TO ASSESS RELATIONSHIP BETWEEN INTRAOCULAR PRESSURE AND SYSTEMIC BLOOD PRESSURE AND AGE

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Abstracts: **INTRODUCTION**: Intraocular pressure is the pressure exerted by aqueous humor in the intraocular tissue due to balance between formation and drainage of aqueous humor. In a normal eye, it ranges between 12 to 20 mmHg average being 15 mmHg. Ocular hypertension is any intraocular pressure which is higher than normal range of intraocular pressure. Glaucoma is a disease in which the intraocular pressure rises pathologically as high as 60 to 70 mmHg. A rise in IOP up to 25 to 30 mmHg causes loss of vision, may be temporary or permanent due to damage caused to optic nerve. Studies have shown positive correlation between age and systemic blood pressure ; age and intraocular pressure hence this attempt is made to find a correlation between IOP and systemic blood pressure. **AIMS& OBJECTIVES**:1) To assess relation between intraocular pressure and systemic blood pressure.2)To assess if there is any influence of age 0n intraocular pressure and systemic blood pressure relationship. **MATERIAL & METHODS**: 200 individuals were divided into two groups GROUP A -Control group -normotensive subjects and GROUP B -Study group-hypertensive patients. (based on JNC 8 classification) in age group of 20 to 90 year. Individuals with high power myopia, diabetes mellitus, renal disease, cataract, tobacco and alcohol consumption were excluded. Blood pressure of each individual was measured in supine position after given rest for 15 mins and noted. Perkins applanation tonometer was used to measure IOP after anesthetizing eye with lignocaine and staining with fluroscein dye. **RESULT**: For all ages, intraocular pressure (mean IOP 16.5 ± 3.9) of hypertensives (mean SBP 152 ± 14) individual was higher than intraocular pressure (mean IOP 12.8 ± 3.2) of normotensives (mean SBP 120 ± 10); though not statistically significant. IOP of individuals aged more than 60 years was higher than that of individuals aged between 20 to 59 years. In the individuals above the age of 60 yr, hypertensive individuals had higher IOP than normotensive individuals. **CONCLUSION**: From our study we conclude that IOP tends to be higher in hypertensive individuals especially those above the age of 60 years. So it is recommended that elderly and hypertensive patients should be screened for ocular hypertension. Including comprehensive eye test in routine checkup can help in reducing incidence of glaucoma.

Key Words: intraocular pressure, hypertension, aging

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Introduction:

Intraocular pressure is the pressure exerted by aqueous humor on the intraocular tissue due to balance between formation and drainage of aqueous humor. (Normal range: 10 to 21 mmHg)

Ocular hypertension is any intraocular pressure which is higher than the normal range without any optic nerve damage or visual field loss.

Glaucoma is a group of eye disorder which results in damage to optic nerve and causes visual field loss. Glaucoma is one of the leading cause of blindness in people above 40 years .Population based studies have shown that Intraocular pressure is the major and only realistic modifiable risk factor for glaucoma. The interplay between intraocular pressure and blood pressure is important clinically because glaucoma and hypertension often coexist in aging population.By knowing the exact relationship between age , IOP and SBP the incidence of visual field loss occurring due to consistently elevated intraocular pressure can be decreased by early screening.

Material and Methods:

The study was conducted at Glaucoma Unit, M & J institute of Ophthalmology, Civil hospital Ahmedabad from June – Sept 2019. 200 individuals were divided into two groups GROUP A -Control group -normotensive subjects and GROUP B -Study group-hypertensive patients. (based on JNC 8 classification) in age group of 20 to 90 years.Individuals with high power myopia, diabetes mellitus, renal disease, cataract, tobacco and alcohol consumption were excluded.Blood pressure of each individual was measured by

Sphygmomanometer in supine position after given rest for 15 mins and noted.Perkins applanation tonometer was used to measure IOP after anesthetizing eye with lignocaine eyedrops and staining the tearfilm with fluroscein dye strip.

