Research Paper

Volume : 5 | Issue : 4 | April 2016 • ISSN No 2277 - 8179 | IF : 3.508 | IC Value : 69.48

Variation of Intraocular Pressure in Relation To Age And Gender – A Cross Sectional Study in The Regional Institute of Ophthalmology, Gauhati Medical College And Hospital.

Medical Science

KEYWORDS : Intraocular pressure, Goldmann Applanation tonometer, Age, Gender.

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ABSTRACT

Background :
The intraocular pressure refers to the pressure exerted by intraocular fluids on the coats of the eyeball(normal=10-21mm Hg).
Aim and objective :
To assess the effect of aging and gender on IOP.
Materials and methods :
The study was conducted in the Regional Institute of Ophthalmology and Department of Physiology , GMCH including both male and female between 21 - 70 years .
Results :
There is statistically significant difference in IOP between males and females (p-value<0.05). IOP decreases significantly with increasing age but statistically significantly only in males (p-value <0.001).
Conclusion :
IOP varies significantly between male and female and decreases with advancing age but more so in males than in females.

Introduction :

The intraocular pressure refers to the pressure exerted by intraocular fluids on the coats of the eyeball. The normal IOP varies between 10 and 21 mm of Hg (mean 16±2.5 mm of Hg). The IOP is determined by the balance between the production of the aqueous humor (the clear fluid inside the eye) and the drainage of aqueous humor[1]. Clinically IOP remains the most important risk factor though not the only for the development of glaucoma[2]. People with a high IOP with no proof of having primary open-angle glaucoma are considered at risk of developing optic nerve damage, even if they do not suffer from any ocular disease. Though IOP has disappeared from the definition of glaucoma it can still be used as category 3 diagnosis when the optic disc cannot be seen and perimetry is impossible[3]. Intraocular pressure is not a constant value and it varies based on a number of factors. A number of studies have been conducted in an attempt to establish a correlation between age and gender and change in IOP. Mohammed Jeelani et al found that there was statistically significant difference in mean IOP in females and males ($p<0.05$) and a significant positive correlation between age and IOP ($r=0.911$)[3]. Some like Lin CP et al found that intraocular pressure showed a significant reduction with aging in men but not in women[4] while some found that mean intraocular pressure increases with increasing age group with higher values seen in females. Still others like Sanaa A. Yassin and Elham R. Al-Tamim and others like Eghosasere Iyamua , Ebi Osuobeni found that there was no statistically significant association between the IOP and age or gender[5,13]. A number of other studies also found negative correlations between IOP and age in Japan, Taiwan, and Korean populations[6,7,8,9]. In a study conducted by Qureshi IA it was found that the mean IOP increases progressively with age until 60yrs. When one age group is compared with its preceding, the increase is non significant until 40yrs but highly significant in the age group of 41-50 and 51-60 ($p<0.001$)[10] . This is similar to the finding by H Hashemi et al who also found that IOP increased with increasing age[14]. Sangshin Park et al found that there was no significant difference in IOP (mean±SE) between men (12.24 ± 2.42) and women (12.55 ± 2.41 mmHg, $p > 0.1$), while IOP of men tended to decrease as age increased (p for trend< 0.01)[11]. Pointer JS found that there was gender difference in this parameter, with human females recording a consistently higher value than age-matched males[12]. Keeping in view these varying reports this study was undertaken to assess the effect of aging and gender on intraocular pressure.

Materials and methods:

The study was conducted in the Regional Institute of Ophthalmology , GMCH and the Department of Physiology , GMCH between ..... The study group consisted of 202 subjects, consisting of 101 Male and 101 Female subjects attending ophthalmic OPD at Gauhati Medical College and Hospital. The study was approved by the Institutional ethical committee .

The study group included both male and female in the age group of 21 years - 70 years.

Subjects suffering from any type of glaucoma , ocular injury , ocular surgical trauma , corneal ulcer , corneal oedema , corneal scar or those having only one eye were excluded from the study.

The procedure was explained to the subjects and informed consent was obtained from each of the participant. IOP was measured in both the eyes using the Goldmann Applanation Tonometer.

The collected data was statistically analysed using the Graphpad Instat+ v3.36 software. P-value <0.05 was considered statistically significant and p value <0.01 was taken as highly significant.

Results :

Table 1: Showing mean IOP ± SD in different age groups.

AGE GROUP	SEX	MEAN ± SD	RANGE	MEDIAN
21 – 30 YRS	MALE	15.3 ± 1.98	12 – 18	16
	FEMALE	15.37 ± 1.89	12 – 18	15
	BOTH	15.35 ± 1.9	12 – 18	16
31 – 40 YRS	MALE	15.46 ± 2.416	11 – 19	16
	FEMALE	15.368 ± 2.7	11 – 19	15
	BOTH	15.412 ± 2.5	11 – 19	15.5
41 – 50 YRS	MALE	13.773 ± 2.69	10 – 19	13.5
	FEMALE	15.15 ± 2.9	10 – 20	15.5
	BOTH	14.429 ± 2.89	10 – 20	14
51 – 60 YRS	MALE	13 ± 3.225	10 – 20	12
	FEMALE	14.87 ± 2.95	10 – 21	15
	BOTH	14 ± 3.19	10 – 21	14
61 – 70 YRS	MALE	12.26 ± 2.94	9 – 19	11
	FEMALE	14.25 ± 3.46	10 – 21	14
	BOTH	13.186 ± 3.31	9 – 21	12

Table 2 : Significance of difference of average IOP between males and females in different age groups.

