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RESEARCH ARTICLE

Chronomorphological and pressure changes in a sign of aging - pseudoexfoliation of the eye

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ABSTRACT

Background: Pseudoexfoliation (PXE) is an age-related disorder, a risk factor for glaucoma. The aim of this research was to study the chronomorphological and pressure changes in PXE of the eye. **Aims and Objectives:** To determine and to compare the anterior chamber depth (ACD), lens thickness (LT), axial length (AL), corneal curvature (CC), and intraocular pressure (IOP) in cases with PXE and in controls. Thence, predict the future onset of pseudoexfoliative glaucoma. **Material and Methods:** This was a case–control study, patients diagnosed to have PXE with the help of slit lamp, above 50 years were taken as cases and age-matched subjects as controls. Measurement of ACD, LT, and AL by A-scan; CC by Keratometer; and IOP by Schiotz tonometer of both cases and controls were performed. **Results:** Fourteen cases and seventeen controls were studied. A significant difference in mean IOP (P = 0.029) and AL (P = 0.001) between cases and controls was found. **Conclusion:** IOP and AL were significantly more in PXE as compared to controls. A significant increase in IOP and AL together may predict the future onset of PXE and hence, may help in early diagnosis of glaucoma and which may be missed in cases of PXE.

KEY WORDS: Glaucoma; Pseudoexfoliation; Axial Length; Intraocular Pressure; Corneal Curvature

INTRODUCTION

Pseudoexfoliation (PXE) syndrome is an age-related disease, more common in females[1] and above the age of 50 years. This entity is rarely seen below 50 years of age, and its prevalence increases with age.[2] PXE syndrome has a number of risk factors such as age, gender, and race; added to this list is another important risk factor, the genetic inheritance. Some people carry a variant in the LOXL1 gene that is a risk factor for PXE glaucoma. However, its exact cause is unknown; PXE is characterized by the accumulation of microscopic granular amyloid-like protein fibers. It involves the entire body but manifests primarily in the eye, which increases the risk of developing glaucoma.[3] The reason for it to be called "PXE" is that there is also a disease called "true" exfoliation, which is found in glassblowers and is caused by heat or infrared-related changes in the anterior lens capsule and is characterized by lamellar delamination of the lens capsule. PXE material is associated with many organs such as the lung, skin, liver, heart, and kidney in the body, but it manifests as a disease only in the eye, where flakes of material are present at the edge of the pupil, on the lens and on iris, in the drainage parts and other structures primarily in the anterior segment of the eye. When this PXE material gets clogged in the eye's drainage system, the ocular pressure can rise and lead to glaucoma, and also if the material gets deposited on the structures like zonules, which hold the lens in place, and are weaker, it would increase the risk of complications during cataract surgery.

It is estimated that about 40–50% of patients among PXE syndrome will, later on, develop glaucoma indirectly by

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blocking the outflow of aqueous humor with PXE flakes, which leads to higher intraocular pressure (IOP).[4] PXE syndrome without higher IOP should be treated as glaucoma suspects and would need a regular recording of IOP, along with optic disc and visual field monitoring due to the frequent aggravation of the disease.[5] Hence, it is important for those who are diagnosed with this syndrome, to be followed over time to monitor for the development of glaucoma. Indeed, sometimes PXE syndrome is subtle and can be missed. A careful examination including a detailed look at the drainage angle will help in the diagnosis. In view of this, the present study was carried out to assess the possibility of diagnosing this disease well in advance that is, before it manifests as flaky material in the anterior segment of the eye and to predict future onset based on other morphological features of the eye.

MATERIALS AND METHODS

This was a case–control study. Institutional Ethics Committee clearance and informed consent were obtained. Patients of both genders, who visited ophthalmology Outpatient Department (OPD), HSK Hospital, Bagalkot, and having diagnosed as PXE with the help of slit lamp microscope, and those without any history of ocular surgery or trauma were taken as cases. Age-matched randomly selected patients of both genders, who visited ophthalmology OPD without having PXE and without any history of ocular surgery or trauma, were taken as controls.

In both cases and controls, eye parameters such as lens thickness (LT), anterior chamber depth (ACD), and axial length (AL) were recorded using A scan ultrasound, IOP was recorded with Schiotz Tonometer and corneal curvature (CC) (vertical and horizontal) with Keratometer. Data were analyzed by students *t*-test, using SPSS software version 16.

RESULTS

A total of 31 patients including 17 controls (2 males and 15 females) and 14 cases (5 males and 9 females) were studied. The mean age (in years) of the control group was 62.58 ± 6.53, and that of cases were 63.21 ± 2.48. Eye parameters such as IOP, ACD, CC (vertical and horizontal), lens thickness (LT), and AL were recorded and analyzed by student *t*-test.

There was a significant increase in IOP (*P* - 0.029) and AL (0.001) of the eyeball in patients with PXE than controls, and no significant difference was found in LT or ACD [Table 1].

DISCUSSION

In the present study, there was a significant increase in IOP and AL of the eyeball in patients with PXE than controls and no significant differences were found in LT, ACD, and CC.

Hepsen *et al*., in a study, proved that CC is steeper in eyes with PXE as compared to normal eyes,[6] but in the present study, there was no significant change in CC.

Ozcura *et al*. showed that there was no significant change in CC in eyes with PXE compared with control eyes,[7] which is similar to the results obtained in the present study.

In a study by Yavas *et al*., there was no change in AL, LT, and ACD in eyes with PXE as compared to normal eyes,[8] the findings of which were similar to the results of the present study, except a significant increase in AL was observed in eyes with PXE.

According to Ünsal *et al.,* crystalline lenses tended to be thicker in the eyes with clinical PXE than their fellow eyes without PXE,[9] but in the present study, there was no significant change in LT in cases as compared to controls.

Table 1: Ocular parameters in PXE and without PXE

Ocular parameters	Group	*n*	Mean±SD	Standard error mean	*t*	*P*
IOP	Controls	17	12.76±3.56	0.86	−2.29	0.029*
	Cases	14	17.87±8.33	2.22		
CC (horizontal)	Controls	17	45.97±2.70	0.65	1.25	0.220
	Cases	14	44.91±1.80	0.48		
CC (vertical)	Controls	17	45.19±2.87	0.69	1.58	0.123
	Cases	14	43.80±1.69	0.45		
LT	Controls	17	3.77±0.52	0.12	−0.47	0.638
	Cases	14	3.88±0.67	0.18		
ACD	Controls	17	3.06±0.31	0.07	−0.82	0.415
	Cases	14	3.17±0.37	0.09		
AL	Controls	17	22.40±0.52	0.12	−3.60	0.001*
	Cases	14	23.22±0.73	0.19		

*Statistically significant. SD: Standard deviation, PXE: Pseudoexfoliation, IOP: Intraocular pressure, CC: Corneal curvature, LT: Lens thickness, ACD: Anterior chamber depth, AL: Axial length

The limitations of the present study could be small sample size and also the consideration of less number of variables, to make it feasible in the study set-up.

CONCLUSION

It can be concluded from the present study that raised IOP along with increased AL may predict the future onset of PXE in eyes, which needs closer monitoring to prevent incipient/ subclinical glaucoma at an early stage.

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