



PREVALENCE OF GLAUCOMA IN CASES WITH PSEUDOEXFOLIATION

Ophthalmology

Dr. Kamala.S glaucoma consultant sankara eye hospital, shimoga

Dr. Mahesha.S consultant sankara eye hospital, shimoga

Dr. Aroni Chakraborty* Destination glaucoma fellow sankara eye hospital, shimoga *Corresponding Author

ABSTRACT

AIM: To study the prevalence of pseudoexfoliation in a population based study.

METHOD: 2552 patients were selected from camps organized by Sankara Eye Hospital, Shimoga between August 2017 and Dec 2017 in rural areas. On satisfying the inclusion and exclusion criteria, informed consent from the patients will be taken after counselling them regarding the nature of the study. Detailed history regarding any ocular and systemic conditions in accordance with inclusion and exclusion criteria will be noted. Uncorrected visual acuity (UCVA) and best corrected visual acuity (BCVA) for distance using logMAR3 meter chart (English letters or Symbols chart) and near vision using reduced logMAR near vision chart (E-chart or Numbers) will be recorded. Intraocular pressure will be measured using Goldmann's applanation tonometry. Detailed ophthalmological examination will be done using slit lamp. Gonioscopic examination will be conducted with both indentation and non indentation method. Optic disc examination will be carried out with slit lamp biomicroscopy using +78 D lens, fundus examination using +20D lens. Visual fields and OCT was done if media clear.

RESULT: In this study out of 2552 patients, 135 (5.29%) were found to have PXF syndrome. There was a significant increase in prevalence with age but no sex predilection. Out of those 135 cases 18 patients had ocular hypertension (>21 mm Hg), 20 patients (14.8%) had open angle glaucoma, and 4 patients (2.9%) had occludable angle glaucoma. Prevalence of OHT, OAG, and closed angles were significantly high amongst people with PXF compared to those without PXF.

CONCLUSION: In our study, prevalence of pseudoexfoliation was 5.2%. Among pseudoexfoliation, 13.3% had raised intraocular pressure, 14.8% had open angle glaucoma and 2.9% had occludable angle glaucoma.

KEYWORDS

cataract, epidemiology, glaucoma, pseudoexfoliation

Background:

In Pseudoexfoliation syndrome (PXF) there is deposition of a distinctive fibrillary materials in the anterior segment of eye and was first introduced in 1917 by Lindberg^[1]. Open angle glaucoma is frequently seen in pseudoexfoliation syndrome, it is the most common identifiable form of secondary open angle glaucoma worldwide^[2]. It is secreted by iris pigment epithelium, the ciliary epithelium, and the peripheral anterior lens epithelium^[3]. This material moves into the aqueous humor and causes obstruction of the trabecular meshwork which in turn elevates the intraocular pressure (IOP)^[4].

Recent studies show that PXF is also associated with stroke, systemic hypertension, and myocardial infarction^[5]. Pseudoexfoliative like material has been found in lungs, skin, liver, heart, kidney, gallbladder, blood vessels, extra ocular muscles and meninges^[6].

The prevalence of PXF world-wide ranges from 0.5% in those aged <60 years to 15% in those aged ≥60 years. The prevalence of PXF based on hospital reports from India varies between 1.87% and 13.5%. Population-based studies from south India have recently reported the prevalence of PXF to be between 3.8% and 6.0% among persons aged ≥40 years (7-10).

In this study, we reported the prevalence and characteristics of PXF syndrome in a segment of rural population in southern India.

Method:

After approval from the hospital ethics committee, 2552 patients were enrolled for this study. Patients were selected for cataract during outreach camps between July 2017 to December 2017 in Sankara Eye Hospital Shimoga. Patients aged 40 or more were brought to the hospital for comprehensive ophthalmic evaluation. Written informed consent was obtained from all participants before the commencement of examination.

Examination procedures:

The ophthalmic evaluation included recording of relevant ocular and systemic history, best corrected visual acuity (BCVA) recorded with logMAR chart, examination of the pupillary reaction, and slit lamp evaluation of the anterior segment with careful search for PXF deposits. Intraocular pressure (IOP) was recorded with Goldmann applanation tonometry. Gonioscopy was performed on all subjects

using a 4 mirror gonioscopy lens and indentation gonioscopy was performed whenever necessary. Pupils were dilated with 5% phenylephrine and 1% tropicamide eye drops in case of open angle. If phenylephrine was contraindicated, 1% tropicamide eye drop was used. If the angles were found to be occludable laser iridotomy was explained to the patients.

Slit lamp evaluation was done before and after dilatation. Fundus and the optic disc evaluation was done with the indirect ophthalmoscope and the +78 D lens. If PXF material was present in either or both eyes the subject was classified as PXF syndrome. Visual field analysis with Humphrey 720 i and OCT with topcon 3D OCT 2000 for the optic disc were done for the pseudoexfoliation glaucoma patients.

Diagnostic criteria:

Diagnosis of occludable angle was held if on gonioscopy pigmented trabecular meshwork was not visible in more than 180° of the angle. Diagnosis of Glaucomatous optic nerve damage was held if one or more of the following features prevailed: (i) vertical cup-disc ratio of 0.6 or more (physiological cups were excluded) with baring of vessels, sloping and notching of rim; (ii) vertical cup-disc asymmetry of 0.3 or more between the two eyes; (iii) characteristic glaucomatous excavation of the neuroretinal rim.

Open angle glaucoma (OAG) was diagnosed if on gonioscopy, angle is open with glaucomatous optic nerve damage as described above with visual field changes.

Ocular hypertension was diagnosed on subjects with intraocular pressure (IOP) >21 mm Hg with healthy optic discs and normal field. Subjects with IOP greater than 21 mm Hg and/or suspicious optic disc changes were asked for a Humphrey visual field examination and OCT. Diagnosis of glaucoma was based entirely on the appearance of the optic disc, for cases whose visual field data were either not available or were unreliable.

