Effect of religious fasting on intra-ocular pressure

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Abstract

Aim The objective of this study was to find out the effect of religious fasting on intra-ocular pressure.

Methods Intra-ocular pressure by applanation tonometer was measured four times a day in 38 healthy young adult male patients. The mean age of patients was 29 years. Body weight was measured to assess the extent of dehydration caused by fasting.

Results There was a statistically significant difference between the intra-ocular pressure during fasting and the non-fasting period ($P < 0.001$). There was weight loss ranging from 0.4 to 1.5 kg.

Conclusion Fasting alters the diurnal intra-ocular pressure in the study population, ie young males 22–38 years.

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Keywords: fasting; intra-ocular pressure; dehydration

Introduction

The Muslim community of India strictly abstains from food and water during daytime in the months of Ramadan because of religious traditions. Meals are exclusively taken in the evening. The long-term dietary restrictions can lead to alteration in hematocrit and electrolyte imbalance.¹ Additionally increased incidence of central retinal vein occlusion during religious fasting has been reported.² To the best of our knowledge, there is only one study in the literature on fasting and IOP, which concluded that fasting in healthy adults did not alter the diurnal intra-ocular pressure in healthy adults.³ This study was aimed to determine whether religious fasting has any significant effect on intra-ocular pressure.

Material and methods

This study was conducted from 1996 to 1998 during the Ramadan period at a tertiary eye care center, which is surrounded by a mainly Muslim population. Thirty-eight healthy male patients were included in the study. Females were excluded, because they might not be fasting during part of month of Ramadan because their requirement is waived during their menstrual cycle. Young patients were studied, because glaucoma occurs classically in older patients and we did not want to take patients who were at risk. Patients with systemic diseases such as hypertension, diabetes and cardiovascular diseases were excluded. Patients having ocular hypertension, glaucoma and family history of glaucoma were also excluded. We compared the intra-ocular pressure values during fasting conditions with non-fasting values on a normal diet and normal daily activities. Intra-ocular pressure measurements were determined on the third week of the Ramadan period. Nine patients did not turn up for follow-up and were excluded from the study. The probable reason might be that most of the males were responsible for earning the livelihood for their family. All the patients were male and mean age was 29 years (22–38). Intra-ocular pressure was measured at 9.00, 12.00, 15.00 and 18.00 hours of the day during the fasting period. Intra-ocular pressure was measured by Applanation tonometer by a single observer and an average of two readings was taken for statistical analysis. The instrument was calibrated. The Goldman tonometer was chosen, because it has been accepted as a gold standard instrument for measuring IOP. Intra-ocular pressure was measured 45 days after the fasting period on the normal diet. Body weight was measured at the beginning, end of the fasting period and 45 days after fasting to determine amount of dehydration. Student's *t*-test was used for statistical analysis.

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Results

Mean body weight of the patients was 56 kg (50–62 kg) at the beginning and 54 kg (49.6–60.2 kg) at the end of fasting. The body weight was 56.5 kg (48–63 kg) 45 days after the fasting period. Every patient had weight loss of 0.4–1.8 kg. The IOP of patients ranged from 8.00 to 13.00 mmHg in the left eye during the fasting period and from 8.00 to 14.00 mmHg in the right eye. The intra-ocular pressure was 13.00–18.00 mmHg and 12.00–18.00 mmHg in the right and left eye, respectively. The data of IOP of all patients in the right and left eye are presented in Tables 1 and 2 respectively. The difference between fasting and non-fasting intra-ocular pressure values was statistically significant ($P < 0.001$)

Discussion

Fasting was defined as abstaining from taking any type of food (liquid or solid) from dawn until sunset for the whole month of Ramadan. To the best of our knowledge, there is only one study in the literature on

fasting and IOP. Karjickioglu and Guler concluded that fasting in healthy adults does not affect the intra-ocular pressure.⁴ They also found that there was no alteration in intra-ocular pressure despite a body weight loss of 2–3%, which is indicative of slight dehydration.

The results of our study are not in agreement with above authors. In our study, IOP was uniformly reduced for each time of the day during the fasting period compared to the mean after the fasting period. The probable reason for the alteration of intra-ocular pressure might be that reduced water intake causes reduced aqueous formation and thereby a decrease in intra-ocular pressure. Secondly fatty stores, which are depleted during fasting, cause decreased secretion of prostaglandin thereby causing decreased intra-ocular pressure. Moreover, the average weight of our patients was less than the average weight of patients of the above authors, which might also have a bearing on intra-ocular pressure.

