

SPECTRUM OF PSEUDOEXFOLIATION SYNDROME AT LAMC, RAIGARH- A STUDYUtkarsha Deshmukh¹, Atul Manoharrao Deshkar²¹Assistant Professor, Department of Ophthalmology, Late Shri Lakhi Ram Agrawal Memorial Medical College, Raigarh, CG.²Professor and HOD, Department of Physiology, Government Chhattisgarh Institute of Medical Sciences, Bilaspur, CG.**ABSTRACT****BACKGROUND**

PXF glaucoma is the most common form of secondary open-angle glaucoma worldwide. PXF associated open-angle glaucoma represents a relatively severe and progressive type of glaucoma, which is less responsive to medical treatment due to high intraocular pressure levels and fluctuations in the diurnal pressure curve.

MATERIALS AND METHODS

139 eyes of 100 subjects from the outpatient services of the hospital having Pseudoexfoliation Syndrome (PXF) were scrutinised. The subjects underwent the following examinations- Best Corrected Visual Acuity (BCVA), Intraocular Pressure (IOP) - by both noncontact and applanation tonometry, slit-lamp examination (both undilated and dilated pupil), gonioscopy, fundus examination visual fields (when possible). All examinations were done by a single observer.

RESULTS

We found that 8 patients had pseudoexfoliation glaucoma. Out of these, 3 had unilateral and 5 had bilateral glaucoma. Thus, total 13 pseudoexfoliation eyes out of 139 examined had glaucoma (9.35%). Of these, 10 eyes (7.20%) had secondary open-angle glaucoma and 3 eyes (2.15%) eyes had secondary angle-closure glaucoma. The association between pseudoexfoliation and glaucoma was found to be statistically significant (p value of 0.045).

CONCLUSION

The association between pseudoexfoliation and glaucoma is significant, especially in older age groups and contributes to the visual impairment. Also, we found out a positive statistical association of pseudoexfoliation with age, cataract and poor mydriasis.

KEYWORDS

Pseudoexfoliation Syndrome, Secondary Open-Angle Glaucoma, Poor Mydriasis, Cataract.

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BACKGROUND

Pseudoexfoliation Syndrome (PXF) is a disorder having ocular as well as systemic features. It was first described by a Finnish ophthalmologist Lindberg in the year 1917 followed by Vogt and initially termed "glaucoma capsulare." The classic white flaky dandruff like material was initially thought to originate from the lens capsule.¹ But, subsequently molecular and genetic studies have revealed the pathogenesis of PXF material formation and the association of PXF with the extracellular matrix and cellular metabolism.²

PXF is distinct from 'true exfoliation' observed in glass blowers, which is due to heat or infrared-related schisis of the anterior lens capsule.

It is characterised by the deposition of gray-white, fibrillary, amyloid like material on the anterior lens capsule, ciliary body, zonules, iris, trabecula, anterior vitreous face

and sometimes the cornea and the conjunctiva. PXF material has a complex glycoprotein/proteoglycan, composition containing glycosaminoglycans (heparan sulfate, chondroitin sulfate, dermatan sulfate, hyaluronic acid). This material is produced primarily by the non-pigmented epithelium of the ciliary body, the posterior iris pigment epithelium and the pre-equatorial lens epithelium.

A high risk of developing PXF is conferred by mutations in the LOX1 gene at the locus 15q22, which codes for elastic fibre components of extracellular matrix. It is associated with some vascular disorders, hearing loss and Alzheimer's disease.

PXF has a greater prevalence in the older population. The clinical profile and associated complications of PXF gain importance due to the increasing age of general population in many parts of the world.³

The iris changes may account for the clinical signs characteristic of early stages, such as melanin dispersion, peripapillary atrophy, trabecular meshwork pigmentation and insufficient asymmetric mydriasis.⁴

The most significant association of PXF is that it causes secondary open-angle glaucoma.