Inclusion criteria-

Cases selected for cataract surgery in outreach camp sites aged above 40 years between July 2017 to December 2017.

Exclusion criteria-

Subjects having very old age and ill people and/or invalids who were not willing for the study.

Statistical analysis:

At the end of the study, data were analyzed using SPSS software (Statistical Package for Social Science) and the Paired student's t test.

Result:

In this study out of 2552 patients 135(5.29%) were found to have PXF syndrome, with unilateral disease in 49 (36.2%) and bilateral in 86 (63.7%) subjects. The mean age of subjects having PXF was 64.7 (SD 9.63) years while the mean age of subjects without PXF was 53.54 (10.49) years, the difference being significant (*t* test, $p < 0.001$).

Table 1: Age specific prevalence of PXF syndrome. χ^2 analysis for trend showed a significantly linear increase of PXF with age ($p < 0.001$)

AGE	NO. OF SUBJECTS WITH PXF	TOTAL POPULATION	PREVALENCE (%)
40-49	5	670	0.7%
50-59	18	1001	1.79%
60-69	57	621	9.17%
70-79	45	230	19.6%
>80	10	30	33%

Women outnumbered men in the PXF as well as in the non-PXF groups. Women constituted 52.8% of the subjects with PXF and men constituted 47.2% of them. Amongst the subjects without PXF, 53.4% were women and 45.6% were men. There was no significant difference in sex distribution between both groups—this remained after adjusting for age ($p = 0.953$).

The mean IOP in people with PXF was 19.42 (8.12) mm Hg and without PXF was 12.13 (5.88) mm Hg—the difference was significant (*t* test, $p = 0.001$).

Eighteen out of 135 (13.3%) cases with PXF syndrome had IOP higher than 21 mm Hg at presentation (ocular hypertensive) and in non PXF group, 34 of 2417 cases were having ocular hypertension (1.406%) and the difference is significant ($p < 0.001$). In this study open angle glaucoma were seen in 20 of 135 (14.8%) cases with PXF and 46 of 2417 (1.90%) cases with non PXF and the difference was significant ($P < 0.001$). Occludable angles were seen in 4 of 135 (2.9%) cases with PXF; 86 of the 2417 (11.7%) non PXF subjects had narrow angles.

Table 2: Prevalence of OHT, OAG, and occludable angles was significantly higher among people with PXF compared to those without PXF.

TYPE OF GLAUCOMA	NON PXF CASES(2417)	PXF CASES(135)	P VALUE
OCULAR HYPERTENSION	34(1.406%)	18(13.3%)	<0.001
OPEN ANGLE GLAUCOMA	46(1.90%)	20(14.8%)	<0.001
CLOSED ANGLE GLAUCOMA	86(3.6%)	4(2.9%)	0.002

Discussion:

PXF syndrome shows an extensive variation in different population—Eskimos 0%^[7], in a south eastern US population 1.6%^[5], Navajo Indians 38%^[8]. Blue Mountains Eye Study estimates a prevalence of 2.3%^[11]. These showed true variations due to race, genetic, and/or geographical differences. Sood and Ratnaraj in 1968 showed 1.87% prevalence of PXF in patients aged below 45 years and 34% above 45 years^[12]. Lamba and Giridhar in 1984^[13] reported a 7.4% prevalence of PXF and 9% of patients had glaucoma amongst them. In our study prevalence of PXF was 5.2%.

Previous reports have shown an age-related increase of PXF, it typically being less common below the age of 60 years and increasing thereafter. We found similar results.

We found no significant association between male and female after adjusting for age. Pseudoexfoliation has been reported as the most common cause for open-angle glaucoma^[14].

The mean IOP in subjects with PXF was 19.42 (8.12) mm Hg which was significantly higher than in those without PXF. Ocular hypertension was found in 13.3% of cases with PXF which was higher than cases without PXF, this difference was significant. Open angle

glaucoma was found in 14.8% of PXF cases compared to non PXF cases having 1.90%, which was significant. In a clinical based study, Kozart and Yanoff^[14] reported 15% prevalence of OHT and 7% prevalence of glaucoma amongst PXF patients. The Blue Mountains Eye Study^[11], a population based study had reported 9.3% OHT and 14.2% glaucoma. These data were comparable to our results.

In our study, we found a 2.9% prevalence of narrow angles in cases with PEX. Layden and Schaffer^[15] found that the prevalence of narrow angles was 23% in 100 patients with PXF and Wishart *et al*^[16] had reported 18%. There is a greater tendency to form posterior synechiae by rigid and sticky iris, and anterior lens subluxation due to zonular weakness, these are worsened by miotic therapy (17).

Slit-lamp biomicroscopy and dilated examinations are required to detect early clinical signs. Clinical examination with slit-lamp biomicroscopy for anterior segment and fundus examinations for all patients should be done unless otherwise contraindicated.

A major drawback of our study was sample being small and was taken arbitrarily it does not project estimate for the entire country. The population studied was rural and predominantly illiterate, so many patients were not willing to return for a field examination and only 18% performed the field test had reliably similar problem as shown in a population based study by Jacob *et al*. However, the optic disc was carefully evaluated in every subjects, these factors may have led to underestimation of the prevalence of glaucoma, which was not significant.

Conclusion:

In our study we got 5.2% prevalence of PXF syndrome in rural patients selected for cataract surgery and also noted that increased intraocular pressure, occludable angles, and glaucomatous optic neuropathy occur more frequently in the population with PXF syndrome compared to people without PXF. Due to high prevalence of PXF syndrome detailed examination must be done to detect early signs.

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