Age group	p-value , remark
21-30 yrs	P > 0.05, NS.
31-40 yrs	P > 0.05, NS.
41-50 yrs	P > 0.05, NS.
51-60 yrs	P < 0.05 , SIGNIFICANT.
61-70 yrs	P < 0.05 , SIGNIFICANT.

Table 3: Showing variation in IOP according to gender.

Gender	Sample size	Mean	Standard deviation	Median	p-value
Male	101	13.79	2.9	13.00	0.0027
Female	101	15.02	2.83	15.00	

Table 4: Showing correlation between age and IOP.

Gender	Total no. of cases	Average age	Correlation coefficient(r)	Coefficient of determination(r^2)	p-value
Male	101	45.57	-0.4211	0.1773	<0.001
Female	101	45.47	-0.1099	0.01208	0.274
Both	202	45.67	-0.2555	0.06526	<0.005

Figure 1 : Showing mean IOP among both gender according to age in years.

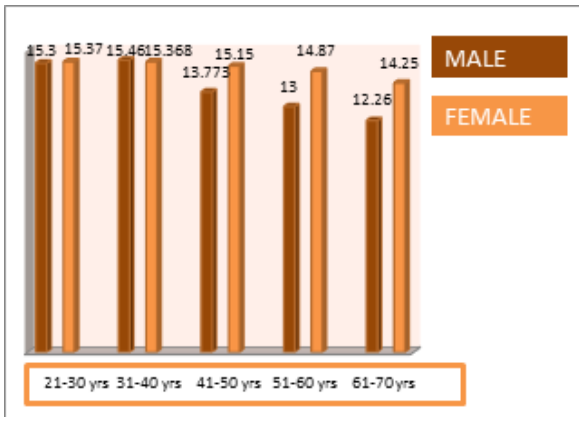

Figure 2 : Showing age distribution in both sexes.

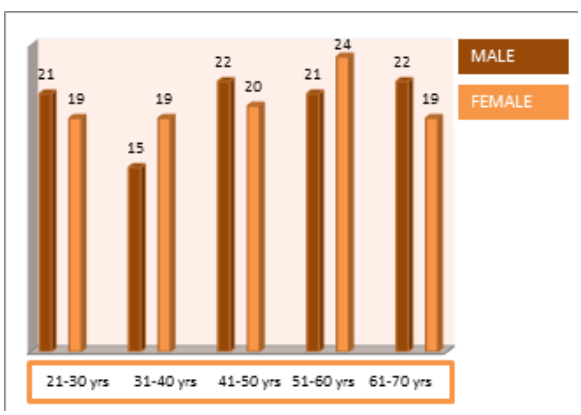

Figure 3 : Showing correlation of age and IOP.

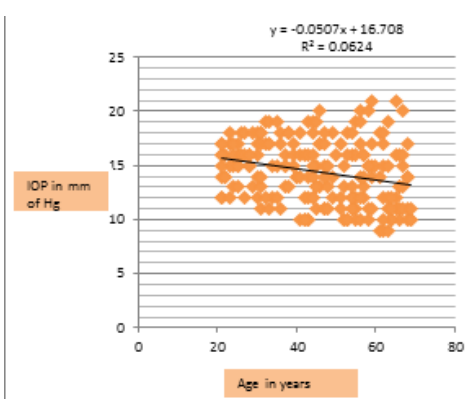

Figure 4 : Showing correlation of age and IOP in males.

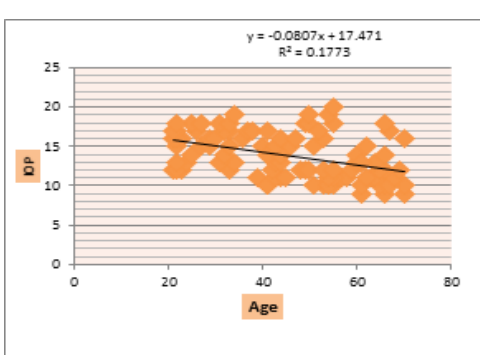

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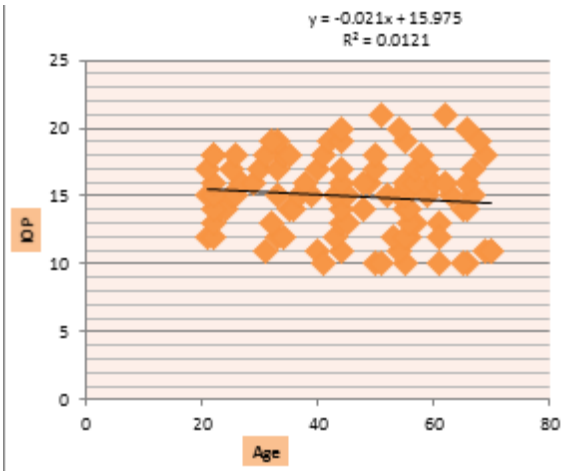
Figure 5 : Sshowing correlation of age and IOP in females.