The drawback of our study includes observer bias. We did not have information about diurnal changes but changes between 9.00 am to 18.00 pm, and also the

Table 1 Intra-ocular pressure values during fasting and non-fasting periods in the study population (right eye)

Sr. No.	9.00 am		12.00 am		3.00 pm		6.00 pm	
	Fasting	Non-fasting	Fasting	Non-fasting	Fasting	Non-fasting	Fasting	Non fasting
1	10	14	8	13	8	14	9	13
2	8	13	11	13	8	13	8	13
3	8	13	9	13	8	16	8	14
4	8	13	8	13	9	13	9	14
5	9	13	11	13	9	13	9	14
6	9	13	9	13	9	13	8	14
7	9	13	8	14	10	14	9	15
8	08	13	10	14	10	14	10	15
9	11	13	10	14	10	14	10	15
10	10	13	10	14	10	13	10	15
11	10	14	10	14	10	14	10	16
12	10	14	12	15	11	14	11	16
13	10	14	12	14	11	14	11	16
14	11	13	11	14	11	15	11	16
15	11	14	8	14	11	15	11	16
16	11	14	11	14	11	15	11	17
17	11	14	10	15	11	15	11	17
18	11	14	9	15	11	15	11	17
19	10	14	11	15	11	16	12	17
20	11	15	11	15	11	16	12	18
21	11	16	10	15	11	16	12	18
22	11	15	11	16	12	16	12	18
23	11	15	10	16	12	16	12	18
24	12	16	12	16	12	13	13	18
25	12	16	10	16	12	16	13	18
26	12	15	12	16	12	16	13	18
27	12	16	11	16	12	17	13	18
28	11	16	12	16	12	17	14	18
29	11	16	12	16	12	17	14	18
Mean	10.3 ± 1.2	14.2 ± 0.8	10.4 ± 1.3	14.6 ± 0.9	10.6 ± 1.3	14.8 ± 1.6	10.9 ± 2.1	16.2 ± 1.6

Table 2 Intraocular pressure values during fasting and non-fasting periods in the study population (left eye)

Sr. No.	9.00 am		12.00 am		3.00 pm		6.00 pm	
	Fasting	Non-fasting	Fasting	Non-fasting	Fasting	Non-fasting	Fasting	Non-fasting
1	9	12	10	13	8	12	8	14
2	9	14	8	12	11	12	8	14
3	9	12	8	12	9	12	8	14
4	9	12	8	12	9	12	8	14
5	11	12	8	12	12	13	9	14
6	9	12	8	13	9	13	9	14
7	10	13	9	13	10	13	9	15
8	12	13	9	13	10	13	9	15
9	10	13	9	13	10	13	10	15
10	13	13	9	13	10	13	10	15
11	10	13	13	13	10	13	10	15
12	10	13	8	12	11	14	10	15
13	11	13	10	13	11	14	11	15
14	11	13	10	14	11	14	11	16
15	13	12	10	14	8	14	11	16
16	11	14	10	14	11	15	11	16
17	11	14	11	14	11	15	11	16
18	11	14	11	16	11	15	11	16
19	9	14	11	14	12	15	11	16
20	11	14	11	15	9	15	12	18
21	11	14	12	15	12	14	12	17
22	12	15	12	15	12	16	12	17
23	12	15	12	15	12	16	12	17
24	10	15	13	16	13	16	12	18
25	12	15	13	15	13	16	12	18
26	11	15	13	15	13	16	13	18
27	13	15	9	15	13	16	13	18
28	13	15	13	15	13	16	13	18
29	10	15	13	14	13	16	13	16
Mean	10.8 ± 1.1	13.6 ± 0.9	10.4 ± 1.6	13.8 ± 1.0	10.9 ± 1.6	14.2 ± 1.4	1 ± 2.2	15.8 ± 1.4

study population was small. Based on the results of our study, we conclude that during the prolonged period of fasting there is an alteration in normal intra-ocular pressure. Although, the study populations are different, we are justified in suggesting that this aspect must be kept in mind while dealing with patients who are more susceptible to IOP variation.

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