

ORIGINAL RESEARCH

Intraocular pressure changes in normotensive and hypertensive postmenopausal women

¹Dr. Pushpa MB, ²Dr. Preeti Dharapur, ³Dr. Shubash C

¹Tutor, Department of Physiology, Bidar Institute of Medical Sciences, Bidar, Karnataka, India

²Assistant Professor, Department of Pharmacology, Bidar Institute of Medical Sciences, Bidar, Karnataka, India

³Professor and Head, Department of Physiology, Bidar Institute of Medical Sciences, Bidar, Karnataka, India

Corresponding Author

Dr. Pushpa MB

Tutor, Department of Physiology, Bidar Institute of Medical Sciences, Bidar, Karnataka, India

ABSTRACT

IOP is one of the vital factors whose maintenance within normal limit is essential for serve its normal function. IOP is influenced by various factors like smoking, alcohol, hypertension, sex hormones, pregnancy, medications etc. Changes in IOP are directly and significantly associated with changes in systemic blood pressure with the age. Increase in IOP leads to glaucoma. Glaucoma is second only to cataract as leading cause of blindness. Population based study have revealed prevalence of glaucoma in India to be 11.9 million and 60.5 million in the world by the year 2010 out of which approximately half are undiagnosed. So control of IOP within the normal range is necessary. A total number of 100 postmenopausal women with age group of 45 to 55 were included in the study. They were divided into two groups of each 50 normotensive and hypertensive. Blood pressure was recorded in right arm supine position by using sphygmomanometer by both palpatory and auscultatory method averages of three recordings were taken. IOP was recorded by using Goldmann's Applanation Tonometer. Results were analysed by using student t test. A P- value of <0.05 was taken as a statistically significant. Our study showed that there was a significant increase in IOP in hypertensive postmenopausal women compared to normotensive postmenopausal women.

Keywords: IOP, Blood pressure, Post menopause.

INTRODUCTION

IOP is defined as the pressure exerted by the ocular components against the fibrous tunics of the eye. IOP is determined by the volume of aqueous humor, central corneal thickness, choroidal blood volume, rigidity, sclera compliance, tone of extra ocular muscles and external pressure. IOP is one of the vital factors, whose maintenance within normal limits is essential for the eye to serve its normal functions¹.

The average normal IOP is about 15mmHg (12-20mmHg)². Elevated IOP causes a mechanical stress like situations, leading to damage of neurons of retina and their axons resulting in progressive loss of visual field and blindness seen in glaucoma³. IOP is influenced by various factors like, fluid intake, exercises, medications, alcohol, smoking, hypertension, sex hormones and pregnancy etc⁴. Changes in IOP are directly and significantly associated with changes in systemic blood pressure^{5,6}. Increase in IOP leads to glaucoma. Glaucoma is second only to cataract as leading cause of blindness⁷. Raised IOP is the principal modifiable risk factor for development and progression to glaucoma^{8,9}.

In India more than 60 million women are in the age of 55 years because of aging population¹⁰. With women living longer than before, a majority would spend one third of their life in postmenopausal age. Blood pressure increases with age in most population, especially after menopause there is a sharp increase in prevalence of hypertension in women¹¹. It is evident that postmenopausal women are at increased risk of developing elevated IOP and glaucoma because of presence of multiple risk factors as mentioned above.

If ocular hypertension or glaucoma is detected early and treated appropriately, their progression and blindness can be prevented. So this work undertaken to study correlation between IOP changes and hypertension in postmenopausal women.

METHODOLOGY

The study included 100 postmenopausal in which 50 normotensive and 50 hypertensive with the age group between 45-55 yrs who attended the outpatient department of medicine and ophthalmology, were included in our study.

Written informed consent was obtained after detailed procedure of measuring IOP was explained to the

individuals who included in our study. Those who satisfy the inclusion and exclusion criteria were subjected to detailed clinical examination including height in meters, weight in kgs, body mass index, blood pressure, pulse pressure, mean arterial pressure and IOP.

Blood pressure was recorded in right arm supine position by using sphygmomanometer by both palpatory and auscultatory method averages of three recordings were taken. IOP was recorded by using Goldmann’s Applanation Tonometer.

INCLUSION CRITERIA

Normotension and hypertension postmenopausal women who gave a history of one year of amenorrhea with age group between 45-55yrs.

EXCLUSION CRITERIA

- Ocular trauma
- Refractive errors
- Mechanical and surgical illness
- Smoker
- Diabetes
- Family history glaucoma

- History of previous ocular surgeries
- On medication like beta blockers, diuretics and hormone replacement therapy.