PXF glaucoma is the most common form of secondary open-angle glaucoma worldwide with an identifiable aetiology and accounts for approximately 25% of all glaucomas. PXF associated open-angle glaucoma represents

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a relatively severe and progressive type of glaucoma with less response to medical management as compared to POAG. This is due to high intraocular pressure levels and fluctuations in the diurnal pressure curve. The primary cause of chronic pressure elevation appears to be local production of PXF material by trabecular meshwork cells and Schlemm's canal cells with subsequent degenerative changes of Schlemm's canal and juxtacanalicular tissues.⁵

MATERIALS AND METHODS

139 eyes of 100 subjects from the outpatient services of the hospital having Pseudoexfoliation Syndrome (PXF) were recruited.

The time frame of the study was from August 2015 to December 2015.

Written informed consent was taken from the subjects and they underwent the following examinations-

1. Best Corrected Visual Acuity (BCVA).
2. Intraocular Pressure (IOP)- by both Non-contact Tonometry and Applanation Tonometry.
3. Slit-lamp examination (both undilated and dilated pupil {in subjects with open angle}).
4. Gonioscopy.
5. Fundus examination.
6. Visual fields (when possible).

All examinations were done by a single observer.

STATISTICAL ANALYSIS

The data obtained was compiled by using Microsoft excel sheet. The qualitative data was analysed using frequencies and percentages. Chi-square test was used as test of statistical significance. A P value of less than 0.05 was considered as statistically significant.

Selection Criteria

Adults aged >40 years (male and female) having PXF and who gave consent to participate in the study.

Exclusion Criteria

1. Subjects <40 years of age.
2. Subjects (eye) having history of any previous ocular surgery.

EXAMINATIONS PERFORMED

1. Best Corrected Visual Acuity.

2. Slit Lamp examination.

Van Herick's test

Performed on the slit lamp without any additional aids, the Van Herick's test allows quick, noninvasive assessment of anterior chamber angle depth.

3. Gonioscopy

Gonioscopy was performed in a semi-darkened room with minimum slit lamp illumination using a Sussman four-mirror goniolens.

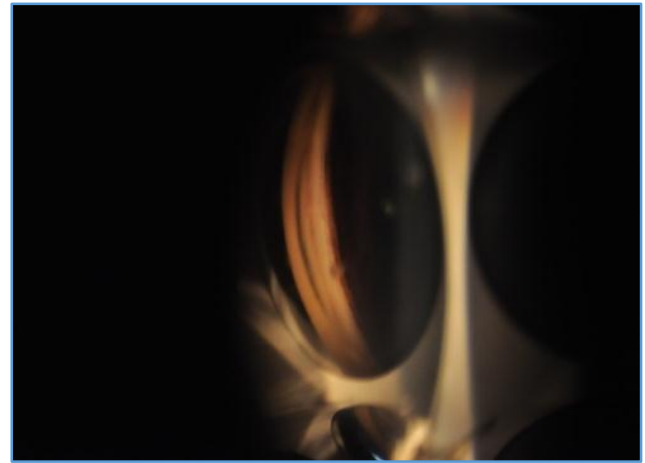


Figure 1. PXF in the Angle

4. Applanation Tonometry

Applanation tonometry was carried out with Haag-Streit applanation tonometer in all subjects.

5. Dilated Fundus Examination

The patients were then dilated with tropicamide (0.8%) eye drops and underwent the following examinations. The patients with angle closure were not dilated. Their optic disc was examined through a Volk 78 D lens with slit lamp.

a. Lens PXF

The anterior lens capsule was examined to look for the PXF material.

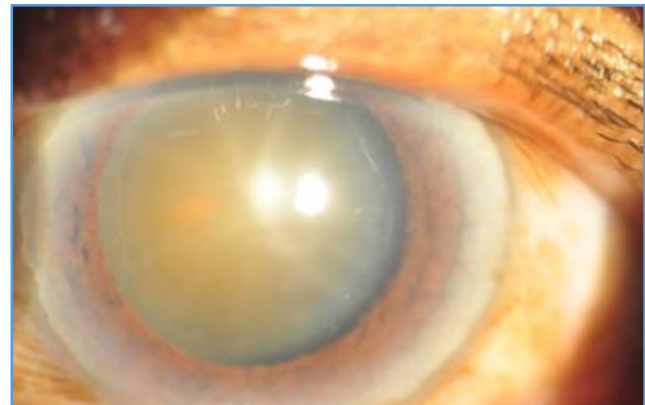


Figure 2. Pseudoexfoliation Material on the Anterior Lens Capsule

b. To measure the maximum pupillary diameter 1 hr. after applying the mydriatic eye drops.

c. To grade the cataract.

