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TO STUDY CORRELATION BETWEEN AXIAL LENGTHS OF GLAUCOMATOUS AND NON-GLAUCOMATOUS PATIENT

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ABSTRACT **PURPOSE :** To determine the axial length in patients with POAG and PACG using A scan and to compare them with normal subjects taken as control. **METHOD :** A prospective cross sectional hospital based study was conducted on 120 subjects attending glaucoma clinic of Department of Ophthalmology, G.R. Medical College and J.A. Group of Hospitals, from January 2020 to June 2021. After proper glaucoma work up of all patients their axial lengths were measured and compared with normal subjects to determine their correlation using proper statistical analysis. **RESULT :** Axial length was longer in the POAG group and shorter in PACG group compared to the normal group. Significant difference was noted in axial lengths of normal, POAG and PACG. **CONCLUSION :** The study shows that eyes with POAG have longer axial length and with PACG have shorter axial length compared to normal eyes. Hence proper screening and follow ups are required in such patients to prevent deleterious effects of glaucoma.

KEYWORDS : POAG, PACG, Axial length

INTRODUCTION

Glaucoma, a chronic progressive optic neuropathy, is the leading cause of blindness all over the world after cataract blindness. In 2010, worldwide 60.5 million people were expected to have OAG (Open angle glaucoma) and ACG (Angle closure glaucoma), increasing to 79.6 million by 2020, and of these, 74% will have OAG[1]. There are approximately 11.2 million persons aged 40 years and older with glaucoma in India[2].

Many risk factors like high IOP, thin central corneal thickness, increasing age, male gender,family history, adult onset diabetes, migraine and peripheral vasospasm, alcohol consumption, cigarette smoking have been identified for POAG, but only a small number is well supported by evidence. Elevated IOP remains the most prominent factor[4]. Myopia is considered as a risk factor for POAG and hypermetropia for PACG[5-6]. The Axial Length (AL) is the linear distance from the corneal surface to an interference peak corresponding to the retinal pigment epithelium/Bruch's membrane. It is measured using A scan[7,8].

Clinic based studies have suggested that eyes with occludable angles and ACG have a shorter AL, shallower anterior chamber, and a thicker lens[9-12] and eyes with OAG tend to have longer axial lengths[13-16].

Identification of risk factors of ACG is important for prevention of this devastating irreversible blinding disorder. Shorter AL is one of the risk factors of PACG and longer AL for POAG.

This study is aimed to determine association of axial length with PACG and POAG so that risk factors can be identified and patients with these risk factors can be treated on priority basis for prevention of fatal outcomes of the disease.

MATERIAL AND METHODS

Source of data and materials

This Prospective Cross Sectional hospital based study was conducted on 120 subjects attending glaucoma clinic of Department of Ophthalmology, G.R. Medical College and J.A. Group of Hospitals, from January 2020 to June 2021.

All the patients were recorded in a pre-designed proforma; that includes demographic data and complete glaucoma work up. The associated relevant examinations including visual acuity, pupillary reaction, flashlight test, Van Herick test, Slit lamp biomicroscopy, fundoscopy, applanation tonometry and gonioscopy were carried out. Study included both male and female patients & diagnosed cases of POAG and PACG. Patients with any corneal pathology that can interfere with the Applanation tonometry(e.g. Corneal scarring, corneal abrasion, keratitis, keratoconus, ocular herpes, trauma) ,patients with secondary glaucoma and patients with non-glaucomatous optic atrophy were excluded.

METHOD OF DATA COLLECTION

Detailed slit lamp evaluation was done for every case under Zeiss slit lamp and the findings were recorded.

Intraocular pressure was measured with applanation tonometer. Gonioscopy was performed with Goldmann two mirror gonio lens in every subject. Grading of the irido-corneal angle was done using the modified Shaffer - Spaeth system.

Evaluation of the fundus, particularly of the optic disc was done with direct ophthalmoscope.

Axial length measurement with A scan machine was done in all 240 eyes of 120 subjects included in this study.

OBSERVATION AND RESULTS

In this study, 120 patients were subjected to glaucoma work up and axial length measurement,
Analysis of the data showed the following results:

Mean age of participants were 58± 12 years, the youngest participant being 30 years old and oldest being 85 years old.

