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Evaluation of Gender Difference in Resting Intraocular Pressure in Normal Subjects.

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ABSTRACT

Increase in the intraocular pressure (IOP) is a potential risk factor for the development of glaucoma. In the present study, efforts are made to evaluate the resting IOP in normal males & females, compare the IOP in right and left eye. It was a cross-sectional study. IOP was measured in both the eyes for 65 males & 37 females by Goldmann's applanation tonometry. Applanation tonometry was done under topical anesthesia using a slit lamp with a cobalt blue filter. The resting IOP in males for the right & left eye were 13.74±1.67 & 13.46±1.65 mmHg. The corresponding values for females were 13.22±1.47 & 12.81±1.48 mmHg respectively. IOP was higher in right eye when compared to left eye in both males and females. The difference was statistically significant in females. Males had a higher IOP in both the eyes when compared to the corresponding eyes in their female counterparts. However, the difference in left eye between males & females was statistically significant.

Keywords: Intraocular pressure, Glaucoma, Tonometry

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INTRODUCTION

Intraocular pressure (IOP) is a difference in pressure between inside of the eyeball to the extraocular space. It is measured as the transcorneal pressure difference between the eye and the atmosphere [1]. Increased IOP is a major risk factor for development of glaucoma [2, 3]. Glaucoma is one of the major cause of acquired blindness. Intraocular pressure is an important modifiable risk factor for the development of glaucoma. Information about the resting IOP in normal subjects is available for American and European population. There are limited studies estimating IOP in Indian subjects. The earlier studies have indicated that the ethnicity in addition to other factors like age, gender, hypertension, diabetes, refractive error, BMI, race, iris colour and family history of glaucoma influence the IOP [4,5]. The present study was undertaken to evaluate the gender differences in resting IOP and differences in pressure between right & left eye in south Indian subjects.

METHODS

The study was conducted in the Department of Ophthalmology, M.S.Ramaiah Medical College, Bengaluru. The study protocol was approved by institutional scientific & ethical committee. The subjects were explained the study protocol & the potential risks involved and the right to terminate during the course of the study. A written informed consent was obtained from the participating subjects.

The subjects attending the outpatient of ophthalmology department, students & staff of the institution were screened. Subjects in the age group of 20 to 40 years were recruited for the study. Sixty five males and 37 females participated in the study. A detailed medical history was taken & clinical examination was conducted for all the subjects considered for the study. Subjects with refractive error, family history of glaucoma, history of ocular trauma, ocular surgeries, astigmatism**,** presbyopia**,** hypertension and diabetes mellitus were excluded from the study. The measurement of IOP was done between 11 am to 1 pm.

The IOP was measured by Goldmann's applanation tonometry. Applanation tonometry was done after anaesthetizing the cornea with a drop of 2% xylocaine and staining the tear film with fluorescein dye. Patient was seated in front of the slit lamp. The cornea and biprisms were illuminated with cobalt blue light using the slit lamp. Biprism was then advanced until it just touched the apex of cornea. At this point, two fluorescent semicircles were viewed through the prism. Then, applanation force against cornea was adjusted until the inner edges of two semicircles just touched. This was the endpoint for measurement. The IOP was determined by multiplying the dial reading by ten. The IOP was measured in right & left eyes independently with a time interval of 15 min between 2 recordings. At the end of recording procedure, the eye was washed with artificial tear to remove the dye. Antibiotic drops were instilled to prevent ocular infections.

Statistical analysis

Intraocular pressure was expressed as Mean ± SD. Data was analyzed by statistical package for social science (SPSS version 18). Independent t-test was used to test the

significance of the difference in the parameters between the groups. Paired't' test was used to test the significance of difference in the parameters between the right and left eyes in the same subject. $P < 0.05$ was considered as statistically significant.

RESULTS

The IOP in males in right & left eye were 13.74±1.67 & 13.46±1.65 mmHg. The corresponding values in females in right & left eye were 13.22±1.47 & 12.81±1.48 mmHg. Right eye had a higher IOP compared to left eye in both males & females. The difference was statistically significant in females ($p<0.01$). Males had significantly higher IOP in both right & left eye when compared to their female counterparts in the corresponding eye. The difference was statistically significant in left eye ($p<0.05$). Table: 1, 2.

Table 1: Comparison of IOP between right and left eye

Gender	IOP (mean±SD) in mmHg		'P' value
	Right eye	Left eye	
Males	13.74±1.67	13.46±1.65	0.118
Females	13.22±1.47	12.81±1.48	0.012

Table 2: Comparison of IOP between males and females in corresponding eye

Eye	IOP (Mean±SD) in mmHg		'P' value
	Male	Female	
Right	13.74±1.67	13.22±1.47	0.117
Left	13.46±1.65	12.81±1.48	0.050

DISCUSSION

Intraocular pressure is reported to be influenced by various factors like age, sex, BMI, diabetes mellitus, and refractive errors. The information about resting IOP is available from the western population and there is limited information about the Indian population. The age and IOP are reported to be related. European and American studies indicate that the IOP increase with age [6,7]. However, Korean [8], Japanese [9] and Australian [10] studies have reported a decline in IOP with age. Gender is also reported to be one of the factors influencing IOP. The studies evaluating gender difference in IOP have reported conflicting results. Hashemi et al [4] have reported that there was no significant difference in IOP between male and female subjects. However, Memarzadeh et al [5] have observed a higher IOP in females compared to males. Higher IOP in females is attributed to obesity, hypertension and longer life expectancy. They have also reported that BMI correlated positively with IOP independent of hypertension and diabetes mellitus. Obesity causes excessive accumulation of orbital fat. This increases orbital pressure enhancing episcleral venous pressure decreasing outflow of aqueous humor. Earlier studies from Spain have reported a significant difference in IOP between males and females in right eye possibly due to a difference in corneal thickness. Garcia-Meidna et al [11] reported that IOP is influenced by corneal thickness and refractive error. Further, they have reported a difference in corneal thickness in different ethnic groups. Europeans and Americans have a thicker cornea when compared to Indians/Asians. The average corneal thickness in

Europeans was 550.12 µm. The corresponding average value for south Indian subjects was around 536 µm.

Therefore, it is reasonable to expect a perceptible difference in the intraocular pressure between Western & Indian subjects. In our study, males had a higher intraocular pressure when compared to females. Further, the right eye had a higher IOP when compared to left eye. It is reported that higher IOP in right eye can be attributed to thicker cornea in that eye.

One of the explanations for a higher IOP in right eye was the commencement of recording in the right eye, which could have some psychological influence on the recording in left eye [12].
In our study to address this possible bias, recordings were done in either the right or the left eye randomly. Still we noticed that the intraocular pressure was higher in the right eye in both males and females.

CONCLUSION

- Males had higher IOP when compared to females in both the eyes.
- IOP was higher in right eye when compared to left eye.

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