The grading was done by using the LOCS (lens opacities classification system) criteria.

d. Fundus examination using VOLK 78D lens to examine the optic disc for characteristic glaucomatous changes, the CD ratio and evaluate the macula. The periphery was examined using indirect ophthalmoscope with 20 D lens.

Glaucomatous changes of the optic disc- Glaucomatous optic nerve damage was diagnosed based on a combination of one or more of the following features- (i) Vertical cup-to-disc ratio of 0.7 or more (physiological cups were excluded);

(ii) Vertical cup-to-disc asymmetry of 0.2 or more between the two eyes; (iii) Characteristic glaucomatous excavation of the neuroretinal rim, bayoneting sign, beading of the circumferential vessels and lamellar dot sign.

6. Visual Fields

The visual field examination was advised for the patients in whom it was required (glaucomatous optic disc changes and/or IOP >21 mmHg) and if it was possible to perform the examination.

It was done by using 30-2 SITA standard programme in the Zeiss Humphrey field analyser (Model 780i).



Figure 3. Performing Visual Fields

The visual fields were interpreted on the basis of their reliability and whether the typical glaucomatous field defects like asymmetry across horizontal midline located 5-25 degrees from the fixation point (mid periphery) and cluster of depressed points were seen or not.

Anderson’s criteria for abnormal fields was used.

Subjects with IOP >21 mmHg, characteristic glaucomatous optic disc features and typical visual field defects with open angles on gonioscopy were termed as having ‘secondary open-angle glaucoma.’ Those with above features, but with narrow angles on gonioscopy were labelled as having ‘angle closure glaucoma.’

In those for whom visual field data were either not available, or were unreliable, the diagnosis of glaucoma was based entirely on the appearance of the optic disc and the IOP.

Subjects with intraocular pressure (IOP) >21 mmHg with open angles on gonioscopy, healthy optic discs and normal fields were labelled Ocular Hypertensive (OHT).

OBSERVATION AND RESULTS

We examined 139 eyes of 100 subjects having pseudoexfoliation. 61 subjects had unilateral, whereas 39 had bilateral pseudoexfoliation. The mean age of the sample group was 65.69±6.88. There was no significant mean age difference between the unilateral (64.66±7.02) and the bilateral (67.29±5.39) cases. The association of pseudoexfoliation and age was found to be significant (p 0.029).

The study group comprised of 53 males and 47 females. The association between pseudoexfoliation and sex of the subject was not found to be significant (p value 0.259).

On the basis of the best corrected visual acuity, the subjects were categorised as having mild (6/6-6/18), moderate (6/18-6/60) or severe (6/60 or less) visual impairment.

Based on the modified Shaffer’s grading, the gonioscopic findings were used to classify the subjects as having open angles (grade 2 in 180 degrees or more) and occludable angles (grade 2 in 180 degrees or less).

In our subjects, we found 8 (OD) and 9 (OS) prevalence of occludable angles. Synechial angle closure was seen in 2. Pseudoexfoliation material was seen in the angle in 4 patients.

Poor mydriasis is a feature of pseudoexfoliation eyes. In our study, we found out that 80-OD and 79-OS pseudoexfoliation subjects had either pupillary mid-dilatation (4 mm-6 mm) or very less dilatation (less than 4 mm) 1 hr. after instilling topical mydriatic. The association is found to be significant (p values 0.004 and 0.014). The mean maximal pupillary diameter was OD-4.89±1.17 mm and OS-4.96±1.15 mm.