Table:1 The Axial length Comparison between Control and Glaucoma Groups

	Minimum Axl (mm)		Maximum Axl (mm)		Mean axl (mm)		SD		P value
	RE	LE	RE	LE	RE	LE	RE	LE	BE
Control	21.08	21.08	23.95	24.54	22.58	22.61	0.791	0.796	0.001
POAG	20.22	21.80	26.45	25.86	23.48	23.50	0.949	0.806	
PACG	19.61	19.90	23.07	23.01	21.70	21.75	0.815	0.747	
Total	19.61	19.90	26.45	25.86	22.59	22.62	1.11	1.056	

- Mean axial length among POAG group is significantly($p<0.05$) higher compared to control group. Hence patients having higher

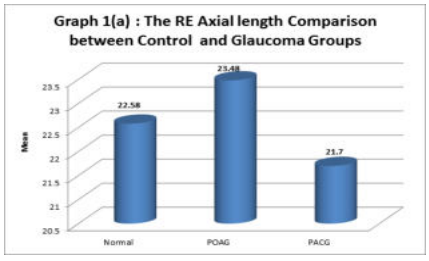
AL are more prone to POAG.

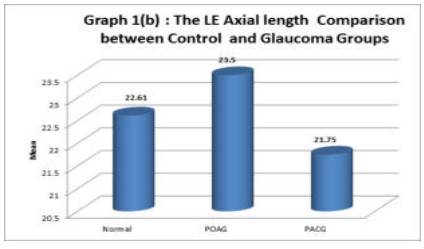
- Mean axial length among PACG group is significantly($p<0.05$) lower compared to control group. Hence patients having lower AL are more prone to PACG.

Table:2 Distribution of cases and control according to Axial length

AL (mm)	Control (n=40)		POAG (n=40)		PACG (n=40)		Total	
	No.	%	No.	%	No.	%	No.	%
19-21	0	0	1	2.5	8	20	9	7.5
21.01-23	27	67	8	20	30	75	65	54
23.01-25	13	32	29	72.5	2	5	44	36.7
25.01-27	0	0	2	5	0	0	2	1.7

The difference in axial length distribution is significant($p<0.05$) with majority of POAG patients having AL >23mm and PACG patients having AL<23mm.





DISCUSSSION

The glaucomas are group of optic neuropathies characterized by progressive degeneration of retinal ganglion cells. These cells are central nervous system neurons that have their cell bodies in the inner retina and axons in the optic nerve. Degeneration of these nerves results in cupping, a characteristic appearance of the optic disc and visual loss.[16] The biological basis of glaucoma is poorly understood and the factors contributing to its progression have not been fully characterized.[17]

Glaucomas can be classified into 2 broad categories: OAG and ACG. In both the glaucomas,patients are asymptomatic and often unaware that they have the disease until advanced visual loss has occurred. Hence, identification of risk factors before appearance of visual symptoms is essential for early detection of POAG and PACG so that timely intervention can be done to prevent irreversible visual impairment.

Many studies have compared the ocular biometry of people with and without glaucoma[18] and found eyes with POAG and PACG have ocular features, which predisposed them to develop the disease. One of the risk factor is AL which if shorter, PACG chances are more and if longer, POAG chances are more.

In our study, Mean AL among POAG group is significantly higher compared to control group and among PACG group is significantly lower compared to control group.The difference in AL distribution is also significant with majority of POAG patients having AL >23mm and PACG patients having AL <23mm.

The Bhaktapur glaucoma study by Thapa SS.[19] shows the eyes in Nepalese population with angle closure have significantly shallower anterior chambers and shorter axial lengths when compared with the normal group. A similar population based study by R. George et al.[18] concluded that eyes with ACG and occludable angles have significantly shorter axial lengths and shallower anterior chamber compared to normal group.These findings are consistent with our present study.Our study shows significantly shorter axial length in PACG group, which was consistent with other studies. A study conducted in by Sherpa D, Badhu BP.[20] showed that patients with AL of less than 23 mm are at risk to develop PACG. Similar results are found in our study with maximum PACG patients having axial length <23mm.

The Singapore Malay Eye Study[12] (SMES) conducted by Shamira A Perera et al. demonstrated an association between increasing AL and POAG suggesting axial myopia as a potential risk factor for POAG. The Meiktila Eye Study in Burmese population by Casson RJ et al. showed an association between long AL and POAG in univariate analysis[13].

CONCLUSION

- This study shows that eyes with PACG have shorter axial length and POAG have longer axial length compared to normal eyes.
- Patients with the axial length of less than 23 mm have more risk of developing PACG than the normal subjects.
- Hence axial length can be used as a risk factor for both PACG and POAG. Patients having axial lengths lower or higher than normal range should be properly investigated for glaucoma and followed up timely for development of glaucoma.

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