0.458
AL[c] (mm)				
All participants	23.65 ± 1.07	23.66 ± 1.07	0.00 ± 0.04	0.810[a]
Male	23.82 ± 0.99	23.83 ± 0.99	0.00 ± 0.04	0.546
Female	23.40 ± 1.14	23.41 ± 1.14	0.00 ± 0.03	0.331
ACD[c] (mm)				
All participants	3.45 ± 0.34	3.43 ± 0.36	0.02 ± 0.18	0.43[b]
Male	3.47 ± 0.35	3.46 ± 0.36	0.00 ± 0.08	0.58
Female	3.43 ± 0.32	3.40 ± 0.36	0.03 ± 0.26	0.52
IOP[d] (mmHg)				
All participants	15.77 ± 3.31	15.21 ± 3.39	0.56 ± 2.25	**0.017**[b]
Male	15.39 ± 3.27	14.68 ± 3.21	0.71 ± 2.15	**0.018**
Female	16.28 ± 3.32	15.92 ± 3.52	0.36 ± 2.38	0.344

SE: Spherical equivalent, TBUT: Tear break up time, AL: Axial length, ACD: Anterior chamber depth (external), IOP: Intraocular pressure. *P*-value < 0.05 is statistically significant. Bold values are significant.
[a] Wilcoxon signed ranks test.
[b] Paired-samples *T* test.
[c] It was measured by IOL Master.
[d] It was measured by computerized tonometer.
[e] Difference between one week before Ramadan and last week of Ramadan.

Dadeya et al. reported a change in normal IOP in prolonged fasting which is in agreement with our results.[25] They only studied young men and measured the IOP with the Goldmann tonometer (an invasive method) while we studied a larger number of patients using two different non-invasive methods (Computerized Tonometer CT-1/CT-1P and Corvis ST). Sarici et al. investigated the effect of fasting on IOP using the Ocular Response Analyzer (ORA) which utilizes a dynamic bi-directional applanation process.[12] According to this study, IOP associated with Goldmann IOP (IOPg) was different between fasting and non-fasting periods but they did not mention the gender of the subjects.

In another study, Kerimoglu et al. showed IOP variations during prolonged fasting period using the Goldmann tonometer.[3] Their results are in agreement with our findings. In 2014, Koktekir et al. found a significant decrease in IOP during the fasting period compared to the non-fasting period,[26] which concurs with our findings.

In the current study, AL and ACD were investigated in fasting and non-fasting periods using the IOL Master, and no difference was observed in these parameters before and after fasting. To the best of our knowledge, only one study evaluated the effect of fasting on biometric characteristics of the eye before and after Ramadan. Nowroozzadeh et al. showed that AL significantly decreased during Ramadan fasting compared to baseline measurements.[4] Their study was done in a small number of subjects using ultrasound biometry (22 healthy subjects), but we used optical biometry in a larger population. Moreover, they evaluated both eyes of each participant which is a confounding factor.

Our study showed the results of the Pentacam tomography in fasting and non-fasting periods. Kerimoglu et al. concluded that the results of the Pentacam revealed no significant difference between fasting and non-fasting periods, but they did not present any data or results (mean ± SD and/or *P*-value) for their conclusion.[3] Nowroozzadeh et al. found no significant difference in corneal astigmatism, mean keratometry, and corneal radius of curvature between fasting and non-fasting periods using auto kerato-refractometry.[4] In another study, Sarici et al. compared the results of the Pentacam measured in the afternoon (4 p.m.) between Ramadan and the month following it,[12] but found no significant difference in corneal parameters between fasting and non-fasting periods. We should take into account that they reported the results of the Pentacam in 31 eyes without mentioning the gender of their participants. Our results are in agreement with the findings reported by Sarici et al. except for ACD. In our study, ACD showed a difference in male participants (54 males) using Pentacam. However, according to our results, there was no difference in ACD between fasting and non-fasting periods

Table 2
The effects of fasting in Ramadan on the data of Pentacam.