Pseudoexfoliation glaucoma is the most common cause of secondary open-angle glaucoma. In our study, we found that 8 patients had pseudoexfoliation glaucoma based on the criteria already mentioned. Out of these, 3 had unilateral and 5 had bilateral glaucoma. Thus, 13 pseudoexfoliation eyes out of 139 examined had glaucoma (9.35%). Of the 13 eyes, 10 eyes (7.20%) had secondary open-angle glaucoma. 3 eyes (1 unilateral and 1 bilateral) had secondary angle-closure glaucoma (2.15%). The association between pseudoexfoliation and glaucoma was found to be statistically significant (p value of 0.045). Ocular Hypertension (OHT) was present in 19 (10 unilateral and 9 bilateral) patients. The association of OHT with pseudoexfoliation was not found to be statistically significant. The data about the distribution of OHT and glaucoma is tabulated in the table No. 1 and depicted graphically in Chart No. 1.

Ocular Hypertension and Glaucoma	PXF		Total n (%)	χ ² value	p value
	Unilateral n (%)	Bilateral n (%)			
Ocular hypertension	10 (16.4)	9 (21.8)	19	0.921	0.921, NS
Glaucoma	3 (4.9)	5 (12.8)	8	4.037	0.045, Sig

Table 1. Showing Distribution of the Study Group According to Laterality of Pseudoexfoliation Syndrome and Ocular Hypertension and Glaucoma

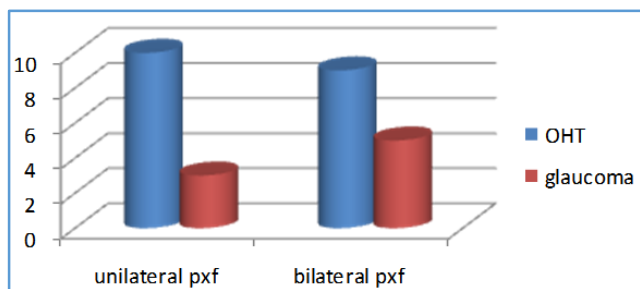


Chart 1. Showing Distribution of the Study Group According to Laterality of Pseudoexfoliation Syndrome and Ocular Hypertension and Glaucoma

All 100 (61 unilateral and 39 bilateral) subjects had cataract. The grade of cataract ranged from nuclear sclerosis grade 1-4, PSSC (posterior subcapsular cataract), PPC (posterior polar cataract), CC (cortical cataract) to mature and hypermature cataract. Phacodonesis and iridodonesis was observed in 29 eyes.

The anterior chamber was classified as being deep, normal or shallow in depth as per the Van Herick's grading on slit-lamp examination. The majority of subjects had a normal AC. Shallow AC was seen in 7 subjects. Patients with shallow AC, but with non-occludable angle on gonioscopy were dilated.

DISCUSSION

Pseudoexfoliation (PXF) has a greater prevalence in the older population and it increases with age. Also, the co-existence of PXF with cataract and resultant intraoperative and postoperative complications may cause significant visual impairment. Hence, data on the clinical profile of PXF is important due to the increasing age of population in many parts of the world.⁶ Deposits of white material on the anterior lens surface are the most consistent and important diagnostic feature of PXF. The classic pattern consists of three zones- a central disc corresponding roughly to the diameter of the pupil; a granular, often layered, peripheral zone and a clear area separating the two. Phacodonesis may be noted because of damage to the ciliary zonules. The incidence of cataract formation is increased in patients with PXF.⁷ Next to the lens, exfoliation material is most prominent at the pupillary border. Pigment loss from the iris sphincter region and its deposition on anterior chamber structures is a hallmark of PXF. The pseudoexfoliative material is found abundantly on the ciliary processes and zonules. The PXF matter indirectly or directly is believed to lead to zonular fragility. The zonular weakness leads to phacodonesis, the evaluation of which is particularly important before cataract surgery. Accumulation of locally produced PXF material in the Juxtacanalicular Tissue (JCT) followed by dysfunction of endothelial cells and disorganisation of JCT and Schlemm's canal appear to be causative factors in the development of a special type of secondary open-angle glaucoma in PXF syndrome.⁸

Flakes of PXF material are often visible in the anterior chamber angle most commonly inferiorly. Pigmentation in the angle is also increased, but irregular. Additional pigmentation is observed along Schwalbe line termed a

"Sampaolesi's line."⁹ In patients with pseudoexfoliation syndrome, a distinct type of corneal endotheliopathy may occur, which can lead to an early corneal endothelial decompensation.