Discussion :-

In our study it was seen that there is a significant difference in the mean IOP between male and female with the females recording a higher mean IOP(15.02±2.83 mm of Hg) than the males(13.79±2.9 mm of Hg). This difference was found to be statistically significant with a p-value<0.05. This is in line with studies like that of Mohammed Jeelani et al [3] who also reported highly significant difference between the mean IOP in males (15.2 mmHg) and that in females (16.5 mmHg) with the SD of ± 2.43 and ± 3.28 respectively ,while it contradicts the findings of Jong Soo Lee et al [9] and others. In the age group 21-30 yrs the mean IOP was only marginally higher in the female while it was lesser than the mean male IOP in the age group 31-40 yrs. In the age groups 41-50 yrs , 51-60 yrs and 61-70 yrs the IOP is greater in the females than the males. It is seen that the difference in the IOP between the male and female is not significant in the age groups 21-30 yrs , 31-40 yrs and 41-50 yrs but statistically significant in the age groups 51-60 yrs and 61-70 yrs (p<0.05).

In both the genders there is a decrease in the mean IOP with increase in the age. However this decrease is statistically significant only in the males (p-value <0.001) but not significant in the females (p-value=0.274). The IOP showed a tendency to decrease with advancing age which was statistically significant(p-value<0.005) irrespective of gender. This is similar to the finding in studies by Lin HY et al , Jong Soo Lee et al[8,9] etc.

Conclusion :

The mean IOP among the females is more than the males which is statistically significant.. The IOP decreases with increasing age but more significantly in males than in females. Thus we see that though IOP is higher in females than males , with an increase in age the IOP decreases with a more statistically significant decrease in males.. However it is needed to build on these observations and to further confirm them with a study with a larger sample size.

Conflict of interest : None.

Acknowledgement : We would like to thank all the participants of the study for their patience and cooperation.

References:

1. Anandha Lakshmi S et al. Study on IOP in subjects with type 2 DM; Journal of Clinical and diagnostic research.2011 November (Suppl-2) Vol-5(7):1336-1338.
2. Coleman AL. Population studies and ocular blood flow in POAG. Ocular Surgery News, 2002.
3. Jeelani M, Taklikar RH, Taklikar A, et al. Variation of intraocular pressure with age and gender. Natl J Physiol Pharm Pharmacol 2014; 4:57-60.
4. Lin CP, Lin YS, Wu SC, Ko YS. Age- and gender-specific association between intraocular pressure and metabolic variables in a Taiwanese population. Eur J Intern Med. 2012 Jan;23(1):76-82. doi: 10.1016/j.ejim.2011.06.002. Epub 2011 Jul 18.
5. Sanaa A. Yassin and Elham R. Al-Tamim. Age, gender and refractive error association with intraocular pressure in healthy Saudi participants: A cross-sectional study; DOI: http://dx.doi.org/10.1016/j.sjopt.2015.11.007.
6. Shiose Y. The aging effect on intraocular pressure in an apparently normal population. Arch Ophthalmol 1984;102:8837.
7. Shiose Y, Kawase Y. A new approach to stratified normal intraocular pressure in a general population. Am J Ophthalmol 1986;101:71421.
8. Lin HY, Hsu WM, Chou P, et al. Intraocular pressure measured with a noncontact tonometer in an elderly Chinese population: The Shihpai Eye Study. Arch Ophthalmol 2005;123:3816.
9. Jong Soo Lee,Young Rac Choi , Ji Eun Lee et al. Relationship between intraocular pressure and systemic health parameters in a Korean population. Korean J Ophthalmol Vol. 16:13-19,2002.
10. Qureshi IA. Age and intraocular pressure: how are they correlated? ; J Pak Med Assoc. 1995 Jun;45(6):150-2.
11. Sang-shin Park et al. The Distribution of Intraocular Pressure and Its Association With Metabolic Syndrome in a Community; Journal of Preventive Medicine and Public Health doi: 10.3961/jpmph.2010.43.2.125 March 2010, Vol. 43, No. 2, 125-130.
12. Pointer JS. Evidence that a gender difference in intraocular pressure is present from childhood. Ophthalmic Physiol Opt. 2000 Mar;20(2):131-6.
13. Eghosasere Iyamua , Ebi Osuobeni. Age, gender, corneal diameter, corneal curvature and central corneal thickness in Nigerians with normal intra ocular pressure. Journal of Optometry (2012) 5, 87-97.
14. Hashemi H, Kashi AH, Fotouhi A, Mohammad K. Distribution of intraocular pressure in healthy Iranian individuals: the Tehran Eye Study. Br J Ophthalmol. 2005 Jun;89(6):652-7.