	One week before Ramadan (mean ± SD)	Last week of Ramadan (mean ± SD)	Difference[c] (mean ± SD)	P-value
K1 front (diopter)				
All participants	42.84 ± 1.84	42.84 ± 1.87	0.00 ± 0.17	0.807[a]
Male	42.76 ± 1.82	42.75 ± 1.88	0.00 ± 0.19	0.884
Female	42.95 ± 1.89	42.96 ± 1.87	−0.02 ± 0.14	0.509
K2 front (diopter)				
All participants	43.79 ± 1.99	43.76 ± 1.99	0.04 ± 0.42	0.432[a]
Male	43.78 ± 1.99	43.71 ± 1.98	0.07 ± 0.53	0.337
Female	43.80 ± 2.04	43.82 ± 2.01	−0.02 ± 0.16	0.555
K1 back (diopter)				
All participants	−6.09 ± 0.27	−6.09 ± 0.25	0.00 ± 0.09	0.838[b]
Male	−6.06 ± 0.27	−6.07 ± 0.28	0.01 ± 0.09	0.220
Female	−6.14 ± 0.25	−6.12 ± 0.25	−0.02 ± 0.18	0.176
K2 back (diopter)				
All participants	−6.42 ± 0.28	−6.41 ± 0.29	−0.01 ± 0.09	0.362[a]
Male	−6.41 ± 0.28	−6.38 ± 0.30	−0.03 ± 0.10	**0.034**
Female	−6.43 ± 0.29	−6.45 ± 0.28	0.17 ± 0.08	0.164
CCT (μm)				
All participants	536.19 ± 32.62	535.06 ± 31.64	1.13 ± 7.03	0.123[a]
Male	538.08 ± 33.11	536.85 ± 32.92	1.22 ± 6.34	0.162
Female	533.65 ± 32.17	532.65 ± 30.06	1.00 ± 7.94	0.430
Thinnest point (μm)				
All participants	531.44 ± 32.99	529.65 ± 32.95	1.79 ± 13.11	0.190[a]
Male	533.39 ± 33.65	531.41 ± 33.09	1.98 ± 16.30	0.376
Female	528.80 ± 32.31	527.28 ± 33.03	1.53 ± 6.97	0.174
ACD (int)[d] (mm)				
All participants	2.96 ± 0.33	2.95 ± 0.34	0.01 ± 0.04	**0.032**[a]
Male	2.99 ± 0.35	2.97 ± 0.36	0.02 ± 0.04	**0.004**
Female	2.92 ± 0.30	2.92 ± 0.31	0.00 ± 0.05	0.797
ACD (epith)[e] (mm)				
All participants	3.50 ± 0.33	3.49 ± 0.32	0.01 ± 0.05	**0.040**[a]
Male	3.53 ± 0.34	3.52 ± 0.35	0.02 ± 0.04	**0.003**
Female	3.46 ± 0.29	3.46 ± 0.30	0.00 ± 0.05	0.990

K1: Flat keratometry of corneal astigmatism, K2: Steep keratometry of corneal astigmatism, CCT: Central corneal thickness, ACD: Anterior chamber depth (internal). *P*-value < 0.05 is statistically significant. Bold values are significant.
[a] Paired-samples *T* test.
[b] Wilcoxon signed ranks test.
[c] Difference between one week before Ramadan and last week of Ramadan.
[d] It was measured from endothelium (internal).
[e] It was measured from epithelium.

Table 3
The effects of fasting in Ramadan on Corvis ST parameters.