The limitations of this study were that visual fields could not be done in all patients because of the presence of visually significant cataract and the resultant decrease in BCVA in most of the subjects. Also, some patients advised for fields did not come back for follow-up. We did not dwell on the systemic associations of PXF in our study.

CONCLUSION

Pseudoexfoliation appears to be a relatively common disorder in older individuals in India. The increasing prevalence of PXF and cataract with age and the association of PXF with secondary open-angle glaucoma have public health implications for India.

In our study, we found out a positive statistical association of pseudoexfoliation with age, cataract, glaucomatous optic neuropathy and poor mydriasis. There was no significant difference in the association of PXF with OHT or occludable angles.

Improved healthcare results in a definite demographic shift toward aging that may result in a higher burden of both PXF and cataract in India. A careful slit lamp examination before cataract surgery to look for PXF is helpful to anticipate intraoperative problems like poor mydriasis, zonular dialysis, capsular rupture and vitreous loss. Also, the significance of PXF lies in the fact that it may be used as a marker to aid in the detection of glaucoma.

Many advances and changes occurred since its first documentation around hundred years ago Lindberg.¹⁰ We recommend further population-based studies with larger sample size and examining other parameters related to PXF should be done to unravel the complete clinical picture of pseudoexfoliation syndrome.

REFERENCES

1. Tarkkanen A, Kivela T. John G. Lindberg and the discovery of exfoliation syndrome. *Acta Ophthalmol Scand* 2002;80(2):151-154.
2. Thorleifsson G, Magnusson KP, Sulem P, et al. Common sequence variants in the LOXL1 gene confer susceptibility to exfoliation glaucoma. *Science* 2007;317(5843):1397-1400.
3. Ritch R, Schlötzer-Schrehardt. Exfoliation glaucoma. In: Weinber RN, Kitazawa Y, eds. *Glaucoma in the 21st century*. London: Harcourt Health Communications: Mosby International 2000:171-179.
4. Hammer T, Schlötzer-Schrehardt U, Naumann GO. Unilateral or asymmetric pseudoexfoliation syndrome? An ultrastructural study. *Arch Ophthalmol* 2001;119(7):1023-1031.
5. Schlötzer-Schrehardt U, Kühle M, Jünemann A, et al. Relevance of the pseudoexfoliation syndrome for the glaucomas. *Ophthalmologie* 2002;99(9):683-690.

6. Philip SS, John SS, Simha AR, et al. Ocular clinical profile of patients with pseudoexfoliation syndrome in a tertiary eye care center in south India. *Middle East Afr J Ophthalmol* 2012;19(2):231-236.
7. Puska P, Tarkkanen A. Exfoliation syndrome as a risk factor for cataract development: five-year follow-up of lens opacities in exfoliation syndrome. *J Cataract Refract Surg* 2001;27(12):1992-1998.
8. Schlötzer-Schrehardt U, Naumann GO. Trabecular meshwork in pseudoexfoliation syndrome with and without open-angle glaucoma. A morphometric, ultrastructural study. *Invest Ophthalmol Vis Sci* 1995;36(9):1750-1764.
9. Sampaolesi R, Zarate J, Croxato O. The chamber angle in exfoliation syndrome. Clinical and pathological findings. *Acta Ophthalmol Suppl* 1988;184:48-53.
10. Lindberg JG. Kliniska undersökningar över depigmentering av pupillarranden och genomlysbarkefäva iris vid fall av alderstarr samit i normala ögon hos gamla personer. Doctoral thesis, Diss Helsingfors 1917.