Care was taken to ensure that just enough fluroscein was used to make the tonometry prism visible.One reading was taken from each eye. If the IOP was greater than 21mm of Hg, a repeat reading was taken and second reading was used for analysis.Data was noted & analysed by MS Excel and *p value* was calculated using STUDENT INDEPENDENT T TEST in SOCIAL SCIENCE STATISTICS ONLINE.In applanation tonometry, IOP is inferred from the force required to flatten a constant area of the cornea. From the Imbertfick law, "tension of the whirl can be eliminated when the application of the tonometer produces a flat surface instead of a concave one and the reading of the tonometer then equals the IOP."

Result

Following table shows the general parameters of the sample studied.

Table:1 General parameters

Mean Age (in years)	55.39
Mean IOP (mm of Hg)	13.95 ± 3.66
Mean BP (mm of Hg)	135.74 / 78.3

Table – 2: Comparison of IOP of normotensive and hypertensive individuals (p value = <0.00001)

Group	IOP (mm of Hg)					
	Right Eye			Left Eye		
	Min	Max	Mean	Min	Max	Mean
Group A (Normotensive)	8	32	12.7 ± 3.05	8	20	12.8 ± 2.35
Group B (Hypertensive)	10	30	15.2 ± 3.80	10	26	14.4 ± 3.27

The mean IOP of hypertensives was higher as compared to IOP of normotensive in both the eyes and is statistically significant, although both fall in normal range of IOP.

Table-3: Variation of IOP with age (p value = 0.17)

Age Group	Sample Size	Mean IOP (mm of Hg)	
		Right Eye	Left Eye
20 – 59 years	102	13.7 ± 3.16	13.5 ± 2.59
60 years & above	98	14.2 ± 4.11	13.7 ± 3.29

The mean IOP of individuals aged between 20-59 years was lower as compared to IOP of individuals aged 60 years and above, although statistically not significant, both fall in the normal range of IOP.

Table-4 : Comparison of IOP of normotensive and hypertensive individuals in age group 20-59 years (p value = 0.004)

Group	Sample Size	Mean IOP (mm of Hg)	
		Right Eye	Left Eye
Group A (Normotensive)	53	12.9 ± 3.3	12.7 ± 2.04
Group B (Hypertensive)	49	14.6 ± 2.7	14.3 ± 2.9

In the age group 20-59 years, IOP in hypertensive individuals was higher as compared to normotensive individuals and statistically significant. Also, the IOP remains with in the normal range.

Table-5 : Comparison of IOP of normotensive and hypertensive individuals in age group 60 years & above (p value = 0.000016)

Group	Sample Size	Mean IOP (mm of Hg)	
		Right Eye	Left Eye
Group A (Normotensive)	47	12.5 ± 2.7	12.9 ± 2.6
Group B (Hypertensive)	51	15.8 ± 4.5	14.6 ± 3.6

In the age group 60 years and above, IOP in hypertensive individuals was higher as compared to normotensive individuals though statistically significant. Also, the IOP remains with in the normal range.

Discussion

Systolic blood pressure was positively associated with IOP in the Barbados eye study. Several population based studies like Rotterdam eye study, Egna-Neumarkt Glaucoma study, Beaver Dam study consistently demonstrated a positive correlation between BP and IOP. Barbados eye and EgnaNeumarkt studies found IOP to increase with age reflecting that age has a strong and persistent effect on IOP in Caucasian and black eyes . Old age has been reported as a risk factor for development of glaucoma in patients with ocular hypertension in multiple progressive studies.In several studies old age has been reported as a single independent risk factor for progression of ocular hypertension and glaucoma.Studies performed by Quigley HA ,Broman AT postulated that age is a major risk factor for primary open angle glaucoma at this seldom occurs below the age of 40 years. In contrast, Tina T Wong et al in their study had concluded that IOP decreased with age. Tina T Wong et.al concluded in their study that age and systolic BP are significant determinants of IOP in persons aged between 40-80 years.Many studies have shown that aging is associated with a progressive reduction in ocular blood flow due to insufficient capacity for auto-regulation.

Conclusion:

The intraocular pressure in hypertensive individuals was higher than normotensive individuals. This phenomenon was particularly true for individuals aged more than 60 years. Hence it is recommended that elderly and hypertensive patients should be screened for ocular hypertension.Including comprehensive eye test in routine check-up can help in reducing incidence of glaucoma.

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Conflict of Interest: None