	One week before Ramadan (mean ± SD)	Last week of Ramadan (mean ± SD)	Difference[c] (mean ± SD)	P-value
Peak distance (mm)				
All participants	5.05 ± 0.30	5.10 ± 0.31	−0.06 ± 0.17	**0.002**[a]
Male	5.10 ± 0.29	5.14 ± 0.30	−0.04 ± 0.13	**0.018**
Female	4.98 ± 0.30	5.05 ± 0.31	−0.07 ± 0.21	**0.046**
Peak radius (mm)				
All participants	7.50 ± 0.92	7.59 ± 1.11	−0.09 ± 1.15	0.453[a]
Male	7.48 ± 0.97	7.57 ± 1.06	−0.09 ± 1.03	0.535
Female	7.51 ± 0.86	7.61 ± 1.20	−0.10 ± 1.31	0.662
Deformation amplitude (mm)				
All participants	1.04 ± 0.11	1.06 ± 0.13	−0.03 ± 0.11	**0.016**[a]
Male	1.05 ± 0.11	1.07 ± 0.10	−0.02 ± 0.07	0.059
Female	1.02 ± 0.11	1.06 ± 0.17	−0.04 ± 0.14	0.094
IOP (mmHg)				
All participants	15.10 ± 1.89	14.51 ± 1.80	0.59 ± 1.49	**<0.0001**[b]
Male	14.93 ± 1.63	14.30 ± 1.89	0.63 ± 1.49	**0.003**
Female	15.34 ± 2.20	14.80 ± 1.66	0.54 ± 1.50	**0.035**
CCT (μm)				
All participants	531.46 ± 33.43	538.56 ± 43.66	−7.10 ± 33.43	**<0.0001**[b]
Male	531.66 ± 33.87	541.00 ± 49.90	−9.34 ± 43.31	**0.002**
Female	531.19 ± 33.29	535.27 ± 33.83	−4.08 ± 10.02	**0.018**

IOP: Intraocular pressure, CCT: Central corneal thickness. *P*-value < 0.05 is statistically significant. Bold values are significant.
[a] Paired-samples *T* test.
[b] Wilcoxon signed rank test.
[c] Difference between one week before Ramadan and last week of Ramadan.

using the IOL Master. This difference may be due to the different mechanisms of ACD measurement between Scheimpflug imaging and optical biometry. Besides, the Pentacam measures the ACD from the corneal endothelium, whereas the IOL Master measures this parameter from the corneal epithelium. In order to investigate the effect of reference point for ACD measurement, we calculated ACD from the corneal epithelium for Pentacam outputs. The results for ACD (from the corneal epithelium) between fasting and non-fasting group showed a difference in male participants, too.

From a biomechanical point of view, Sarici et al. investigated corneal biomechanics using ORA in fasting and non-fasting periods and found a significant difference in the corneal resistance factor (CRF) but not in corneal hysteresis.[12] We evaluated corneal biomechanics using the Corvis ST and found a

significant difference in the peak distance between males and females. The results of the Corvis ST also showed differences in CCT and IOP between males and females, but we could not find any significant differences in CCT using the Pentacam.

As for ocular surface parameters, Kayikçioglu et al. found that religious fasting in the winter did not affect TBUT values in healthy individuals, which is in agreement with our findings.[10] They examined 32 healthy male patients with an invasive TBUT method in the winter while we studied more subjects with a non-invasive method in the summer. Although environmental changes in different seasons may affect tear parameters, we did not find any significant differences between the findings of the above study and our results. The results of another study by Kerimoglu et al. revealed that the tear secretion values decreased markedly at the end of 12 h of fasting due to dehydration, but they did not evaluate TBUT in their study.[3] Koktekir et al. evaluated the effect of religious fasting on TBUT by an invasive method (fluorescein staining) but found no significant difference in TBUT between non-fasting and fasting periods.[26] These results are compatible with our findings. All of the above studies measured TBUT using invasive methods which has many variations in documentation of the results.[27] In the present study, we found no difference in the first and mean TBUT between fasting and non-fasting periods using the NIKBUT method.

It should be mentioned that we performed all the measurements first in the right (first) eye and then in the left (second) eye. Considering the possible effect of ocular

squeezing on the measurements, only the data of the right (first) were used in this study.[28]

Although this study served its purposes, there were some inevitable limitations. First, we performed this research in the summer without control for intersession variability. Therefore, to generalize our findings for fasting subjects in the winter, the results of this research should be used with caution. Also, we conducted this study on healthy subjects, and it must be considered that our results cannot be used for subjects with ocular or systemic diseases.

In conclusion, our results showed that Ramadan fasting could affect some, but not all, ocular parameters. Although the changes in IOP, ACD, steep keratometry (K2) back, CCT, and peak distance were significant, some changes in ocular parameters in fasting and non-fasting periods are related to a specific gender and measurement instrument. The interpretations of our results and different measurement mechanisms should be considered in the clinical setting.

Acknowledgment

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