RECORDINGS OF IOP

Intraocular pressure was recorded by using Goldmann Applanation Tonometer between 10 am to 1 pm to avoid diurnal variations. Patient was informed about the test. Aseptic precautions were taken before performing test. Tonometer was calibrated each time the cornea was anaesthetized with 4% lignocaine eye drops. The patient was made to sit before the slit lamp at the right height with her chin on the chine rest and forehead against the headband. Magnification of slit lamp was set at x10. Flourescein strips were used to stain the eyes. The tonometer was moved forward slowly until the prism rested gently on the centre of the patient’s cornea, with the other hand the calibrated dial on the tonometer was turned clockwise until the inner lines of the two fluorescein semicircles (mires) coincided(fig 6). The reading on the dial was noted. The prism was withdrawn from the corneal surface and the tip wiped dry. The procedure was repeated for the other eye.

RESULTS

Table 1: Distribution IOP left eye in normotensive and hypertensive patients

	GP	N	Mean	Std. Deviation	t	df	p	Inference
IOP Left	Normotensive	50	13.74	1.2	-11.47	98	0.0001	Highly significant
	Hypertensive	50	18.06	2.37			(<0.001)	

Table 2: Distribution IOP right eye in normotensive and hypertensive patients

	GP	N	Mean	Std. Deviation	t	df	p	Inference
IOP Right	Normotensive	50	13.78	1.17	-11.47	98	0.0001	Highly significant
	Hypertensive	50	18.11	2.39			(<0.001)	

DISCUSSION

Glaucoma is the commonest cause of irreversible blindness worldwide and the second most common cause of blindness overall, after cataract. It affects approximately 70 million people and among them, 7 million are blind.¹¹

Glaucoma or glaucomatous optic neuropathy is characterized by a chronic, slowly progressive loss of the retinal ganglion cells and their neurons. The IOP is widely regarded as the most important modifiable risk factor which is associated with development of glaucomatous optic neuropathy. IOP is influenced by various factors among them systemic hypertension is one of the factor. Therefore the factors that influence the IOP and its measurements are of great relevance in understanding the progression of the disease and in reducing the burden of blindness.¹²

We found that changes in IOP are directly and significantly associated with changes in systemic blood pressure. This would suggest that treatment of blood pressure might have an effect on risk of developing glaucoma. In India there are not many study comparing IOP changes in relation to

hypertension in postmenopausal women. This study undertaken to study the IOP changes in normotensive and hypertensive postmenopausal women.

In our study mean IOP in normotensive postmenopausal women was 13.74±1.2 mmHg (mean ± standard deviation) and in hypertensive postmenopausal women was 18.06±2.37mmHg. This IOP changes in relation to blood pressure in postmeopausal women is statistically significant. So findings from our study indicates that SBP, DBP, PP, MAP were positively correlated with IOP changes which is statistically significant. There are lot of other studies which showed positive correlation between the IOP changes and hypertension.

CONCLUSION

The findings of our study showed that there is positive correlation between IOP changes in relation to hypertension in postmenopausal women. So to increase awareness regarding ocular complication of hypertension is important. Especially the hypertensive postmenopausal women must undergo regular

checkup IOP changes to avoid complications such as glaucoma and blindness in future.

REFERENCES

1. Murgatroyd H, Bembridge J. Intraocular pressure. Continuing Education in Anaesthesia, *Critical Care and Pain*. 2008; 8 (3): 100-103.
2. Guyton AC. Text book of medical physiology. 12th ed.2011;597-606
3. Intraocular pressure. Wikipedia, the free encyclopaedia
4. Pan Y, Varma R. Natural history of glaucoma. *Indian J Ophthalmol*. 2011 Jan; 59 Suppl: S19-23.
5. Bulpitt CJ, Hodes C, Everitt MG. Intraocular pressure and systemic blood pressure in the elderly. *Br J Ophthalmol*. 1975 Dec;59(12):717-20.
6. Klein BE, Klein R, Knudtson MD. Intraocular pressure and systemic blood pressure: longitudinal perspective: the Beaver Dam Eye Study. *Br J Ophthalmol*. 2005 Mar;89(3):284-7.
7. Resnikoff S, Pascolini D, Etya'ale D *et al*. Global data on visual impairment in the year 2002. *Bull World Health Organ* 2004; 82: 844–851
8. Friedman DS, Wilson MR, Liebmann JM, Fechtner RD, Weinreb RN. An evidence-based assessment of risk factors for the progression of ocular hypertension and glaucoma. *Am J Ophthalmol* 2004; 138: 19-31.
9. American Academy of Ophthalmology. Intraocular pressure and aqueous humor dynamics. In: Liesegang TJ, Deutsch TA, Grand MG, eds. Basic and clinical science course. Section 10: Glaucoma. San Francisco: American Academy of Ophthalmology, 2003:14–24.
10. Rao KA, editor. Text book of Gynaecology. 1st ed: Saunders: Elsevier 2008.
11. Alvarado J A, Yun A G, Murphy C G. Juxtacanalicular tissue in primary open angle glaucoma and in nonglaucomatous normal. *Arch Ophthalmol* 1986 Oct; 104 (10): 1517-9
12. Drecoll L, Shimizu T, Rhrbach M, ERohen J W. Quantitative analysis of plaque material in the inner and outer wall of schlemm's canal in normal and glaucomatous eyes, *Exp Eye Res* 1986 may; 42(5): 44-45.